Fonterra Whareroa
Compliance Monitoring Programme
Annual Report
2015-2016

Technical Report 2016-40

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Executive summary

Fonterra Co-operative Group Limited (Fonterra) operates a dairy processing complex located on Whareroa Road at Hawera, in the Tangahoe, Tawhiti and Tasman catchments. Fonterra hold resource consents to allow for the abstraction of water from the Tawhiti Stream and Tangahoe River; the discharge of wastewater back to those two streams; the discharge of stormwater to unnamed tributaries of the Tawhiti Stream, the Tangahoe River and an unnamed coastal stream; the discharge of stormwater and sediment to land; the discharge of dairy factory wastewater to the Tasman Sea; the discharge of laboratory waste and unprocessable wastes to waste pits; the discharge of dairy liquids to land and the discharge of emissions to air. This report for the period July 2015 to June 2016 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess Fonterra's environmental performance during the period under review. This report also details the results of the monitoring undertaken and assesses the environmental effects of their activities.

Fonterra holds a total of 26 resource consents, which include conditions setting out the requirements that they must satisfy. Fonterra holds four consents to allow it to take and use water and for associated structures, eight consents to discharge stormwater, sediment, and back flushing from sand filters (and their associated structures) into the unnamed tributaries of the Tangahoe, Tawhiti and an unnamed coastal stream, or to land where it may enter water, six consents to discharge wastewater to the Tasman Sea along with associated structures, two consents to discharge waste to land, and six consents to discharge emissions into the air at this site.

During the monitoring period, Fonterra demonstrated an overall level of environmental performance that required improvement.

The Council's monitoring programme for the year under review included ten scheduled site inspections; two composite samples from the outfall discharge for inter-laboratory comparison; 30 samples of stormwater pond discharges collected for physicochemical analysis; 10 grab samples of the outfall discharge for microbiological analysis; one freshwater inspection downsteam of the stormwater pond discharge points; one freshwater biomonitoring survey; two intertidal surveys; 30 deposition gauging samples; 8 nitrogen oxides (NOx) samples and two periods of fine airborne particulate (PM10) monitoring in relation to air emissions, and auditing of monitoring data collected by Fonterra.

The monitoring indicated a variable level of environmental performance during the 2015-2016 year. Of the 20 consents for which compliance and environmental performance could be categorised, 2 (10%) were rated 'improvement required' and 18 (90%) were rated 'high'.
The site was generally well managed, however, two incidents resulted from procedural issues that have now been addressed. Water abstraction limits were adhered to. The stormwater system performed well and no impacts were detected in the receiving environments. There were a number of exceedances regarding wastewater discharge limits, some of which were beyond Fonterra's control, however one incident was not. There were no adverse effects from the outfall discharge detected in the marine environment. An air discharge limit was exceeded in the Powder 2 drier stack; however there were no associated adverse effects detected offsite. In summary, three incidents were recorded during the year under review which resulted in two Infringement Notices being issued.

During the year, Fonterra demonstrated an overall level of environmental performance and compliance which required improvement. This rating was due to the issuing of two infringement notices. A high level of administrative performance and compliance was achieved.

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

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance has remained comparable, and improvement is required.

This report includes recommendations for the 2016-2017 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2015 to June 2016 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Fonterra Co-operative Group Limited (Fonterra). Fonterra operates a dairy processing complex situated on Whareroa Road at Hawera, in the Tangahoe, Tawhiti and Tasman catchments.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Fonterra that relate to abstractions and discharges of water within the Tangahoe and Tawhiti catchments and discharges to the Tasman Sea. This report also covers the air discharge permits held by Fonterra to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of Fonterra's use of water, land and air, and is the 23rd combined annual report by the Council for Fonterra.

1.1.2 Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by Fonterra;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at the Company's site.

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

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

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

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

1.1.3 The Resource Management Act 1991 and monitoring

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

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

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

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

  For example:

  - High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
  - Strong odour beyond boundary but no residential properties or other recipient nearby.

- **Improvement required**: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

- **Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

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

- **Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided

for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

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

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

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

1.2 Process description

The Whareroa dairy factory was established in 1972 and is currently operated by Fonterra. The site processes up to 14 million litres of milk a day and produces the largest volume of dairy ingredients from a single factory worldwide. Annually, the factory produces about 428,000 tonnes of milk powder, cheese, cream, protein and lactic casein ingredients (Table 1).

Table 1 Product manufactured at Fonterra annually

Generic product	Metric tonnes/season
Whole & skim milk powders	200,000
Cheese products	95,000
Cream products	88,000
Protein products	35,000
Lactic casein	10,000
Total	**428,000**

The Whareroa site covers approximately 25 ha and is situated on Whareroa Road, east of Hawera (Photograph 1). The site includes five milk powder dryers, two cheese plants, a casein plant, a butter plant, a whey plant, a laboratory, a tanker depot, a cogeneration plant, a water treatment plant, a rail siding and storage for finished product.

Significant expansion of the factory occurred during the 1996-1997 season. Kiwi Co-operative Dairies greatly increased its milk supply area through the acquisition of small dairy companies in the South Island and the Hawke's Bay and through a merger with the Tui Dairy Company in the Manawatu. Accordingly, the construction of a number of new plants, the upgrade of several existing plants, and improvements in waste treatment systems were undertaken during the 1996-1997 monitoring period.

Currently, the site obtains its water supply from two nearby surface waterways and supplements this with water derived from the milk process (i.e. condensate).

Wastewater is discharged through a long marine outfall (1,845 m). Energy is mainly sourced from two on-site gas-fired cogeneration plants, operated as a joint venture with Todd Energy Limited. The 68 Mega Watt plants provide all the steam and electricity requirements for the site.

The consolidation of the dairy processing industry in Taranaki has led to a corresponding centralisation of discharges to both air and water. In 1981 there were 22 dairy processing sites in Taranaki and the resulting discharges to air and water and abstraction of water were dispersed throughout the region. Now the environmental effects are largely confined to the activities at the Whareroa site.

In the 2014-2015 season a new distribution centre was constructed at the Whareroa site, almost doubling the site's total dry storage capacity to 70,000 tonnes. A new rail loop and siding were constructed to enable increased load out of product by rail. Together, these developments mean a reduction in freight movements by road and more movements by rail.

Further plant upgrades were undertaken in the 2015-2016 season, these are discussed in Section 2.1.1.

Photo 1 The Fonterra Whareroa site

1.3 Resource consents

1.3.1 Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14.

Fonterra holds water permit **0047** to cover the abstraction of water from the Tawhiti Stream (Photograph 2), a tributary of the Tangahoe River, for the processing and

manufacture of dairy products, cleaning of plant, and cooling purposes. This permit was re-issued by the Council on May 1996 under Section 87(d) of the RMA and the fourth version of this consent granted since 1973. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are five special conditions attached to the consent.

Condition 1 requires that the abstraction shall be managed to ensure a flow of not less than 50 litres per second (L/s) is maintained in the Tawhiti Stream at all times.

Condition 2 requires Fonterra to maintain a measuring device to record daily rates of abstraction, and to supply this information to the Council upon request.

Condition 3 allows the Council the right to suspend or reduce the abstraction temporarily during extreme low flow events in order to protect the biological communities in the stream.

Condition 4 deals with review of the consent.

Condition 5 stipulates that the abstraction rate not exceed 184 L/s when flow is less than 800 L/s and turbidity is less than 150 Nephelometric Turbidity Units (NTU).

Photo 2 Tawhiti water intake

Fonterra holds water permit **4508** to cover the abstraction of water from the Tangahoe River, for the processing and manufacture of dairy products, cleaning of plant, and cooling purposes. This permit was re-issued by the Council on September 1997 under Section 87(d) of the RMA and the second version of the consent granted since 1994. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are three special conditions attached to the consent.

Condition 1 allows the Council the right to suspend or reduce the abstraction temporarily during extreme low flow events, in order to protect the biological communities in the river.

Condition 2 requires the Company to maintain a measuring device to record daily rates of abstraction, and to supply this information to the Council upon request.

Condition 3 deals with review provisions.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.3.2 Water discharge permits

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

Fonterra holds coastal permit **1450** to cover the discharge of 40,000 cubic metres per day (m^3/day) of dairy factory wastewater into the Tasman Sea via a marine outfall. This consent was issued by the Council in September 1995 under Section 87(e) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

An application for a change of condition on coastal permit 1450, to increase the maximum daily discharge volume limit from 26,000 m^3/day to 40,000 m^3/day, was received on 8 February 2002. The variation to consent conditions was granted on 19 September 2006. A further change to the purpose of the consent was granted on 29 June 2007, to include the temporary discharge of lactose solids from the Fonterra Kapuni site.

There are 16 special conditions attached to the consent.

Condition 1 requires the discharge of lactose solids to be managed in accordance with documentation submitted in support of the application.

Condition 2 states that lactose solids of approximately 400 m^3 be discharged prior to 1 August 2007 only.

Condition 3 requires that all whey and whey permeate to be removed from the wastewater by 31 December 1996.

Condition 4 requires the Company to maintain a loss minimisation programme to reduce product losses to wastewater throughout the term of the consent.

Condition 5 details standards relating to suspended solids, fats and chemical oxygen demand (COD).

Condition 6 required the Company to install an outfall extension which would result in the achievement of no significant visual, chemical or ecological impacts outside a mixing zone.

Condition 7 requires the Company to supply plans and design details for the outfall extension and condition 8 establishes a 200 m mixing zone which applied after the outfall had been commissioned.

Condition 9 outlines a number of numerical standards that the wastewater shall not exceed up until the time the new outfall had been installed.

Condition 10 requires that there shall be no discharge of raw or treated domestic sewage from the Whareroa site (domestic wastes are piped to Hawera sewerage for treatment).

Condition 11 requires the Company to provide a contingency plan outlining procedures to be taken in the event of a spillage of stored chemicals, accidental discharge, accumulation of off-specification effluent or accumulation under emergency conditions of whey or whey permeate.

Condition 12 requires the consent holder to install a system to monitor pipeline structural performance.

Condition 13 requires the consent holder to provide a report reviewing any technological advances in dairy wastewater management and how these might be applicable at the Whareroa site, and detailing any measures taken by the consent holder to improve or minimise the wastewater discharge.

Condition 14 requires the Company and Council staff to meet with submitters to the consent and any other interested party at least once a year to discuss any matters relating to the exercise of the consent and to facilitate ongoing consultation.

Conditions 15 and 16 allow the Council to undertake a review of the special conditions on the consent.

Note: South Taranaki District Council (STDC) also holds a consent to discharge from the marine outfall owned and used by Fonterra. Consent **5079** was granted on 22 March 1998 to provide for the discharge of up to 12,000 m^3/day of municipal wastes from Hawera oxidation ponds. This consent was first exercised in February 2001.

Monitoring of this consent is reported separately.

Fonterra holds water discharge permits **3902, 3907** and **4133** to discharge stormwater from the Whareroa sites. These consents were originally issued by the Council in June 1999 under Section 87(e) of the RMA. The consents were re-issued on 14 February 2014 and are due to expire on 1 June 2028.

Discharge permit **3902** provides for the discharge of stormwater from the Whareroa milk processing site into an unnamed tributary of the Tangahoe River.

Discharge permit **3907** covers the discharge of stormwater, back flushing from the sand filters, and intermittent discharges of treated water from a reservoir, from the Whareroa milk processing site into an unnamed tributary of the Tawhiti Stream.

Discharge permit **4133** covers the discharge of stormwater from the Whareroa milk processing site into unnamed coastal stream 18.

There are eight special conditions attached to consent 3907, while consents 3902 and 4133 both have nine. The conditions of these consents are essentially the same as each other and are discussed below.

Condition 1 deals with best practicable option to prevent or minimise adverse environmental effects.

Condition 2 states the catchment area for each pond.

Conditions 3 and 4 require the preparation and maintenance of contingency and stormwater management plans.

Conditions 5 to 7 deal with effects on the receiving waters.

Condition 8 (in 3902 and 4133) requires maintenance of existing fencing and plantings downstream.

Condition 9 (8 in 3907) deals with review provisions.

Fonterra holds consent **4927** to cover the discharge of up to 1.05 m^3/day of river silt and sand from mechanical pre-filtering of river water during abstraction of water, by returning it to the Tawhiti Stream. This consent was issued by the Council in May 1996 under Section 87(e) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are four special conditions attached to this consent.

Condition 1 requires the discharge be operated on a continuous purge basis in order to mitigate adverse effects on the Tawhiti Stream.

Condition 2 allows a 50 m mixing zone, with limits set for the suspended solids of the receiving water.

Condition 3 outlines a number of potential adverse effects in the Tawhiti Stream which shall not occur outside the 50 m mixing zone.

Condition 4 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **5148** to cover the discharge of up to 1.2 m^3/day of river silt and sand from mechanical pre filtering of river water during abstraction of water, by returning it into the Tangahoe River. This consent was issued by the Council in May 1997 under Section 87(e) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are three special conditions attached to this consent.

Condition 1 requires the discharge to be operated on a continuous purge basis in order to mitigate adverse effects on the Tangahoe River.

Condition 2 states that no adverse effects shall arise in the Tangahoe River outside the 50 m mixing zone.

Condition 3 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **9621** to cover the discharge of stormwater and sediment from earthworks onto and into land in circumstances where it may enter water. This consent was issued by the Council on 25 July 2013 under Section 87(e) of the RMA. It is due to expire in June 2018.

There are six special conditions attached to this consent.

Condition 1 gives more information on the authorisation.

Condition 2 requires the consent holder to notify Council prior to commencement of works.

Conditions 3 and 5 deal with sediment control measures.

Condition 4 requires that exposed areas must be stabilised within 6 months of completion of disturbance activities.

Condition 6 deals with the best practicable option.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.3.3 Other water permits

Fonterra holds consent **4953** to erect, place and maintain two earth dams at the headwaters of an unnamed tributary of the Tangahoe River for stormwater collection and treatment purposes. This consent was issued by the Council in May 1999 under Section 87(e) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are four special conditions attached to this consent.

Condition 1 requires the consent holder to maintain and operate the dams in a safe and appropriate manner.

Condition 2 states the notification period prior to commencement of any construction work or maintenance.

Condition 3 requires the consent holder to prevent the discharge or placement of silt and contaminants, and minimise the disturbance of the bed during construction or maintenance.

Condition 4 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **5016** to allow the permanent diversion of the unnamed stream, which passes through the access way gully for the purpose of protecting the outfall pipeline and associated structures. This consent was issued by the Council in 1996 under Section 87(e) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are four special conditions attached to this consent.

Condition 1 states the notification period of three days prior to the construction or maintenance works.

Condition 2 requires the diversion to be constructed in accordance with the documentation submitted with the application.

Condition 3 requires that construction or maintenance shall be undertaken in a way that prevents the discharge or placement of silt, organics or contaminants into the stream and minimise disturbance of the stream bed.

Condition 4 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **5337** to cover the damming of an unnamed tributary of the Tawhiti Stream for stormwater and backwash water collection and treatment purposes. This consent was issued by the Council in May 1997 under Section 87(e) of the RMA.

This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are four special conditions attached to this consent.

Condition 1 requires 48 hour notification to the Council prior to construction, completion and any subsequent maintenance works.

Condition 2 states that during construction or maintenance the consent holder shall prevent the discharge or placement of silt and contaminants, and minimise the disturbance of the bed.

Condition 3 requires the consent holder to operate and maintain a safe dam.

Condition 4 allows the Council to undertake a review of the special conditions on the consent.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.3.4 Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Fonterra holds consent **4977** to allow Fonterra to erect, place and maintain a marine outfall and diffuser structure of approximately 1,845 metres length in the coastal marine area. Consent 4977 is a restricted coastal activity (RCA) where the consent was issued by the Minister of Conservation in 1996. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are seven special conditions attached to this consent.

Conditions 1 and 2 require the consent holder to construct and maintain the structure in accordance with the documentation submitted with the application and that the Council is notified at least three days prior to the commencement of construction or any major maintenance works.

Condition 3 requires that during construction and subsequent maintenance works that every practicable measure be observed to minimise any discharge of contaminants to the environment and any disturbance of the foreshore and seabed. After construction, condition 4 requires that the intertidal construction area be reinstated as far as practicable.

Condition 5 requires that the intertidal section of the pipeline shall not be visible at any stage of the tide.

Condition 6 requires the structure to be removed and the area reinstated if and when it is no longer required.

Condition 7 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **5013** to cover the construction and maintenance of a rock wall 100 m in length in the coastal marine area for the protection of the outfall, stream diversion pipelines and associated structures. This consent was issued by the Council in 1996 under Section 87(e) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are eight special conditions attached to this consent.

Condition 1 requires a notification period of 3 days prior to the construction or maintenance works.

Condition 2 requires the rock wall to be constructed in accordance with the documentation submitted in support of the application.

Condition 3 states that the construction and maintenance shall be undertaken in a manner that minimises disturbance of seabed, foreshore and the discharge of contaminants.

Following completion, conditions 4 and 5 require the construction site to be reinstated and revegetated, and monitoring for any erosion affects at least 200 m either side of the rock wall.

Condition 6 states that should erosion be occurring the Company will compensate for any losses. If the consent is no longer required condition 7 states the rock wall shall be removed and the area reinstated.

Condition 8 allows the Council to undertake a review of the special conditions on the consent.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.3.5 Air discharge permits

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

Fonterra holds air discharge permit **4103** to cover the discharge of emissions into the air arising from the manufacture and processing of milk products and associated processes at the factory premises on Whareroa Road, Hawera. This permit was issued by the Council on September 1992 under Section 87(e) of the RMA. This consent expired on 1 June 2004 and was renewed on 4 October 2006. It is due to expire on 1 June 2025.

The consent was renewed in such a way as to 'split' the consent in two so that one of the consents would cover emissions from the milk processing plant (4103) while the other consent would cover emissions from the cogeneration and services plant (6273, discussed below). This restructure of the consent is to allow the consents to be considered separately if a change to one of the operations is sought.

There are 15 special conditions attached to consent 4103.

Conditions 1 and 2 deal with best practicable option to prevent or minimise adverse effects on the environment.

Condition 3 deals with alterations to the plant, process or operations.

Condition 4 requires the consent holder to provide the Council, within five years of granting the consent, and every six years thereafter, a report on various aspects of the air discharge.

Conditions 5 to 11 deal with various aspects of the discharge, including limits on various parameters, odour and monitoring requirements.

Condition 12 requires the consent holder to hold an annual meeting with Council and interested submitters to discuss matters pertaining to the discharge.

Condition 13 allows the processing of skim milk powder through Powder-5 only with prior notice and with a monitoring programme in place.

Conditions 14 and 15 deal with review of the consent.

Fonterra holds air discharge permit **5044** to cover the discharge of emissions into air from the disposal of laboratory wastes, unprocessable dairy wastes and stormwater sump cleanings onto and into land. This permit was issued by the Council on September 1992 under Section 87(e) of the RMA. It is due to expire in June 2022.

There are six special conditions attached to the consent.

Condition 1 requires the consent holder to adopt the best practicable option at all times to prevent or minimise the potential for adverse effects on the environment with respect to the discharge of odours into the air.

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

Condition 3 requires the consent holder to provide a management plan and outline methods to adopt the best practicable option to prevent or minimise adverse effects on the environment.

Conditions 4 and 5 require that the exercise of the consent shall not result in any offensive or objectionable odour at or beyond the boundary of the property and states the definitions of an odour to be offensive or objectionable.

Condition 6 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds air discharge permit **6257** to cover the discharge of emissions into air from dual fuel boilers (gas or coal) with a maximum energy output of 250 MW together with associated processes. This permit was issued by the Council on 7 December 2005 under Section 87(e) of the RMA. It is due to expire in June 2034.

There are 29 special conditions attached to the consent.

Conditions 1, 4, 5 and 6 deal with best practicable option to prevent or minimise adverse effects on the environment.

Conditions 2 and 3 require the exercise of the consent is undertaken in accordance with documentation submitted in support of the application.

Condition 7 stipulates that the minimum height of discharges from the boiler stack are at least 60 m above ground.

Condition 8 requires that approval is gained from Council prior to significant plant alterations.

Conditions 9 to 13 deal with emission limits on discharges to the atmosphere.

Conditions 14 to 19 deal with ambient and workplace limits on discharges.

Conditions 20 to 26 deal with recording and reporting requirements.

Condition 27 requires the consent holder to conduct a liaison meeting with Council and interested submitters annually (subsequent to commissioning of the energy centre).

Conditions 28 and 29 deal with lapse and review of the consent.

Fonterra holds air discharge permit **6273** to cover the discharge of emissions into air from 'Cogen-I' and 'Cogen-II' gas fired co-generation energy generating plants (Photograph 3) with an energy output of 70 MW together with associated processes. This permit was issued by the Council on 4 October 2006 under Section 87(e) of the RMA. It is due to expire in June 2025.

There are 15 special conditions attached to the consent.

Conditions 1 and 2 deal with best practicable option to prevent or minimise adverse effects on the environment.

Condition 3 requires the consent holder to consult with the Council prior to undertaking any alterations to the plant, processes or operations.

Condition 4 requires the consent holder to provide a report on various aspects of the emissions.

Conditions 5 to 13 deal with emissions of contaminants to the atmosphere.

Condition 14 requires a suitable water treatment regime for the cooling water system.

Condition 15 deals with review of the consent.

Photo 3 Air discharges from 'Cogen-I' and 'Cogen-II'

Fonterra holds air discharge permit **7465** to cover the discharge of emissions into air from the combustion of waste wood packaging (photograph 4). This permit was issued by the Council on 31 March 2009 under Section 87(e) of the RMA. It is due to expire in June 2028.

There are nine special conditions attached to the consent.

Conditions 1 and 2 detail the type and volume of waste wood allowed to be burned.

Condition 3 deals with best practicable option.

Condition 4 requires the consent holder to have regard to wind direction so that there are no adverse effects beyond the boundary of the property (Conditions 5 and 6).

Condition 7 requires that a record of each burning event is maintained.

Conditions 8 and 9 deal with lapse and review of the consent.

Fonterra holds air discharge permit **9620** to cover the discharge of contaminants (dust) to air from earthworks associated with construction activities. This permit was issued by the Council on 25 July 2013 under Section 87(e) of the RMA. It is due to expire in June 2018.

There are ten special conditions attached to the consent.

Conditions 1 and 2 require the preparation and adherence of/to a dust control management plan.

Condition 3 deals with best practicable option.

Condition 4 requires that the soil exposure not exceed 15.15 ha.

Condition 5 requires that the consent holder notify Council prior to exercising the consent.

Conditions 6 and 7 deal with dust deposition beyond the property boundary.

While conditions 8 to 10 deal with any complaints received.

Photo 4 Burning waste wood packaging in the burn pit

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.3.6 Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Fonterra holds discharge permit **4406** to cover the discharge of laboratory wastes onto and into land. This permit was issued by the Council on October 1996 under Section 87(e) of the RMA. It is due to expire in June 2022.

There are 15 special conditions attached to this consent.

Condition 1 requires the consent holder to adopt the best practicable option at all times to prevent or minimise the potential for adverse effects on the environment.

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

Condition 3 states the daily discharge limit of 1 m^3/day.

Conditions 4 and 5 require the consent holder to provide a management plan for the discharge site and the discharge pit shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

Condition 6 states the discharge shall not occur within 50 m of any bore, well or spring used for water supply purposes, or 25 m near any surface body of water, or within 100 m from the coastal cliff edge.

Conditions 7, 8 and 9 require the disposal does not intercept the water table or lead to contaminants entering the water body from overland surface flows, or result in any adverse impacts on groundwater due to leaching.

Condition 10 states the types of wastes to be discharged shall only consist of Petri dishes, their contents and the plastic they are wrapped in.

Condition 11 requires 50 mm of earth is to cover the discharged material.

Conditions 12 and 13 requires after each pit is full, it shall be reinstated with a soil cover of 0.5 m, compacted and contoured to maintain its integrity and the vegetation re-established.

Condition 14 requires records to be kept of all uses of the pits, including date, volume discharged and product type.

Condition 15 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds discharge permit **5036** to allow for the discharge of waste material from stormwater sumps and road sump and unprocessable dairy factory wastes onto and into land. This permit was issued by the Council on February 2004 under Section 87(e) of the RMA. It is due to expire in June 2022. Changes were made to the conditions of the consent in December 2012 in order to provide for irrigation of unprocessable wastes onto land.

There are 18 special conditions attached to this consent.

Condition 1 of this consent requires that the consent holder shall adopt the best practicable options to prevent or minimise any adverse effects on the environment from the exercise of this consent.

Condition 2 states application loading limits for when irrigating unprocessable dairy factory wastes to land.

Condition 3 requires that the consent is undertaken in accordance with documentation submitted in support of the applications.

Condition 4 provides the allowable volumes of discharge of the different types of waste.

Condition 4 requires the consent holder to provide a management plan for the discharge site within three months of granting the consent, and updated regularly as required.

Conditions 6 and 7 require that the discharge shall not occur within 50 m of any bore, well or spring used for water supply purposes, nor within 25 m of any surface water body, or within 100 m from the coastal cliff edge, and the disposal pits shall not intercept the water table.

Conditions 8 and 9 require that the exercise of the consent shall not lead to contaminants entering a waterbody from overland surface flows, or result in any adverse impacts on groundwater as a result of leaching, or surface water including aquatic ecosystems.

Conditions 10 and 11 require that the discharged material shall be covered with up to 50 mm of earth or suitable cover, within a period of 7 days, and all liquid shall be removed from the disposal pit prior to the application of covering material.

Condition 12 states that only materials authorised by the consent and outlined in the consent application shall be discharged to the disposal pits, all non-biodegradable material shall be removed before the material is discharged.

Conditions 13 and 14 require each disposal pit to be reinstated soil cover with a minimum thickness of 0.5 m to be placed over the material and the vegetation re-established. The consent holder also shall compact, contour and maintain the cover layer of soil to ensure its integrity at all times.

Condition 15 states that disposal of waste shall not give rise to objectionable or offensive odours beyond the property boundary.

Condition 16 requires the consent holder to maintain a record of all discharges to land including date, volume discharged, product type, and the reason for discharge and that these records be available to the Council upon request.

Condition 17 states that the discharge of unprocessable waste shall only occur after all other reasonable waste disposal options have been exhausted.

Condition 18 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **9908** to discharge dairy liquids into land and associated emissions to air in various location throughout the Taranaki region.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.3.7 Land use permits

Section 13(1)(a) of the RMA stipulates that no person may, in relation to the bed of any lake or river, use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Fonterra holds land use permit **5015** to dam an unnamed stream which passes through the accessway gully for stream flow control and marine outfall pipeline installation purposes. The unnamed stream is dammed approximately 700 m from the cliff edge to create a pond. This consent was issued by the Council in 1996 under Section 87(a) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

Fonterra holds land use permit **5017** to cover the drainage and excavation of the bed of the unnamed stream and the use of that bed to erect, place, use and maintain outfall and stream diversion pipeline associated structures. This consent was issued by the Council in 1996 under Section 87(a) of the RMA. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are six special conditions attached to this consent.

Condition 1 states the notification period of 3 days prior to the construction or maintenance works.

Condition 2 requires the drainage and excavation to be constructed in accordance with the documentation submitted with the application.

Condition 3 requires the outfall and stream diversion pipelines and any associated structures shall keep in with the natural character of the coastal environment.

Following construction condition 4 states that the site will be revegetated. If the consent is no longer needed condition 5 requires the outfall and stream diversion pipelines to be removed and the areas reinstated.

Condition 6 allows the Council to undertake a review of the special conditions on the consent.

Fonterra holds consent **5143** to provide for the construction and maintenance of the water intake structure in the Tangahoe River. This consent was granted in May 1997 under Section 87(d) of the RMA. The structure must conform to a specified design, with a minimum amount of disturbance to the riverbed. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are six special conditions attached to this consent.

Fonterra holds consent **10208-1** to provide for the construction, placement and use of a water intake structure in bed of the Tangahoe River. This consent was granted on 25 February 2016 under Section 87(d) of the RMA. The review dates for this consent are June 2022 and June 2022. The consent will expire on 1 June 2034.

There are 20 special conditions attached to this consent.

Condition 1 states that the structure shall be constructed in accordance with specified documentation.

Condition 2 states the requirements for signage.

Condition 3 requires a meeting to be held with a Monitoring Officer from the Council prior to the commencement of the works.

Condition 4 refers to documentation specifying the requirements for erosion control.

Condition 5 outlines requirements for sediment control.

Condition 6 outlines requirements for the stabilisation of earthworks.

Condition 7 is a requirement for works notification.

Condition 8 requires concrete work to be isolated from running water.

Condition 9 requires new concrete to remain isolated from running water for 48 hours.

Condition 10 specifies requirements for the installation of bank protection structures in relation to the installation of the coffer dam.

Condition 11 states that no instream works shall take place between 1 May and 31 October inclusive.

Condition 12 requires stream bed disturbance to be minimised and reinstated as far as practicable.

Condition 13 requires that all reasonable steps are taken to minimise instream effects from sediment.

Condition 14 requires best practicable option to be adopted at all times to prevent/minimise adverse effects.

Condition 15 requires that water flow is not adversely affected.

Condition 16 specifies that the river banks shall not be steeper than the existing natural banks following the works.

Condition 17 specifies that the works, and any subsequent effects (e.g. erosion), remain the responsibility of the consent holder.

Condition 18 outlines protocols that are to be adopted if archaeological remains are discovered during construction.

Condition 19 is a consent lapse clause.

Condition 20 is a provision for review of the consent.

Fonterra holds consent **5845** to remove, reconstruct, erect, place, and maintain dam and fish pass for the Tawhiti Stream water intake structure. This consent was granted on 31 July 2001 under Section 87(d) of the RMA to provide for replacement of the existing (unlicensed) water intake structure and associated fish pass on the Tawhiti Stream. The structure must conform to a specified design, with a minimum amount of disturbance to the riverbed, and not obstruct the passage of fish. This consent expired in June 2015, however, in accordance with Section 124 of the RMA, the consent holder applied to renew the consent prior to its expiry, and therefore, continues to operate under the expired consent while the renewal is processed.

There are 13 special conditions attached to this consent.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report (Appendix I).

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

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

The monitoring programme for the Whareroa site consisted of seven primary components.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

The Whareroa site was visited 10 times during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by Fonterra were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Discharge sampling

1.4.4.1 Water

The stormwater discharge was sampled on ten occasions (from three points) and the samples analysed for alkalinity, COD, biological oxygen demand (BOD and filtered carbonaceous BOD), conductivity, pH, free and total chlorine, oil and grease and suspended solids.

The outfall discharge was sampled on 10 occasions and analysed for *E. coli* and enterococci, total grease, suspended solids, COD, pH and conductivity.

Inter-laboratory comparisons of a 24 hour flow-proportional sample were carried out on three occasions and analysed for conductivity, pH, fats, COD, alkalinity, BOD, suspended solids, nitrogen, phosphorus, faecal coliforms and turbidity.

1.4.4.2 Air

The Council undertook sampling of both the emissions from the site and the ambient air quality in the areas surrounding the site.

Deposition gauges were placed at five selected sites in the vicinity of the factory on six occasions. The samples collected were analysed for total deposited milk powder and pH.

A 'DustTrak' monitor was deployed on two occasions in the vicinity of the site for approximately 48 hours each time in order to monitor levels of inhalable particulates (PM_{10}).

Monitoring of ambient nitrogen oxides (NO_x) levels at the site was conducted on three occasions at four sites. This monitoring involved placing NO_x passive absorption discs at four sampling sites for between two to four weeks. The discs were sent to an external laboratory for analysis.

1.4.5 Freshwater ecological surveys

A biological inspection was performed on one occasion in tributaries of the Tawhiti Stream, Tangahoe River and unnamed coastal stream, to determine whether or not the discharge of stormwater from the site has had a detrimental effect upon the biological communities of the streams.

A six site biomonitoring survey was undertaken in tributaries of the Tawhiti Stream (two sites), Tangahoe River (three sites) and an unnamed coastal stream (one site) to assess whether stormwater discharges had had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI and SQMCIS scores for each site. They were also checked for heterotrophic growths.

1.4.6 Marine ecological surveys

A marine ecological survey was performed on two occasions at sites on the coast surrounding the marine outfall to determine whether the discharge of wastewater through the outfall has had a detrimental effect upon the intertidal marine communities.

1.4.7 Review of Fonterra monitoring data

Fonterra routinely monitors the wastewater discharge for a number of physical, chemical and biochemical parameters. Results are forwarded to the Council along with data relating to water abstractions from the Tangahoe catchment.

Fonterra's independent consultants, CRL Energy Limited, carried out powder emission measurements on drier exhaust stacks (Powders 1, 2, 3, 5, whey products, and casein) during December 2015. The Council undertook a review of all data upon receipt.

2. Results

2.1 Water

2.1.1 Plant upgrades and improvements

The following improvements and upgrades were implemented during the 2015-2016 monitoring year in relation to environmental performance:

- A new chemical storage facility was installed at the tanker workshop. All oils, coolants and solvents are now stored in 1,000 L chemical pods in a secure bunded area. Chemicals are now piped directly into dispensers in the workshop, which eliminates the need for manually dispensing the chemicals and transporting them, which posed a risk of spillage. The facility will fully contain any leaks or spills and is easily cleaned if necessary.
- The site has purchased new spill kits which are located in every department and adjacent to all chemical storage areas. There are now 35 spill kits on site which enable a rapid response in the event of a chemical incident.
- A new water treatment plant has been built (commissioned in August 2016). The significant investment in new technologies used has allowed the site to improve environmental performance in several ways. The new plant has improved the efficiency of processing the raw water, resulting in a reduction in the volume of water needing to be abstracted. The site no longer discharges the back-flushing from the plant to the Tawhiti stream. Instead, during times of high turbidity, the back-flushing can be contained in purpose-built lagoons, where the silt and sediment settles out and is contained. The discharge of backflushing to the ocean outfall is now controlled so that the discharge will cease if the solids (silt and sand) level reaches a concentration that approaches the consent limit.

2.1.2 Inspections

Routine site inspections were conducted on a monthly basis throughout the 2015-2016 dairy season. A total of ten inspections were undertaken between August 2015 and May 2016, which included a full inspection of the site covering stormwater management, chemical storage, truck wash areas, and general site maintenance and management. Inspection of the three stormwater discharges and the wastewater discharge to the Tasman Sea were also part of the visits.

Overall, site management was found to be good throughout the monitoring period. There were some minor, reoccurring issues related to leaky valves and IBC bunds which required emptying, however these were generally resolved promptly by Fonterra. On one occasion, there were visible patches of floatable material within the mixing zone of the outfall discharge. However, the discharge remained compliant with consent conditions as there was no evidence of effects beyond the mixing zone. The previous fault with the Tawhiti stormwater sump, reported in the 2014-2015 period, had been fixed prior to the first inspection of the 2015-2016.

Additional inspections were undertaken in relation to the construction of the new water take in the Tangahoe River (resource consent 10208). The inspections found that stormwater controls had been implemented as far as practicable during the construction of the water intake. The works did not appear to affect the river's stability

or potential erodibility. There were no visual impacts on the river during any of the inspections. Based on the monitoring that was undertaken, consent conditions were complied with during the year under review.

2.1.3 Water abstraction

Fonterra holds consents to take up to a total volume of 30,000 m^3/day of water at two points in the Tangahoe catchment. The abstraction points are situated on an unnamed tributary of the Tawhiti Stream (consent 0047), and on the Tangahoe River below the confluence (consent 4508).

The maximum allowable rate of abstraction from the Tawhiti Stream is reduced from 30,000 to 15,900 m^3/day when the flow of the stream is below 800 L/s, and the turbidity of the water at the Tangahoe intake is less than 150 NTU. A residual flow of 50 L/s must be maintained in the Tawhiti Stream.

Photo 5 Tangahoe River intake

The maximum allowable rate of abstraction from the Tangahoe River (Photograph 5) is 16,000 m^3/day.

Exercise of the two consents is monitored by both Fonterra and the Council. Fonterra measures abstraction rate continuously for both intakes. Daily abstraction rate data are supplied on a monthly basis to the Council for review. The Council maintains a telemetered hydrologic recorder in the Tawhiti Stream downstream of the abstraction point to monitor compliance with flow restrictions on consent 0047.

A summary of the abstraction data provided by Fonterra is presented in Table 2. The hydrograph for the Tawhiti Stream below Fonterra's intake, at Duffy's Farm, for the 2015-2016 monitoring period is shown in Figure 1. Compliance with conditions on maximum allowable abstraction rate has been determined in terms of number of days that limits were breached.

Table 2 Summary of abstraction rate data for 2015-2016

Month	Tawhiti Stream			Tangahoe River			Total abstraction		
	Mean m^3/day	Max m^3/day	Breach days	Mean m^3/day	Max m^3/day	Breach days	Mean m^3/day	Max m^3/day	Breach days
July	6,239	11,905	0	3,845	9,251	0	10,083	19,809	0
August	13,736	18,278	0	8,041	13,556	0	21,777	27,705	0
September	13,129	16,409	0	9,145	12,017	0	22,274	25,688	0
October	11,142	12,423	0	11,666	13,243	0	22,808	25,574	0
November	10,353	13,977	0	12,412	14,245	0	22,765	25,705	0

Month	Tawhiti Stream			Tangahoe River			Total abstraction		
	Mean m^3/day	Max m^3/day	Breach days	Mean m^3/day	Max m^3/day	Breach days	Mean m^3/day	Max m^3/day	Breach days
December	10,454	12,393	0	12,365	13,646	0	22,819	25,539	0
January	10,538	12,338	0	11,389	13,671	0	21,927	24,220	0
February	10,245	11,958	0	11,414	13,321	0	21,659	25,172	0
March	10,957	12,446	0	11,852	13,419	0	22,809	25,808	0
April	12,395	14,370	0	9,996	14,649	0	22,391	26,651	0
May	11,293	13,788	0	4,503	11,485	0	15,796	21,421	0
June	6,064	9,775	0	1	3	0	6,065	9,775	0

The flow of the Tawhiti Stream regularly dropped below 800 L/s over the monitoring period (Figure 1). The limit on the maximum abstraction rate (15,900 m^3/day) was not exceeded during such times.

The results obtained from the Council's telemetered hydrologic recorder in the Tawhiti Stream show that the minimum residual flow of 50 L/s, required under consent 0047, was maintained throughout the monitoring period. The lowest flow recorded during the 2015-2016 period was 75 L/s during March 2016.

For the Tangahoe River abstraction, the maximum limit of 16,000 m^3/day was complied with throughout the monitoring period. The maximum daily abstraction rate was 14,649 m^3 on 15 April 2016. The maximum total abstraction rate for the Tangahoe catchment (30,000 m^3/day) was complied with throughout the monitoring period.

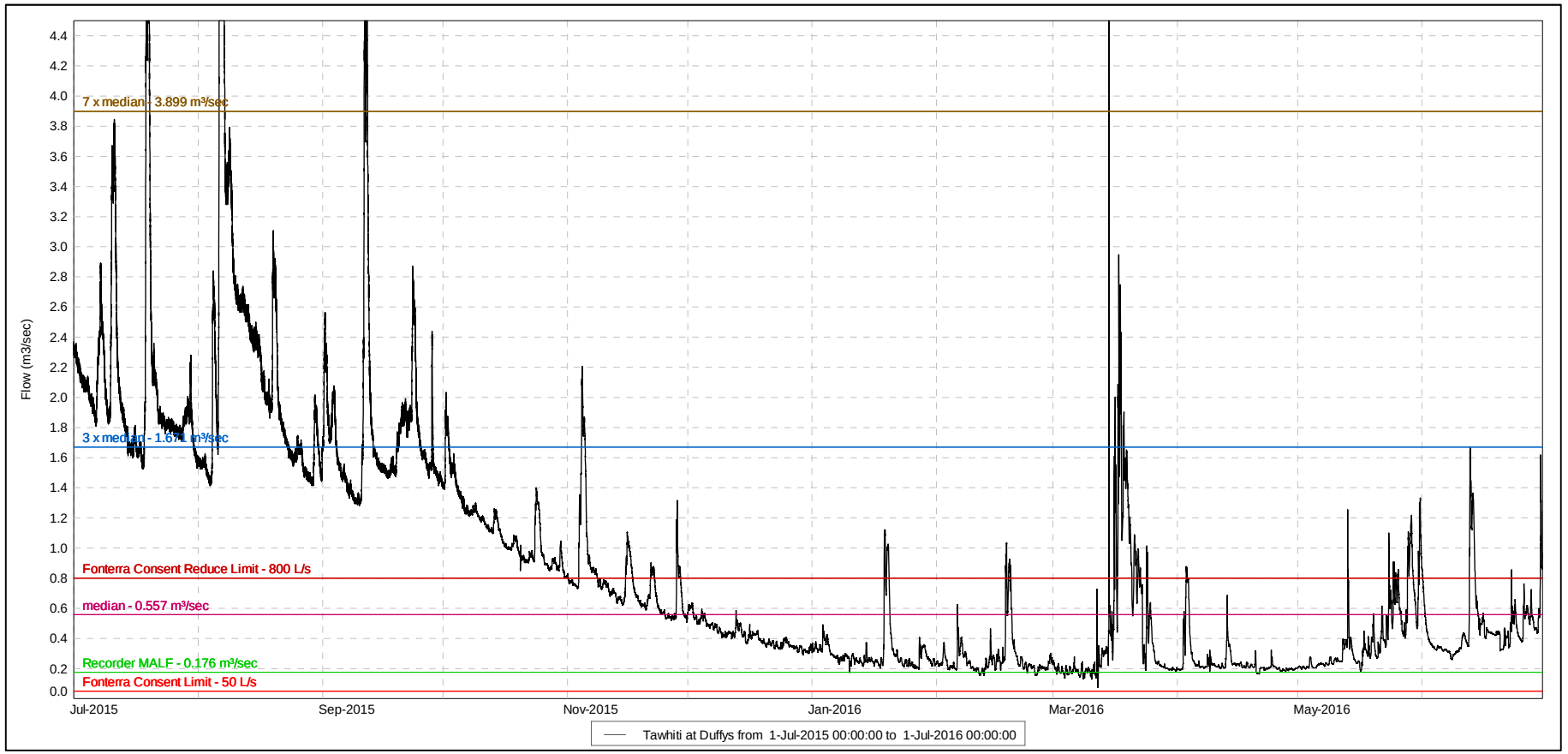

Figure 1 Tawhiti Stream flow (m^3/second) at Duffy's Farm from 1 July 2015 to 1 July 2016[1]

[1] Stream flows reached up to 10 m^3/second during the monitoring year, however a reduced range of flows are presented here for assessment against the consent limits.

2.1.4 Stormwater

There are three stormwater catchments covering the Whareroa site. The northern catchment drains to an unnamed tributary of the Tawhiti Stream (consent 3907), the eastern catchment to an unnamed tributary of the Tangahoe River (consent 3902), while the southern catchment drains to an unnamed coastal stream (consent 4133). The discharge to the unnamed tributary of the Tawhiti Stream can also include intermittent discharges of back flushing from sand filters and chlorinated water from the water reservoir. The approximate stormwater catchment areas at the Whareroa site are shown in Figure 2.

Figure 2 Approximate stormwater catchments at the Whareroa site

Each of the discharges are from a detention pond system designed to contain any spillage that occurs on the site and to attenuate storm flows. The two-pond system in the Tangahoe catchment was completed in May 1996. The benefits of this system were immediately apparent in the results of monitoring in the unnamed tributary.

There are now two stormwater ponds in the Tasman catchment (the unnamed coastal stream) following major upgrade works undertaken during the 2014-2015 year (Photograph 6). The second pond was installed to ensure enough capacity to treat the stormwater following the site expansion. The construction of the new distribution centre increased the size of the catchment area for the Tasman stormwater discharge.

Photo 6 Southern stormwater pond following upgrade (surrounded by native riparian plantings)

The detention pond system at the headwaters of the unnamed tributary of the Tawhiti Stream (Photograph 7) was upgraded in July 1998. The previous single pond rapidly filled with sediment from sand filter back flushing and was therefore ineffective as a detention pond. This pond was replaced with a three-pond system. In response to Abatement Notice 11657, issued February 2011, Fonterra undertook extensive works on the Tawhiti stormwater system during 2011 in order to prevent the growth of sewage fungus in the Tawhiti stormwater ponds and the downstream tributaries. These works included cleaning out the third settlement pond, modifying the outlet structures between the three ponds and repairs to the stormwater isolation sump adjacent to the water treatment plant. A marked improvement in pond water quality has occurred following completion of these works (Section 2.1.5.1, Table 9).

Photo 7 Tawhiti stormwater pond following remedial work

In a voluntary initiative, Fonterra has fenced off and planted areas around the ponds with native vegetation and wetland plants (Photograph 6), to create wetlands that will help maintain the health and habitat of the small streams that receive the discharges. The plantings are progressively being extended down the riparian margins under Riparian Plan 372, and have been found to be well tended during inspections by the Council.

During the 2015-2016 reporting period, the monitoring of stormwater discharges consisted of three components, including the collection of stormwater discharge samples; a freshwater biological inspection in each of the unnamed tributaries and a macroinvertebrate survey of 6 total sites in an unnamed tributary of the Tawhiti stream, the Tangahoe River, and an unnamed coastal stream.

2.1.4.1 Discharge monitoring

Discharge samples were collected during each site inspection. The samples were analysed for temperature, conductivity, pH, alkalinity, oil and grease, total residual chlorine, free chlorine, suspended solids, turbidity, chemical oxygen demand (COD),

biochemical oxygen demand (BOD) and filtered carbonaceous biochemical oxygen demand (BODCF). Parameters with associated consent limits are listed in Table 3.

Table 3 Limits for stormwater composition for each parameter 2014-2015 (consents 3902, 3907, 4133)

Parameter	Units	Consent limit*		
		3902	3907	4133
Temperature	ºC	25	25	25
Oil and grease	g/m^3	5	5	5
Total residual chlorine	g/m^3	0.2	0.2	0.2
pH	pH	6.0 - 9.0	6.0 - 9.0	6.0 - 9.0
Suspended solids	g/m^3	30	30	100
BOD**	g/m^3	15 / 10	10	15 / 10
BODCF***	g/m^3	3.5 / 2.0	2.0	3.5 / 2.0

* Consent limits apply to eight out of ten consecutive samples over the course of an annual monitoring period
** BOD limit is 15 g/m^3 during the period February 2014 – 14 February 2016, thereafter it decreases to 10 g/m^3
*** BODCF limit is 3.5 g/m^3 during the period February 2014 – 14 February 2016, thereafter it decreases to 2 g/m^3

Tributary of Tawhiti Stream

Samples of the discharge to the Tawhiti tributary are taken at the outlet of the three-pond system. Subsequent to the construction of the three-pond system, there has been a marked reduction in the BOD and suspended solids concentration in the discharge. Temperature, conductivity and pH remained consistent. Oil and grease (O&G) and free chlorine levels have remained low.

Samples of the discharge to the Tawhiti tributary are presented in Table 4. A summary of previous results since the installation of the three-pond system are also included for comparison.

Table 4 Sample results for the stormwater discharge to an unnamed tributary of the Tawhiti Stream including summary statistics

Parameter	Alkalinity	BODCF	BOD	COD	Cond.	O&G	pH	SS	Turb.	Temp.	Total Cl_2	Free Cl_2
Unit	**g/m^3 CaCO3**	**g/m^3**	**g/m^3**	**g/m^3**	**mS/m@ 20C**	**g/m^3**	**pH**	**g/m^3**	**NTU**	**°C**	**g/m^3**	**g/m^3**
Summary statistics												
Minimum	6	0.06	0.5	5	2.5	0.4	6.4	2	1	8	0.01	0.01
Maximum	530	19	3,200	2,600	147	12	11.8	900	350	22.5	0.8	0.3
Median	64	0.5	1.1	11	27.3	<0.5	7.6	9	5.6	15	<0.1	<0.1
Number	147	70	163	153	159	147	158	153	88	150	151	150
2015-2016 monitoring results												
05 Aug 2015	44	<0.5	0.5	<5	23.7	<0.5	7.5	6	4.4	11.4	<0.1	<0.1
17 Sep 2015	61	<0.5	<0.5	5	27.5	<0.5	7.5	4	4.5	14.8	<0.1	<0.1
07 Oct 2015	63	<0.5	<0.5	6	27.7	<0.5	7.5	2	2.5	14.4	<0.1	<0.1
10 Nov 2015	68	<0.5	0.9	8	27	<0.5	7.6	5	4.3	17.6	<0.1	<0.1
02 Dec 2015	70	<0.5	0.6	8	27.4	<0.5	7.6	3	2.1	19.3	<0.1	<0.1
13 Jan 2016	78	0.7	0.8	11	27.4	<0.5	7.8	12	3.9	18.6	<0.1	<0.1
05 Feb 2016	79	<0.5	0.8	9	27.2	<0.5	7.8	8	4.2	21.8	<0.1	<0.1
30 Mar 2016	72	0.6	0.6	12	27.9	<0.5	7.7	8	4.4	17.3	<0.1	<0.1
27 Apr 2016	68	<0.5	<0.5	9	27	<0.5	7.8	5	1.8	14.8	<0.1	<0.1
18 May 2016	42	0.6	1.3	6	17.7	<0.5	7.6	15	13	12.2	<0.1	<0.1
Consent limit*	**-**	**2.0**	**10**	**-**	**-**	**5**	**6.0 – 9.0**	**30**	**-**	**25**	**0.2**	**-**

Refer to glossary for an explanation of abbreviations
* Consent limits apply to eight out of ten consecutive samples over the course of an annual monitoring period

No stormwater contaminants exceeded consent limits during the 2015-2016 monitoring year. Results for the remaining contaminants were comparable with those from previous surveys.

Tributary of Tangahoe River

Samples of the discharge to the Tangahoe tributary are taken at the outlet of the two-pond system. Since the ponds were constructed, the characteristics of the discharge have changed. In general, the temperature, conductivity, alkalinity, BOD and O&G values recorded have reduced, while the pH and chlorine values have increased.

Samples of the discharge to the Tangahoe tributary are presented in Table 5. A summary of previous results since the installation of the two-pond system are also included for comparison.

Table 5 Sample results for the stormwater discharge to an unnamed tributary of the Tangahoe River including summary statistics

Parameter	Alkalinity	BODCF	BOD	COD	Cond.	O&G	pH	SS	Turb.	Temp.	Total Cl_2	Free Cl_2
Unit	**g/m³ CaCO3**	**g/m³**	**g/m³**	**g/m³**	**mS/m @20C**	**g/m³**	**pH**	**g/m³**	**NTU**	**°C**	**g/m³**	**g/m³**
Summary statistics												
Minimum	15	0.5	0.6	5	4	0.5	6.6	2	0.67	8.1	0.01	0.01
Maximum	240	3.6	250	840	246	81	11	190	42	36.4	0.5	0.4
Median	119	1	6	24	36.9	0.2	7.9	13	6	16.3	0.1	0.05
Number	143	66	151	150	152	143	155	147	86	145	141	140
2015-2016 monitoring results												
05 Aug 2015	87	0.8	2	9	35.5	<0.5	7.5	7	3.1	11.6	<0.1	<0.1
17 Sep 2015	95	0.7	1.8	10	34.6	<0.5	7.9	5	2.6	14.4	<0.1	<0.1
07 Oct 2015	118	<0.5	1.2	10	38.2	<0.5	7.7	<2	1.1	16.3	<0.1	<0.1
10 Nov 2015	128	1.1	3.2	14	37.2	<0.5	7.8	4	3.2	18.6	0.1	0.1
02 Dec 2015	134	0.8	1.2	15	37	<0.5	7.8	<2	0.67	21.3	<0.1	<0.1
13 Jan 2016	143	0.8	1.8	20	37.8	<0.5	**9.8**	3	2.1	18.1	0.1	<0.1
05 Feb 2016	141	0.7	2.4	21	34.8	<0.5	9	4	3.8	22.1	<0.1	<0.1
30 Mar 2016	121	1	8.5	51	31.4	<0.5	7.6	**31**	24	18.8	0.1	0.1
27 Apr 2016	146	0.7	6	29	36.1	<0.5	7.6	12	7.9	15.3	<0.1	<0.1
18 May 2016	144	0.8	9.8	21	35.5	1.4	7.7	20	12	14.1	0.1	<0.1
Consent limit*	**-**	**3.5 / 2.0*** **	**15 / 10** **	**-**	**-**	**5**	**6.0 – 9.0**	**30**	**-**	**25**	**0.2**	**-**

Refer to glossary for an explanation of abbreviations

* Consent limits apply to eight out of ten consecutive samples over the course of an annual monitoring period

** BOD limit is 15 g/m^3 during the period February 2014 – 14 February 2016, thereafter it decreases to 10 g/m^3

*** BODCF limit is 3.5 g/m^3 during the period February 2014 – 14 February 2016, thereafter it decreases to 2 g/m^3

No stormwater contaminants exceeded consent limits during the 2015-2016 monitoring year. Results for pH were high in January and February; however the limit was only exceeded once and therefore did not constitute a breach of consent. Similarly, the limit for suspended solids was narrowly exceeded once in March. Results for the contaminants not assessed against consent limits were comparable with those from previous surveys.

Unnamed coastal stream

Samples of the discharge to the unnamed coastal stream are presented in Table 6, along with a summary of previous results since November 1994 for comparison.

Table 6 Sample results for the stormwater discharge to the unnamed coastal stream including summary statistics

Parameter	Alkalinity	BODCF	BOD	COD	Cond.	O&G	pH	SS	Turb.	Temp.	Total Cl_2	Free Cl_2
Unit	g/m³ CaCO3	g/m³	g/m³	g/m³	mS/m @20C	g/m³	pH	g/m³	NTU	°C	g/m³	g/m³
Summary statistics												
Minimum	16	0.5	0.8	5	3.6	0.5	6.6	2	1.3	7.7	0.01	0.01
Maximum	130	5.9	22	97	51.2	2.8	8.5	78	44	23.5	0.7	0.6
Median	71	1.4	8.2	32	28.1	0.2	7.4	18	10	15.7	0.05	0.05
Number	129	64	135	133	133	131	135	133	84	131	131	133
2015-2016 monitoring results												
05 Aug 2015	39	1.4	3.5	<5	20.6	<0.5	7.4	7	9.2	11.2	<0.1	<0.1
17 Sep 2015	57	0.8	0.8	21	28.8	<0.5	7.5	4	4.4	14.2	<0.1	<0.1
07 Oct 2015	64	<0.5	1.3	8	30.8	<0.5	7.5	4	2.7	15.6	<0.1	<0.1
10 Nov 2015	63	0.8	1.8	10	28.1	<0.5	7.3	3	2.5	18.7	<0.1	<0.1
02 Dec 2015	65	0.7	1.8	6	24.9	<0.5	7.3	2	4	21.2	<0.1	<0.1
13 Jan 2016	78	1.3	3.5	18	30.1	<0.5	7.6	6	4	20.4	<0.1	<0.1
05 Feb 2016	80	0.8	3.2	18	29.6	<0.5	7.7	9	6.8	23.5	<0.1	<0.1
30 Mar 2016	66	0.8	4.1	18	22.8	<0.5	7.3	14	12	17.9	0.1	0.1
27 Apr 2016	66	0.6	5	14	27.1	<0.5	7.6	6	3.1	14.6	<0.1	<0.1
18 May 2016	53	<0.5	1.9	7	21.8	<0.5	7.3	4	2.8	12.9	<0.1	<0.1
Consent limit*	**-**	**3.5 / 2.0*** **	**15 / 10** **	**-**	**-**	**5**	**6.0 – 9.0**	**100**	**-**	**25**	**0.2**	**-**

Refer to glossary for an explanation of abbreviations

* Consent limits apply to eight out of ten consecutive samples over the course of an annual monitoring period

** BOD limit is 15 g/m³ during the period February 2014 – 14 February 2016, thereafter it decreases to 10 g/m³

*** BODCF limit is 3.5 g/m³ during the period February 2014 – 14 February 2016, thereafter it decreases to 2 g/m³

No stormwater contaminants exceeded consent limits during the 2015-2016 monitoring year. Results for the contaminants not assessed against consent limits were comparable with those from previous surveys.

2.1.4.2 Freshwater biomonitoring

A six site biomonitoring survey was undertaken using either the Council's standard '400 ml sweep-net' method or a combination of '400 ml sweep-net' and 'kick-sampling' methods, in tributaries of the Tawhiti Stream (two sites), Tangahoe River (three sites) and an unnamed coastal stream (one site) to assess whether stormwater discharges had had any adverse effects on the macroinvertebrate communities of these streams (Figure 3, Table 7). Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site. They were also checked for heterotrophic growths.

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 abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored. The presence of masses of heterotrophic organisms can be an indicator of organic enrichment within a stream.

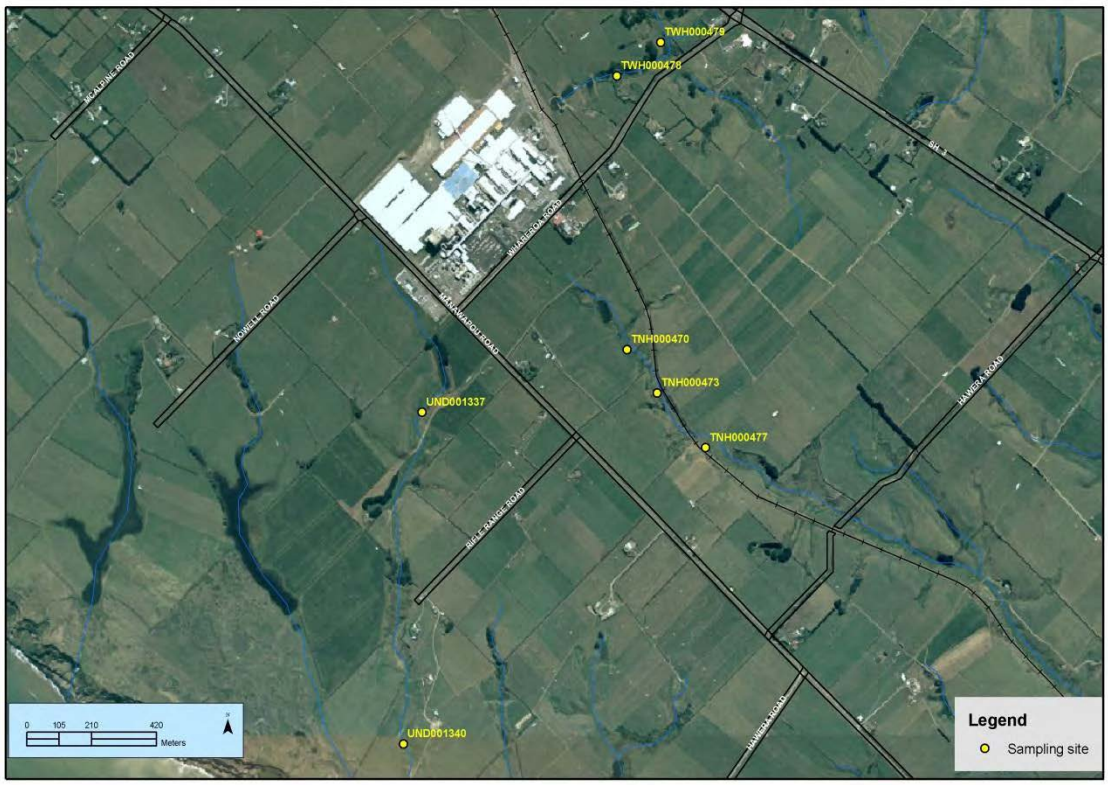

Figure 3 Location of freshwater biological sampling sites in the tributaries of the Tangahoe River and Tawhiti Stream and the unnamed coastal stream

Table 7 Freshwater biomonitoring sites in unnamed tributaries of the Tawhiti Stream and Tangahoe River, and an unnamed coastal stream

Site No.	Site code	Map reference	Location
B1	TWH 000478	Q21: 219770	Tawhiti S. tributary – 60 m below northern discharge
B2	TWH 000479	Q21: 223772	Tawhiti S. tributary – 200 m below northern discharge
1	TNH 000470	Q21: 221762	Tangahoe R. tributary - 10 m u/s of culvert (40 m d/s northern discharge)
2	TNH 000473	Q21: 222762	Tangahoe R. tributary - 400 m below eastern discharge
3	TNH 000477	Q21: 223759	Tangahoe R. tributary - d/s of railway culvert
S1	UND 001337	Q21: 214761	Unnamed coastal stream 300 m below Manawapou Road
S2	UND 001340	Q21: 213749	Unnamed coastal stream 200 m upstream from coast

An unauthorised discharge recorded in the unnamed tributary of the Tawhiti Stream in 2011 resulted in the proliferation of undesirable heterotrophic growths 'sewage fungus' at site B1 and to a lesser extent at site B2 downstream of the stormwater discharge. In response to this incident, Fonterra carried out a number of improvements to the stormwater management system at the Whareroa site between February and April 2011. Results from the 2012 and 2013 survey suggested an improvement in water quality at these sites since the stormwater upgrade was completed in April 2011. Results from the current survey also suggest a continued improvement in preceding water quality at these sites. The SQMCI$_S$ score, although slightly lower than the previous survey results was markedly higher than the historical median at site B1. No significant changes from historical median scores were recorded at site B2. The macroinvertebrate community was dominated by species that would be expected in

this soft sediment, slower flowing and weedy stream (amphipods (*Paracalliope*) and snails (*Potamopyrgus*)).

In the unnamed tributary of the Tangahoe Stream, the macroinvertebrate communities present at the three sites were of 'poor' (site 1 and 2) and 'fair' (site 3) quality at the time of the current survey. This is a typical result for sites 1 and 2, but an improvement for site 3. There were no significant changes in MCI scores between the current survey, previous survey and historic medians at sites 1 and 2, however site 3 recorded a MCI score significantly higher than both the historical median and the previous survey score. The MCI score recorded at site 3 was also equivalent to the highest score recorded at this site to date, a reflection of slightly better habitat (greater flow) at this site in comparison to the two upstream sites. There were improvements in $SQMCI_s$ scores from historical medians at site 2 and 3 but not site 1. Site 1 recorded a $SQMCI_s$ score significantly lower than the historical median and the previous survey result. It is thought this result is likely to be habitat related and related to the large proportion of fine sediment sampled at the time of survey.

The results of this survey continued to reflect improvements in the macroinvertebrate community that have been recorded over the past eight years at site S2 in the unnamed coastal stream. This improvement has been attributed to the fencing and planting of the stream in the vicinity of this site. There was no evidence of any effects of the stormwater discharge on the macroinvertebrate community in the unnamed coastal tributary.

The results of this February 2016 survey of the three small streams around the Fonterra Whareroa factory indicated that stormwater discharges from the factory had not had recent detrimental effects upon the streambed communities in the unnamed tributaries of the Tawhiti Stream and the Tangahoe River, or the unnamed coastal stream.

A full copy of this report is included in Appendix II.

2.1.4.3 Freshwater biological inspection

The inclusion of a spring biological inspection in the monitoring programme is a direct response to the undesirable heterotrophic growths in the Tawhiti Stream tributary that were discovered in January 2011. It became apparent that these growths may have been present since spring. As a result, the monitoring programme was augmented to include a spring biological inspection, to increase monitoring at a time when factory throughput is often the highest.

Due to the layout of the stormwater treatment systems, no upstream site is available in any of the tributaries. As a result only downstream observations were possible. The inspection included the collection of small samples which were sorted on site to assess what live invertebrates were present. As the sorts were not performed using magnification, the level of identification was quite low, except for those invertebrates that could be easily identified to a higher taxonomic level e.g. the sandfly *Austrosimulium*.

This year's inspection found no undesirable heterotrophic growths in the streambeds downstream from the three stormwater pond discharges. Overall, the inspection found

no evidence that any of the three discharges had significant adverse effects on the downstream macroinvertebrate communities.

A full copy of this report is included in Appendix III.

2.1.4.4 Fish survey

The Tawhiti Stream fish survey takes place every three years and was not undertaken during the period under review. This is next scheduled for the 2016-2017 monitoring period.

2.1.5 Wastewater

Since June 1997, wastewater from the Whareroa dairy complex has been discharged through a 1,845 m long marine outfall. Previously, the wastewater was discharged at the low water mark.

A discharge of up to 40,000 m^3/day of dairy factory wastewater is provided for by consent 1450. Changes to the consent in September 2006 added specific limits on the concentration of fats, suspended solids and COD. The consent also controls the environmental effects of the discharge by narrative standards placed on the effects of the discharge at the boundary of a mixing zone. No discharge of raw or treated milk, or milk products, cream, whey or whey permeate is allowed, except under emergency provisions defined in a contingency plan.

Remedial measures undertaken to reduce wastewater in recent years have included: increased level of resourcing in the loss monitoring/CIP optimisation personnel, installation of a second grade water system that reuses up to 3,000,000 L/day of water, and a chemical recovery extension to the nitric acid cleaning system.

Over recent monitoring years, video surveillance has found that the new long outfall had performed according to design. The effluent field that formed above the diffuser moved parallel to the coast, and was not observed to impinge upon the shore.

Occasional surface films formed. There was no evidence of accumulation of material on the seabed near the outfall.

2.1.5.1 Discharge composite samples

Fonterra forward monitoring results to the Council monthly. This includes daily discharge volume, fats, COD, pH, suspended solids, and mean daily temperature of the discharge. The chemical measurements are based on 24 hour flow-proportioned composite samples. A summary of wastewater volume data for the period under review is provided in Table 8.

Table 8 Summary of wastewater volume data for 2015-2016

Month	Mean m^3/day	Maximum m^3/day	Non-compliance days (> 40,000 m^3/day)
July	6,516	13,826	0
August	21,898	29,373	0
September	28,355	32,474	0
October	31,531	33,744	0
November	31,483	34,850	0
December	30,277	33,516	0
January	28,192	30,748	0
February	27,601	31,295	0
March	24,994	30,230	0
April	19,186	22,771	0
May	14,404	17,175	0
June	4,144	8,469	0

The highest maximum daily volume discharged was 34,850 m^3 on 5 November 2015. October had the highest average daily volume discharged (31,266 m^3). The timing of these maxima coincided with the period of highest processing throughput. As in the previous five monitoring periods, the maximum allowable discharge rate of 40,000 m^3/day was not exceeded.

Daily discharge volumes for the 2015-2016 monitoring period are presented in Figure 4. The wastewater composition discharged through the outfall in terms of daily values for suspended solids, COD and fat concentrations, as supplied by Fonterra, is shown in Figures 5, 6, and 7 and summarised in Tables 9 and 10.

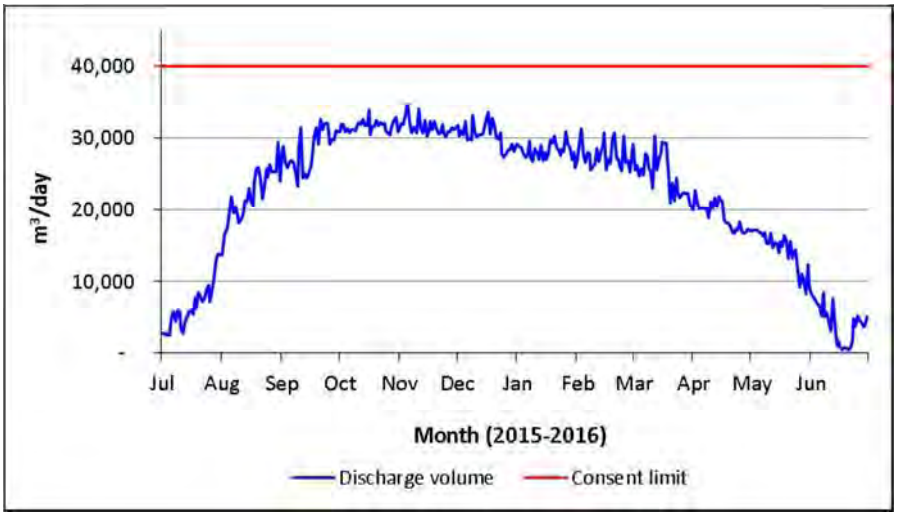

Figure 4 Daily volumes of wastewater discharged through the Fonterra ocean outfall

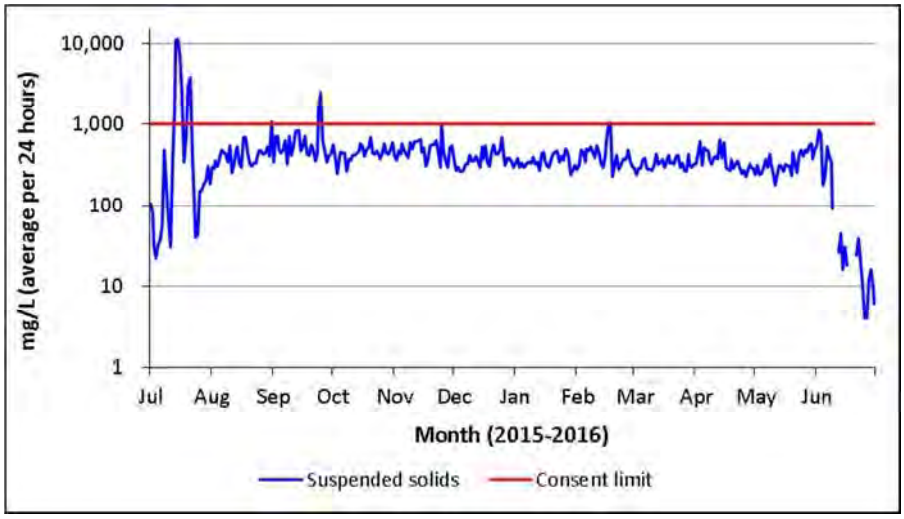

Figure 5 Daily average concentration of suspended solids in wastewater discharge

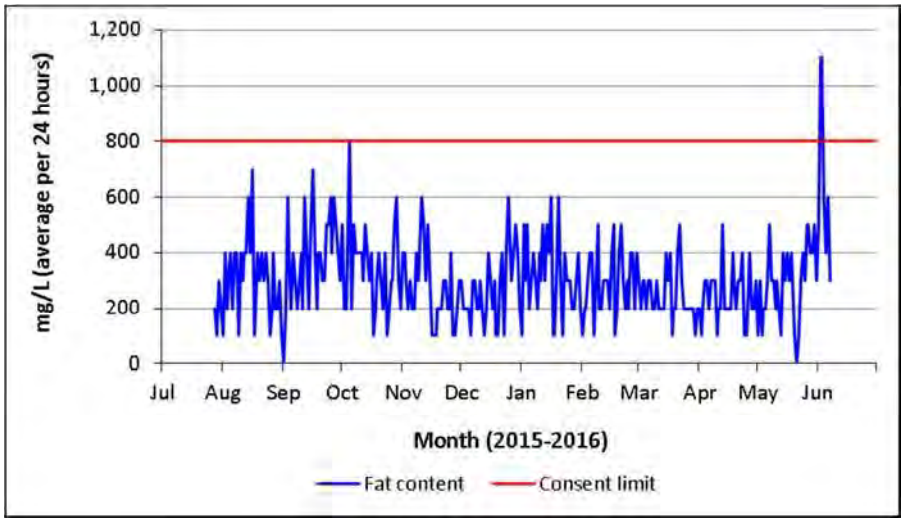

Figure 6 Daily average concentration of fats in wastewater discharge

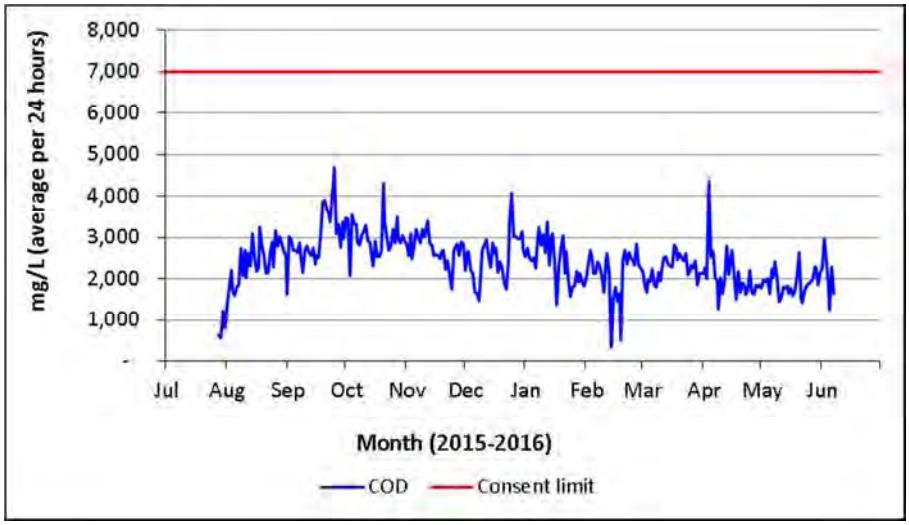

Figure 7 Daily average COD in wastewater discharge

It should be noted that these data relate to 24 hour flow proportioned samples, and therefore represent daily average values. The Council analysed two (24 hour flow

proportioned) samples taken from the discharge of this wastewater and these results are presented in Section 2.1.3.3 (Table 12).

The daily discharge volumes and COD concentrations complied with consent conditions during the entire monitoring period (Figure 4, Figure 7 and Table 9).

Mean daily suspended solids concentrations in the wastewater discharge breached the consent limit on 12 occasions over five months, including seven breaches during July. The maximum daily average concentration of suspended solids was 11,212 mg/L (Figure 5, Table 9).

Mean daily fat concentrations in the wastewater discharge breached the consent limit on two occasions during June. The maximum daily average concentration of fat was 1,100 mg/L (Figure 5, Table 9).

Table 9 Summary of daily wastewater discharge composition data 2015-2016

Month	Suspended solids			Fat			COD		
	No. breach days	Mean (mg/L)	Max (mg/L)	No. breach days	Mean (mg/L)	Max (mg/L)	No. breach days	Mean (mg/L)	Max (mg/L)
July	**7**	1,439	**11,212**	0	200	200	0	104	1,220
August	**1**	433	**1,074**	0	313	700	0	2,409	3,254
September	**2**	633	**2,566**	0	380	700	0	2,988	4,691
October	0	450	692	0	345	800	0	3,013	4,321
November	**1**	497	**1,018**	0	280	600	0	2,731	3,406
December	0	382	694	0	271	600	0	2,533	4,068
January	0	360	492	0	319	600	0	2,420	3,378
February	**1**	437	**1,046**	0	293	500	0	2,118	2,842
March	0	329	430	0	248	500	0	2,237	2,826
April	0	368	642	0	247	500	0	2,082	4,348
May	0	348	574	0	290	500	0	1,893	2,648
June	0	140	140	**2**	657	**1,100**	0	2,088	2,965
Consent limit	≤ 1,000			≤ 800			≤ 7,000		
Total no. breach days	**12**			**2**			0		

NB: The factory is not operational in June.

For the 2015-2016 dairy season, 8,187,622 m^3 of wastewater was discharged through the outfall, a decrease from the previous monitoring period when 8,398,542 m^3 was discharged (Table 10). There were less total suspended solids and COD discharged in the wastewater during the year under review compared to the 2014-15 period. However, there was an increase in the amount of fat that was discharged. The volume and constituents in the wastewater have increased over the last five years in proportion to the increase in volume of milk processed on the site. However, the actual concentration of constituents in the wastewater has remained relatively steady over the same time period. In the 2014-2015 period the concentration of suspended solids and COD decreased, while the concentration of fat increased.

Table 10 Summary of total mass in wastewater discharges over the past five monitoring years

Monitoring year	Volume discharged (m^3)	Suspended solids		Fat		COD	
		tonnes	%	tonnes	%	tonnes	%
2011-12	7,126,617	2,385	0.033	1,705	0.024	19,506	2.74
2012-13	7,149,032	2,735	0.038	2,002	0.028	20,548	2.87
2013-14	7,996,557	3,364	0.042	2,327	0.029	22,548	2.82
2014-15	8,398,543	3,987	0.047	2,220	0.026	24,796	2.95
2015-16	8,187,622	3,677	0.045	2,410	0.029	19,829	2.42

NB: Figures for suspended solids, fat and COD are 11-month totals, as the factory is not operational during June.

2.1.5.2 Discharge grab samples

Grab samples of the wastewater, prior to discharge through the Fonterra outfall, were collected by the Council on ten occasions during the 2015-2016 dairy season. These samples were analysed for temperature, COD, conductivity, pH, suspended solids, total grease (TG), *E. coli* and enterococci bacteria.

The main purpose of collecting the grab samples was to measure the microbiological quality of the discharge, which cannot be undertaken on 24-hour composite samples. These results also allow an assessment of the range of effluent component concentrations, rather than the 'average' results that are produced by composite samples.

Table 11 Results of wastewater grab sample analyses for 2015-2016, including summary statistics based on all Council monitoring data from this site

Parameter	COD	Conductivity	*E.coli*	Enterococci	pH	SS	Temp.	TG
Unit	g/m^3	mS/m@20C	/100ml	/100ml	pH	g/m^3	ºC	g/m^3
Summary statistics								
Minimum	50	12	1	1	1.6	12	7.6	5
Maximum	13,400	3,780	7,600,000	33,000,000	12.6	4,020	56	1,500
Median	2,650	226	50	100,000	10.4	400	31.3	130
Number	181	275	218	217	385	202	241	272
2015-2016 monitoring results								
05 Aug 2015	552	47.9	<3	<3	9.4	280	29.7	No result
17 Sep 2015	1,800	362	<1.8	22,000	12.1	190	31.8	170
07 Oct 2015	2,000	165	5,400	200,000	11.2	240	33.3	55
10 Nov 2015	1,300	151	130	79,000	3.1	310	35.2	150
02 Dec 2015	2,800	226	2	200,000	11.4	410	33.5	180
13 Jan 2016	2,200	158	<1.8	50,000	11.6	440	35.2	300
05 Feb 2016	1,400	192	<1.8	210,000	11.3	290	38.2	137
30 Mar 2016	1,800	393	<1.8	230,000	12	320	33.3	84
27 Apr 2016	410	73.6	<1.8	5,400	11.1	120	36.3	86
18 May 2016	670	240	<1.8	<18	11.9	210	23.6	130

High concentrations of faecal indicator bacteria, in particular enterococci, were recorded in the grab samples (Table 8). Four of the ten samples recorded enterococci counts over twice the historical median. The discharge of domestic wastes in the dairy wastewater itself is specifically prohibited, and this condition was complied with. It is

not unusual for high numbers of faecal indicator bacteria to be found in dairy factory wastewater in the absence of domestic wastes, as has been found elsewhere in the country e.g. at Clandeboye and Westland Milk Hokitika (Palliser *et al*., 2013 and referenced therein). In order to determine whether elevated numbers of faecal indicator bacteria in the wastewater occur as a result of faecal contamination (e.g. from birds and rodents) or growth of environmental strains, further testing of waste streams is currently being undertaken by Fonterra.

In all grab samples, enterococci counts were notably higher than those for *E. coli*. Enterococci are more tolerant of extreme growth conditions than faecal coliforms (including *E. coli*), with the high temperatures and variable pH occurring in the wastewater potentially depressing the growth of the latter (Palliser *et al*., 2013).

COD and suspended solids concentrations were below the consent limits associated with Fonterra's composite sampling programme and were comparable with historical median results. Wastewater temperature and pH was generally higher than the respective historical medians although both parameters remained within the range of previous results. Wastewater conductivity and total grease concentrations were comparable with historical median results.

2.1.5.3 Discharge inter-laboratory comparisons

An inter-laboratory comparison was performed on two occasions during the 2015-2016 season on the 24 hour flow proportioned samples taken from the wastewater discharge. The results obtained by both laboratories are presented in Table 12.

Table 12 includes an agreements column which summarises the acceptability of the difference in each result for the two laboratories. Differences of less than 10% of the mean of the two values were considered acceptable. Differences of 10-25% are considered to constitute a difference between the two laboratories and a difference of greater than 25% are considered significantly different.

Table 12 Inter-laboratory comparison performed on 24 hour composite wastewater sample 2015-2016

Parameter	Unit	2 Dec 2015			18 May 16		
		TRC	Fonterra	Agree	TRC	Fonterra	Agree
Total alkalinity	g/m^{3}CaCO$_3$	133			273		
BOD	g/m^3	1,400			750		
COD	g/m^3	2,800	2,208	*	670	1,605	**
Conductivity @ 20°C	mS/m	226			240		
Faecal coliforms	cfu/100ml	>16,000			170		
pH	pH	11.4			11.9		
Suspended solids	g/m^3	410	370	✓	210	306	*
Total grease/fats	g/m^3	180			130		
Total nitrogen	g/m^3	142			93.4		
Total phosphorus	g/m^3	37.2			17.9		
Turbidity	NTU	310			240		

Note: ✓ = acceptable agreement
* = within 10% - 25% difference from the mean
** = significantly different (i.e. > 25% difference from the mean)

In the December sample, the difference in COD concentrations was slightly greater than 10% from the mean (but less than 25%). There was an acceptable agreement between the two suspended solids concentrations (less than 10% from the mean).

In the May sample, there was a significant difference in COD concentrations (greater than 25%from the mean). The difference in suspended solids concentrations was between 10-25% from the mean.

2.1.5.4 Marine ecological surveys

In order to assess the effects of the Whareroa dairy factory and Hawera Wastewater Treatment Plant combined outfall discharge on the nearby intertidal communities, surveys were conducted in October - November 2015 (peak season) and March 2016 (post-peak season) at four sites (Figure 8, Appendix IV includes photographs). The surveys included three potential impact sites either side of the outfall (two southeast and one northwest) and one control site (further northwest). It was expected that adverse effects of the marine outfall discharge on the intertidal communities would have been evident as a significant decline in species richness and diversity at the potential impact sites relative to the control site. The two survey reports, including statistical analysis of results and further discussion of the findings, are included in Appendix IV. The main findings of these survey reports are summarised below.

Erosion of the adjacent cliff faces was the most influential factor affecting the reef communities prior to the October survey (Photo 8). This was epitomised at the site 200 m SE of the outfall, which recorded no marine species along the surveyed transect. This section of reef had been completely buried by cliff material spanning from the foot of the cliff down to the low water mark. Similarly, when surveying the site 350 m NW of the outfall, it appeared that some sections of the transect appeared to have been recently buried; presumably by eroded cliff material. The extent of the erosion at the other two survey sites was far less (although still notable). It is possible that the impact of the eroding cliffs may have concealed any adverse effect that the outfall was having on the nearby reefs. However, not including the site 200 m SE of the outfall, there were no significant differences in species richness (mean number of species) or diversity (Shannon-Wiener Index) between the impact sites and the control site.

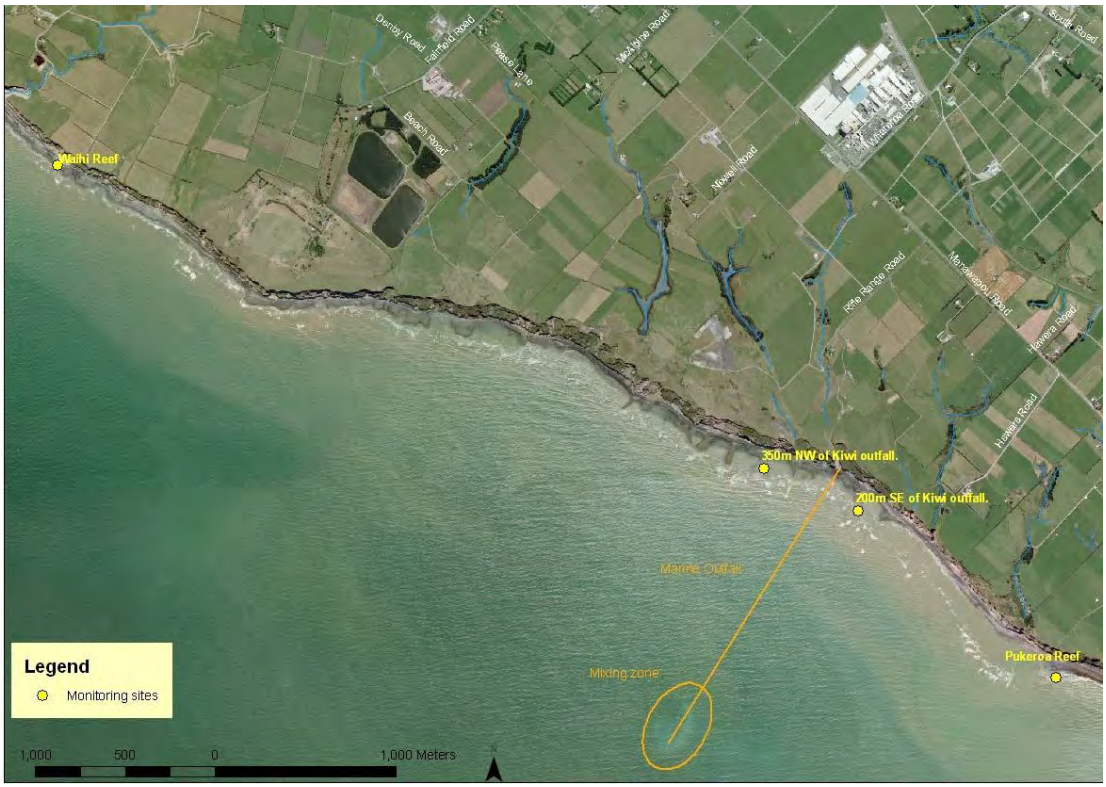

Figure 8 Location of the four intertidal survey sites

Photo 8 Significant erosion over the reef site 200 m SE of the outfall October 2015 (A), Relatively intact cliffs covered in vegetation above the Pukeroa Reef site October 2015 (B), A large slip above Waihi Reef November 2015 (C)

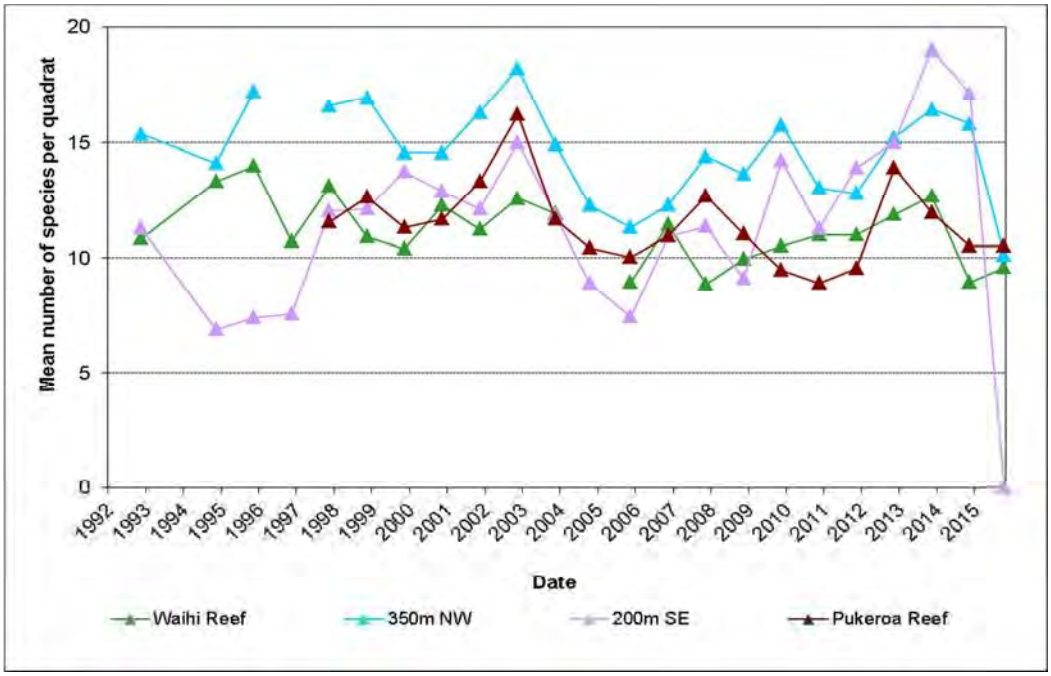

Figure 9 Mean number of species per quadrat for spring surveys 1992-2015

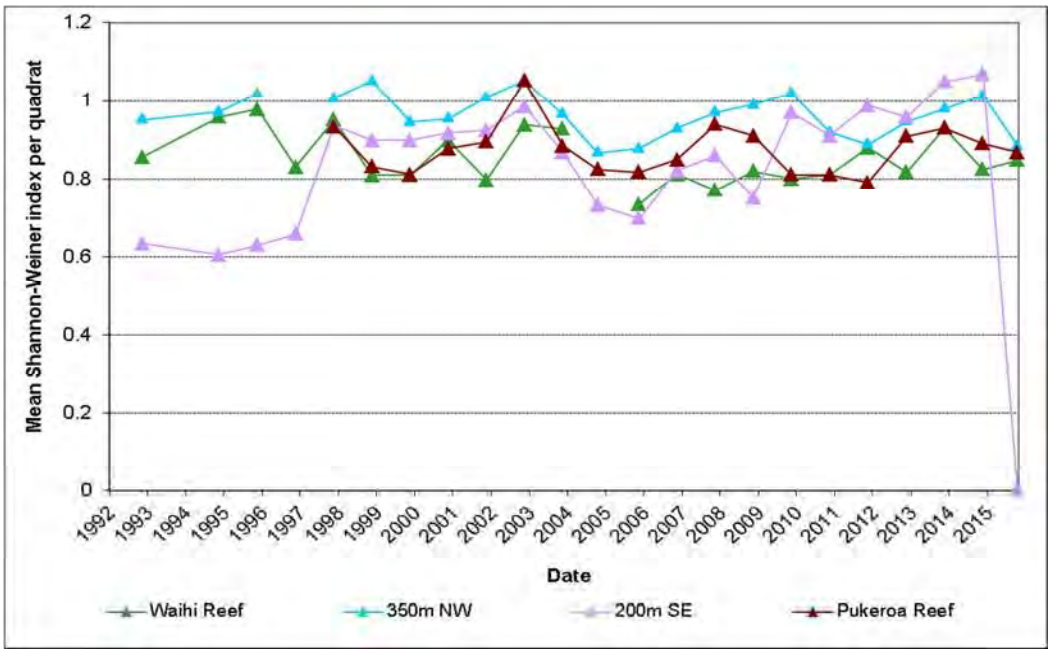

Figure 10 Mean Shannon-Weiner indices per quadrat for spring surveys 1992-2015

Impacts of the marine outfall discharge on the local intertidal communities were not evident from the survey results of March 2016 (Figures 9 and 10). Due to the erosion discovered in October, the impact site 200 m SE of the outfall had decreased substantially from the previous summer in terms of species richness and diversity. The results from this site were also significantly lower than those at the remaining sites. Aside from this event, there were no considerable decreases in species richness or diversity at the impact sites in relation to the control site. Notably, the impact site 350 m NW of the outfall had significantly higher species richness and diversity scores than what was found at the control site, Waihi Reef.

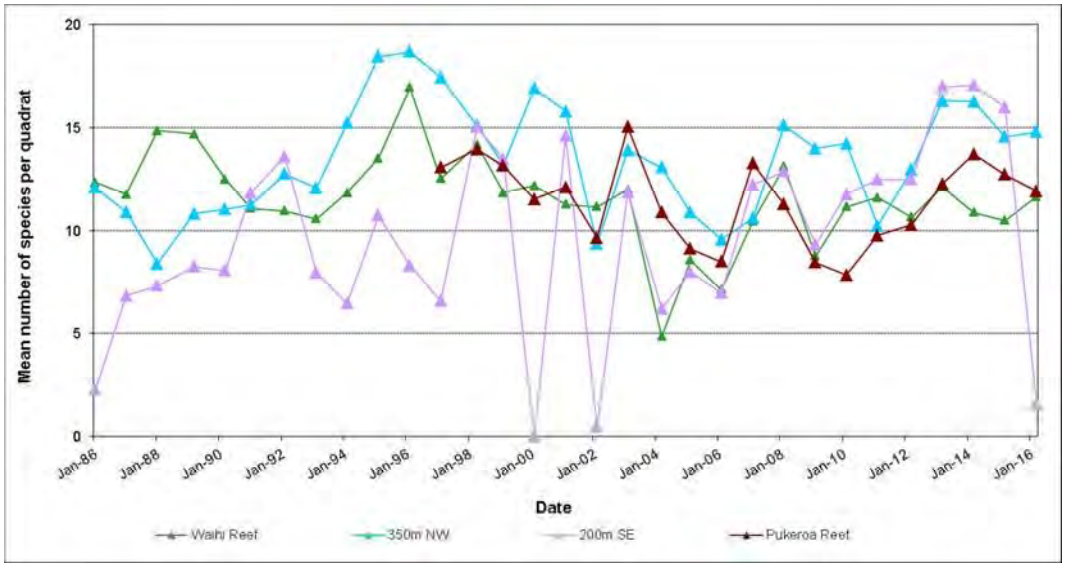

Figure 11 Mean number of species per quadrat for summer surveys 1986-2016

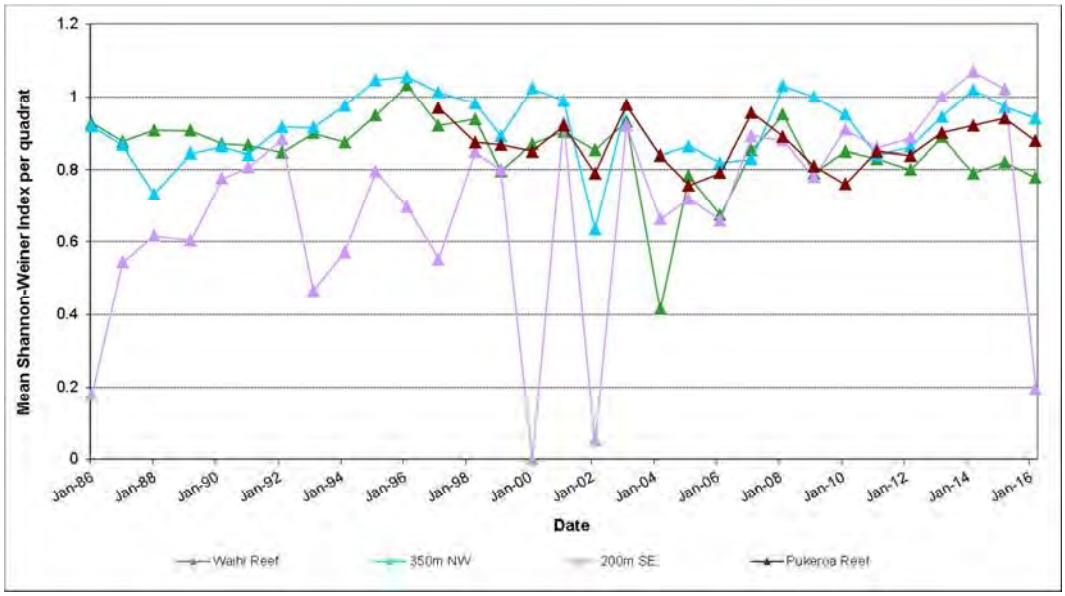

Figure 12 Mean Shannon-Weiner Indices per quadrat for summer surveys 1986-2016

Overall, neither survey provided evidence to suggest that the outfall was having any adverse effects on the intertidal reef communities of South Taranaki. Natural environmental factors, including coastal erosion, exposure and substrate mobility, appeared to be dominant drivers of species richness and diversity at the sites surveyed.

2.2 Air

2.2.1 Inspections

During each monthly site visit a good standard of housekeeping was observed and no unusual emissions to air were noticed. Occasional product odour was noted around the site during the surveys, but these were never objectionable or offensive and did not occur beyond the boundaries of the site. Onsite milk powder deposition ranged from very slight to high over the monitoring period.

2.2.2 Emission source analysis

Consent 4103 places a limit of 125 mg/m^3 of gas flow on powder emissions to the atmosphere from the spray drying process cyclone exhaust.

Fonterra's independent consultants, CRL Energy Limited, carried out powder emission measurements on drier exhaust stacks (Powders 1, 2, 3, 5, whey products, and casein) during December 2015. These results are presented in Table 13. Powder 4 could not be monitored due to safety and access restraints at the time of this survey.

Table 13 Emission source analysis 2015-2016

Plant		Date	Emission concentration (mg/m^3 0ºC, 1 atm, dry gas)
Powder 1	North stack	16 Dec 2015	2
	South Stack		2
Powder 2	Drier stack	16 Dec 2015	**291**
		29 Jan 2016	1
Powder 3	East stack	17 Dec 2015	53
	West stack		23
	Fluid Bed exhaust		38
Powder 4	North stack	-	-
	South stack		-
Powder 5	East stack	14 Dec 2015	20
	West stack		16
	North stack		20
	South stack		22
Whey	WPC Drier	17 Dec 2015	5
Casein	Drier stack 1	15 Dec 2015	19
	Drier stack 2		25
Consent limit			**125**

With the exception of Powder 2, the results from all of the tested driers were below the limit of 125 mg/m^3 prescribed by consent 4103. The emission concentration recorded from Powder 2 was over twice this limit. A follow up test was carried out in January after the emission control system had been repaired. The results from this test found that the particulate concentration of the emission was well under the consent limit (Table 13).

2.2.3 Ambient air quality monitoring

2.2.3.1 Deposition gauging

Many industries emit dust from various sources during operational periods. In order to assess the effects of the emitted dust, industries have been monitored using deposition gauges.

Deposition gauges are a modified bucket elevated on a stand to about 1.6 m. The buckets contain deionised water to ensure that any dust that settles out of the air is not re-suspended by wind. A copper sulphate solution at a concentration of 5 g/L acts as a preservative to prevent growth of algae and bacteria.

Deposition gauges were deployed at five sampling sites on six occasions around the Whareroa site for periods of approximately three weeks, between September and December 2015. The contents of the gauges were analysed for COD. The COD results are compared with the theoretical COD value for dry milk powder and a "total deposited milk powder" (TDMP) value is calculated.

The locations of the five air deposition monitoring sites are provided in Figure 13.

Figure 13 Location of air deposition sites

TDMP values for each monitoring site are presented in Table 14. The 2015-2016 results for the three sites nearest the powder plants are shown in Figure 15.

The Council's guideline value for total particulate deposited to cause a nuisance is 130 mg/m^2/day, but the Council does not have a specific guideline value for milk powder deposited. The Fonterra deposition survey determines deposition due to milk powder only, not total deposition.

The results for TMPD indicate that fallout occurred in the immediate vicinity of the powder plants and did not extend far beyond the site boundaries. Deposition of milk powder on the site is not of great environmental significance, providing the stormwater management systems perform satisfactorily.

Table 14 Total deposited milk powder values (mg/m^2/day) for each monitoring site during 2014-2015

Site ID	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
	7 August to 11 September	11 September to 1 October	1 October to 22 October	22 October to 16 November	16 November to 7 December	7 December to 22 December
AIR002409	102	**276**	**417**	**193**	**167**	121
AIR002416	70	18	40	73	54	0
AIR002422	38	20	20	28	26	27
AIR002424	54	50	30	33	21	28
AIR002426	20	21	16	39	17	25
TRC's guideline	**130 mg/m^2/day**					

As expected, the highest values of TDMP at or outside the boundaries were recorded for sites downwind (in relation to the prevailing winds from the north-west quadrant) of the powder plants. The staff car park entrance (AIR002409) recorded significantly higher levels of milk powder compared with the other sites. Levels recorded were similar to those for previous years, and peaked during October, around the peak of maximum milk powder production.

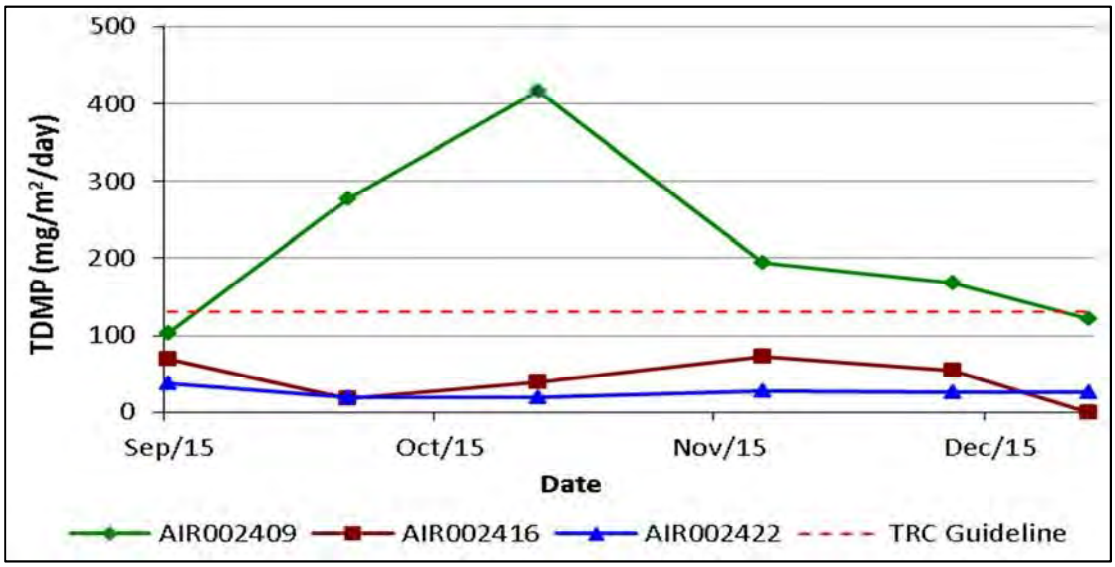

Figure 14 Milk powder fallout at three air deposition sites surrounding Whareroa during the 2015-2016 monitoring year

2.2.3.2 Inhalable particulate (PM10) monitoring

Special condition 9 of consent 4103 sets a limit on the emissions of PM_{10} to the atmosphere from the site to a maximum of 50 µg/m^3 (24 hour average).

During the reporting period, a "DustTrak" PM_{10} monitor was deployed on two occasions in the vicinity of the dairy complex. The deployments lasted from approximately 44 to 49 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM_{10} concentrations. The results from the sampling runs are shown in Figure 15.

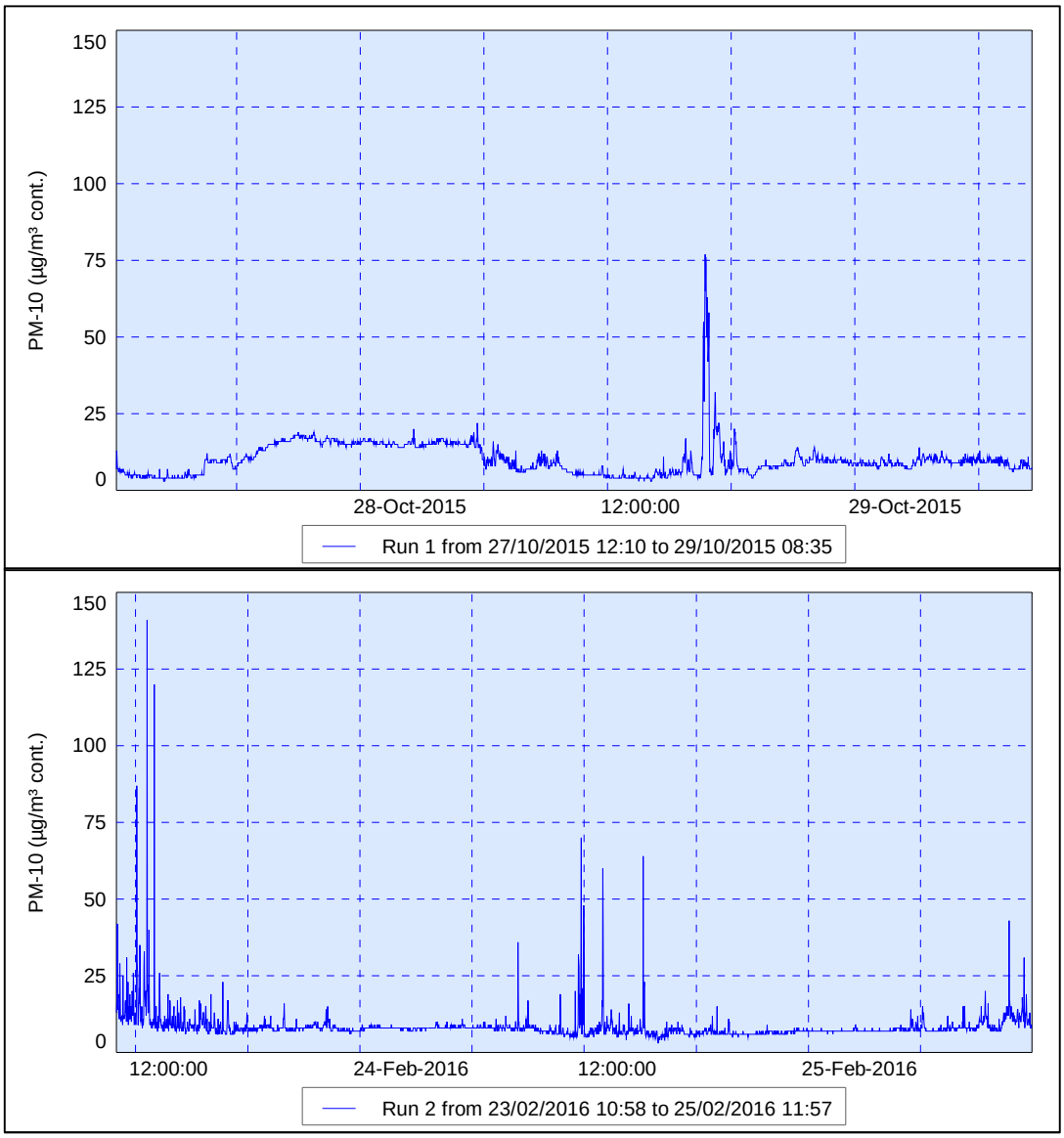

Figure 15 PM_{10} concentrations (µg/m³) at the Whareroa dairy complex

During the first 44-hour run, from 27 October to 29 October 2015, the average recorded PM_{10} concentration for the first twenty-four hour period was 10.9 µg/m³ and 8.7 µg/m³ for the second twenty-four hour period. These daily means equate to 21.8% and 17.4%, respectively, of the 50 µg/m³ value that is set by both the National Environmental Standard and the resource consent 4103-2.

During the second 49-hour run, from 23 February to 25 February 2016, the average recorded PM_{10} concentration for the first twenty-four hour period was 9.0 µg/m³ and 7.7 µg/m³ for the second twenty-four hour period. These daily means equate to 18% and 15.4%, respectively, of the 50 µg/m³ value that is set by both the National Environmental Standard and the resource consent 4103-2.

Background levels of PM_{10} in the region have been found to be around 11 µg/m³. Therefore, the results presented here indicate that onsite PM_{10} concentrations were below the regional background concentration during the survey period.

The full report for PM_{10} monitoring at the Whareroa site over the 2015-2016 season is provided in Appendix V.

2.2.3.3 Nitrogen oxide (NOx) monitoring

Ambient NO_x monitoring was incorporated into the monitoring programme in 1996-1997 to monitor the effects of the co-generation plant at the site. In October 1997, Fonterra commissioned a second co-generation plant (Co-gen 2) in response to increased milk coming to the site. NO_x is the main emission of concern associated with Fonterra's co-gen plants, from the perspective of potential environmental effects. Special condition 7 of consent 6273 set limits for nitrogen dioxide emissions:

> *"The consent holder shall control all emissions of nitrogen dioxide or its precursors to the atmosphere from the site, so as to ensure that the maximum ground level concentration of nitrogen dioxide measured under ambient conditions does not exceed 200 micrograms per cubic metre [$\mu g/m^3$] [one-hour average], or 100 $\mu g/m^3$ [twenty-four hour average], at or beyond the boundary of the site."*

The Council uses passive absorption discs to monitor ambient nitrogen dioxide (NO_2). The gases diffuse into the discs and any target gases (nitrogen dioxide) are captured. These discs are deployed for periods of approximately three weeks and then sent to an external laboratory for analysis.

Passive NO_x discs were placed in four locations surrounding Whareroa site (Figure 16) on two occasions during 2015-2016.

Figure 16 NO_x sample site locations around the Whareroa plant

From the average concentration measured, it is possible to calculate a theoretical maximum daily concentration that may have occurred during the exposure period. Council data on NO_x is gathered over a time period other than exactly 1 hour or 24 hours. There are mathematical equations used by air quality scientists to predict the maximum concentrations over varying time periods. These are somewhat empirical, in

that they take little account of local topography, micro-climates, diurnal variation, etc. Nevertheless, they are applied conservatively and have some recognition of validity.

One formula generally used is:

$$C(t_2) = C(t_1) \times (\frac{t_1}{t_2})^P$$

where C(t) = the average concentration during the time interval t, and p = a factor lying between 0.17 and 0.20. When converting from longer time periods to shorter time periods, using p = 0.20 gives the most conservative estimate (i.e. the highest calculated result for time period t_2 given a measured concentration for time period t_1). Using the 'worst case' factor of p = 0.20, the monitoring data reported above has been converted to equivalent 'maximum' 24 hour exposure levels.

Table 15 presents the actual levels found, theoretical maximum 1 hour and 24 hour concentrations of NO_x, and consent 6273 limits.

Table 15 Results of NOx monitoring during the 2015-2016 period

Monitoring period	NO_x concentration µg/m³											
	AIR002410			AIR002411			AIR002412			AIR002413		
	$NO_{x(Lab)}$	1 $h_{(Cal)}$	24 $h_{(Cal)}$	$NO_{x(Lab)}$	1 $h_{(Cal)}$	24 $h_{(Cal)}$	$NO_{x(Lab)}$	1 $h_{(Cal)}$	24 $h_{(Cal)}$	$NO_{x(Lab)}$	1 $h_{(Cal)}$	24 $h_{(Cal)}$
14 January to 3 February	3.4	11.69	6.19	4.8	16.5	8.74	4.3	14.78	7.83	4.1	14.09	7.46
3 February to 23 February	4.2	14.44	7.65	13	44.69	23.67	3.3	11.34	6.01	3.2	11	5.83
Consent limit		**200**	**100**		**200**	**100**		**200**	**100**		**200**	**100**

1 h = 1 hour average
24 h = 24 hour average

Throughout the 2015-2016 monitoring period NO_x concentrations remained well below consent condition limits (consent 6273, special condition 7 – 200 mg/m³ one hour average, 100 mg/m³ 24 hour average).

Variation in NO_x concentration values can be explained in terms of distance from possible NO_x sources, namely the plant and road traffic, and the wind speed and direction.

Since 2014, the Council has coordinated a region-wide monitoring programme to measure NOx, not only at individual compliance monitoring sites near industries that emit NOx, but simultaneously at urban sites (from the Council's regional state of the environment programme) to determine exposure levels for the general population. The programme involves deploying all measuring devices on the same day, with retrieval three weeks later. This approach will assist the Council to further evaluate the effects of local and regional emission sources and ambient air quality in the region.

Figure 17 presents the average NOx levels (theoretical 1 hour concentrations) from 11 industrial sites monitored around the region from 14 January 2016 to 3 February 2016 (Cheyne, 2016).

The results from Figure 17 show that NOx levels at Fonterra Whareroa are comparable with some of the larger production stations around Taranaki.

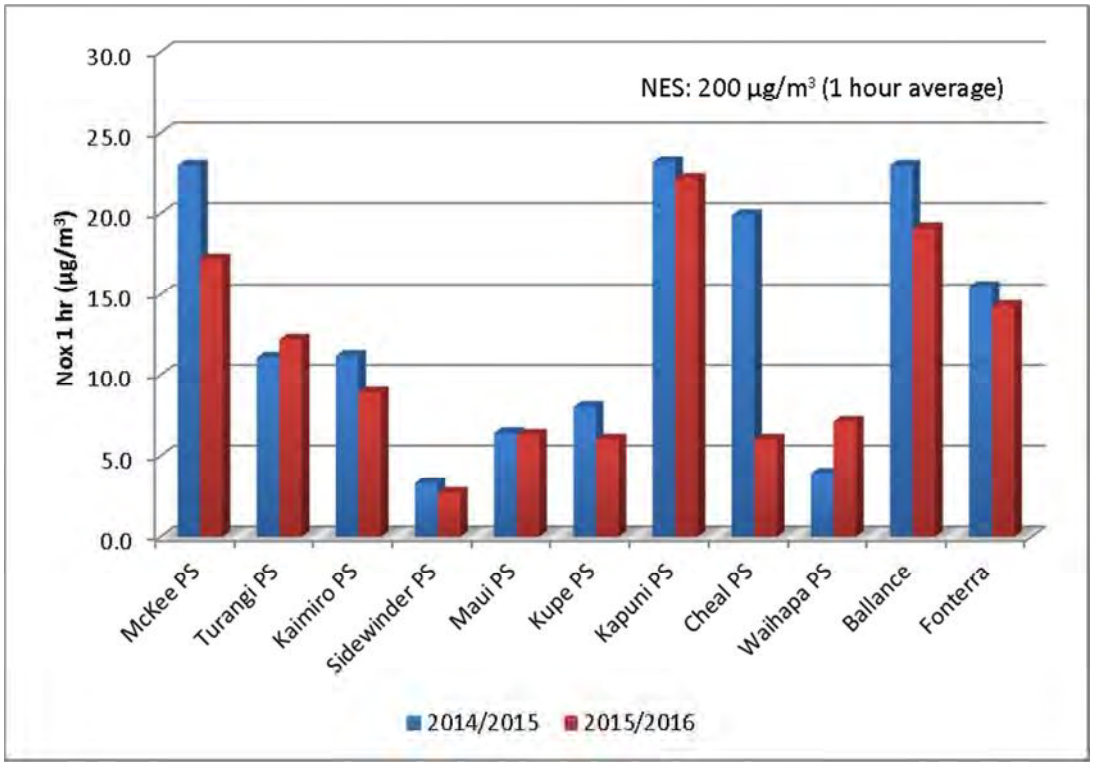

Figure 17 Average NOx levels at 11 monitored industrial sites throughout the region

2.3 Investigations, interventions, and incidents

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

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

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

In the 2015-2016 period, there were three recorded incidents in association with the Whareroa site.

Fonterra notified the Council of two occasions where wastewater discharges exceeded the consented limited for suspended solids (resource consent 1450; 1,000 g/m^3). On the 24th and 25th of September, suspended solids concentrations in the 24-hour wastewater composite samples were 1,528 g/m^3 and 2,556 g/m^3, respectively. The outfall discharge was inspected from the coastal lookout on the 26th of September. There was no

evidence of any adverse environmental effects resulting from the discharge. Rainfall preceding this incident meant that the nearby coast was discoloured with sediment, therefore the potential for resultant adverse effects was low. As there were two incidents late in the previous monitoring period where the suspended solids limit was breached, there was already a reasonable understanding as to why these exceedances were occurring. The primary driver of these exceedances was the high suspended sediment content in the Tangahoe River, from which water is abstracted for use in plant processes at the Whareroa site (TRC, 2015). As stated in the previous year's monitoring report, it is expected that the commissioning of the new Water Treatment Plant will nullify this issue. The plant will be equipped with settling ponds to contain the high level of solids discharged from its backwash; a process which will be fully automated. The Council deemed that there were no grounds to pursue enforcement action, as Fonterra were already working on a solution in the form of a new Water Treatment Plant, and until then, the turbidity of the Tangahoe River was largely out of their control.

Fonterra notified the Council of a breach in consent limit for powder emissions to the atmosphere (resource consent 4103; 125 mg/m^3). On the 16th December 2015, emissions testing carried out by CRL Energy Limited revealed that the Drier Stack in Powder Plant 2 was emitting a particulate concentration of 291 mg/m^3. An investigation revealed that the exceedance was due to a routine replacement of baghouse socks not taking place. As Powder Plant 2 was scheduled to shut down in December, it was deemed unnecessary to replace the socks, however, this production plan changed and the plant continued to operate. A subsequent inspection of the plant revealed that the socks had varying levels of wear affecting their performance. Replacement socks were ordered, however there was a delay in their arrival. After assessing Fonterra's explanation for the breach of consent, the Council deemed the incident to be avoidable and a result of inadequate procedural controls. As a consequence an Infringement Notice was issued. Fonterra have since made procedural changes to ensure that this does not occur again.

Fonterra notified the Council of a breach in consent limit for the concentration of fat in the wastewater discharge (resource consent 1450; 800 g/m^3). On the 2nd and 3rd of June, the fat concentration in the 24-hour wastewater composite samples were 1,100 g/m^3. The exceedance was due to a cream spill on site which entered the wastewater system. The spill resulted from a miscommunication between a tanker driver and staff operating the cream load out hose. Prior to the hose being connected to the tanker, the load out staff assumed the driver had made the connection and began pumping. The control room were alerted to stop the pump when the spill was discovered by an operator. The spill resulted in approximately 5,000 litres of cream with a 42% fat content being discharged into the site wastewater system. There were no visual effects at the outfall discharge point when observed from the coastal lookout. There was no evidence of milk fat on Ohawe Beach when inspected on the morning of the 3rd of June. After assessing Fonterra's explanation for the breach of consent, the Council deemed the incident to be avoidable and a result of human error. As a consequence an Infringement Notice was issued. Fonterra have since introduced a procedure to ensure this does not occur again. Fonterra also plan to introduce electronic controls which will prevent the load out pump from activating unless it is connected to a tanker.

3. Discussion

3.1 Discussion of site performance

3.1.1 Inspections

Routine inspections found site management was generally good throughout the monitoring period. Any minor issues that were identified were promptly resolved.

Additional inspections undertaken in relation to the construction of the new water intake found that consent conditions were complied with during the period under review. No adverse environmental effects were observed.

3.1.2 Provision of data

Fonterra provided its self monitoring data (i.e. abstraction and wastewater volume and composition information) to the Council in a timely manner.

3.1.3 Reporting

Condition 4 of consent 6273 requires:

The consent holder shall provide to the Council within five years from the granting of this consent and every six years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, how these might be applicable and/or implemented at the Whareroa site, and the costs and benefits of these advances;

b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify following consultation with the consent holder;

c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the Whareroa site; and

d) addressing any other issue relevant to the minimisation or mitigation of emissions from the Whareroa site that the Chief Executive, Taranaki Regional Council, considers should be included.

This report (dated July 2014) was due in October 2011 and received from Fonterra in November 2014. The Council accepted this delay. The report is next due in 2020.

Condition 4 of consent 4103 requires that:

The consent holder shall provide to the Taranaki Regional Council within five years from the granting of this consent, and every six years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, especially but not exclusively in respect of milk powder and other particulate emissions, how these might be applicable and/or implemented at the Whareroa site, and the costs and benefits of these advances; and

b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify following consultation with the consent holder; and

c) addressing any other issue relevant to the minimisation or mitigation of emissions from the Whareroa site that the Chief Executive, Taranaki Regional Council, considers should be included.

This report was received in July 2013 and is next due in 2019.

3.2 Environmental effects of exercise of consents

3.2.1 Abstractions

Fonterra remained compliant with the conditions set out in both water abstraction consents in the 2015-2016 monitoring period. This level of compliance is an improvement from the previous monitoring period (there was one minor breach of consent in September 2014).

3.2.2 Stormwater

Discharge sampling from the Tawhiti, Tangahoe and coastal stormwater ponds was undertaken on ten occasions over the 2015-2016 monitoring year. Stormwater discharges from all three ponds remained compliant with consent conditions during this period. There were single exceedances of limits for suspended solids and pH in discharges from the Tangahoe Ponds; however, neither exceedance constituted a breach of consent. Whareroa's stormwater system demonstrated a notable improvement in the year under review compared to the previous monitoring year (where there were two breaches of consent).

Both a freshwater biomonitoring survey and a freshwater biological inspection were undertaken during the 2015-2016 monitoring period in each of the tributaries that drain the stormwater ponds. In summary, the results from the surveys and inspections indicated that stormwater discharges from the factory had not had recent detrimental effects upon the streambed communities in the unnamed tributaries of the Tawhiti Stream and the Tangahoe River, or the unnamed coastal stream.

It is noted that management of the three stormwater catchments within the site is specifically addressed in Fonterra's Environmental Management Manual, and that improvements are an ongoing process in which the Council is closely involved.

3.2.3 Wastewater

A number of monitoring components were used to assess the wastewater discharge and its environmental effects. Fonterra measured effluent outflow, and collected 24-hour composite samples to analyse the wastewater composition. The Council collected ten wastewater grab samples and undertook two inter-laboratory comparisons of 24-hour composite samples with Fonterra. In terms of environmental effects, the marine outfall was visually inspected from the coastal look out during each Council inspection, and two marine ecological surveys were undertaken.

The limit on the daily volume of wastewater discharged was not exceeded during the 2015-2016 season. A leaking joint on the wastewater pipeline caused the flow meter to fail in September. While waiting for a replacement flow meter, the Council were satisfied that Fonterra were able to reliably estimate wastewater outflow.

Results of the composite monitoring by Fonterra showed that COD did not exceed the consent limit during the year. Wastewater fat content exceeded the consent limit over two days one occasion during the year, after there was a cream spill on site (discussed in further detail in Section 2.3). Suspended solids concentrations exceeded the consent limit on 12 days during the year, constituting five separate exceedance events. Only one of these events was recorded as an incident, and after receiving an explanation from Fonterra, the Council was satisfied that enforcement action was not required (further details of this incident in Section 2.3). The exceedance events were all attributed to the highly turbid Tangahoe River; from which water is abstracted for plant processes. It is expected that the new Water Treatment Plant will nullify this issue in the future.

Grab samples were collected by the Council on 10 occasions during the monitoring period. All of the results complied with consent limits (1450). However, as the consent limits in special condition 5, consent 1450 apply to the composite samples and not the grab samples, any exceedances would not have counted as a breach of consent. Enterococci counts have remained high; an issue that warrants ongoing investigation.

An inter-laboratory comparison was performed on 24-hour wastewater composite samples on two occasions during the year. The COD concentrations determined by each laboratory were within 10-25% of the mean in the first comparison, and were significantly different (>25% from the mean) in the second comparison. The suspended solids concentrations were within an acceptable level of agreement in the first comparison, and were within 10-25% of the mean in the second comparison.

Visual inspections of the outfall discharge were undertaken from the coastal lookout during routine inspections and following breaches of consent. The inspections found no evidence of the outfall discharge adversely affecting the coastal environment beyond the mixing zone designated in resource consent 1450. An inspection of the outfall discharge following the suspended solids breach in September determined that there was likely no significant impact on the receiving environment. When the outfall was inspected, the sea was discolored brown in both directions along the coast. Following rainfall, immediate near shore waters often become discolored due to the enhanced input of land-derived sediments from rivers. As the recent suspended solids exceedances have also tended to occur as a result of heavy rainfall, it is reasonable to infer that effects from these events cannot be elucidated from those of riverine inputs.

Spring and summer marine ecological surveys were undertaken in the year under review. Neither survey provided evidence to suggest that the outfall was having any adverse effects on the intertidal reef communities of South Taranaki. Natural environmental factors, including coastal erosion, exposure and substrate mobility, appeared to be dominant drivers of species richness and diversity at the sites surveyed.

3.2.4 Air discharges

Throughout the 2015-2016 monitoring period, emissions to air were monitored with visual inspections, odour surveys, testing of particulate emissions, gauging of milk

powder deposition, measurement of ambient nitrogen concentration, and PM_{10} monitoring.

No environmental impacts were detected beyond the site boundary with visual inspections or odour surveys.

Testing the particulate emissions of the Powder Plants found that one plant, Powder 2, was operating in breach of its consent (4103; condition 7). Results from the deposition gauge surveys, which were deployed at the time of the non-compliance, found that deposition of milk powder beyond the site boundaries remained below the Council's guideline level for total deposited particulate (130 mg/m^2/day). Based on these survey results, the environmental impact of milk powder deposition beyond the site boundary was negligible during the year under review (despite the non-compliance).

Fonterra remained compliant with consent 4103 (condition 9) based on the monitoring of inhalable particulates (PM_{10}) during the year under review. Based on these monitoring results, PM_{10} concentrations at Fonterra Whareroa remained below the regional background concentration.

Fonterra remained compliant with consent 6273 based on ambient NOx monitoring undertaken during the 2015-2016 monitoring period. Ambient NOx concentrations at Fonterra Whareroa were comparable with those at some of Taranaki's larger hydrocarbon production stations.

3.3 Evaluation of performance

A summary of Fonterra's compliance record for the year under review is set out in Tables 16-42.

Table 16 Summary of performance for Consent 0047

Purpose: ***To take water from Tawhiti Stream for use in manufacturing, cleaning and cooling***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Minimum river flow	Council's telemetered sites	Yes
2. Maintenance of a measuring device for recording daily rates of abstraction	Results are forwarded to the Council and reviewed by Council officers	Yes
3. Reserved right to temporarily suspend abstraction		N/A
4. Optional review provision re. environmental effects	No further reviews available	N/A
5. Limited rate of abstraction under certain flow and turbidity conditions	Council's telemetered sites	Yes
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 17 Summary of performance for Consent 1450

Purpose: ***To discharge dairy factory wastewater into the Tasman Sea***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Discharge of lactose solids managed in accordance with application		N/A
2. Approx. 400 m^3 lactose solids to be discharged prior to 1 August 2007		N/A
3. Removal of whey from wastewater	LOSS monitoring and Council composite inter-lab samples	Yes
4. Maintenance of a waste minimisation programme	LOSS monitoring	Yes
5. Limits on wastewater	LOSS monitoring, physicochemical monitoring of composite samples	**No** 12 SS breach days 2 fat breach days
6. Installation of an outfall extension	Outfall extended in 1997	Yes
7. Design details for outfall extension		N/A
8. Discharge cannot cause specified adverse effects beyond mixing zone	Visual inspections	Yes
9. Discharge complies with specified quality standards (prior to construction of outfall		N/A
10. Discharge of domestic sewage not permitted	Outfall samples tested for faecal indicator bacteria levels	Yes
11. Implementation of a contingency plan for action to be taken in the event of a spillage	Contingency plan submitted to Council	Yes
12. Installation of a pipeline monitoring system	The Company carries out an annual dive inspection of the entire length of the outfall pipeline. As a result of this inspection, any necessary repairs or maintenance works are carried out The most recent dive inspections were carried out in April and June 2016.	Yes
13. Review of technological advancements in dairy wastewater management	Fonterra submitted report to Council	Yes
14. Regular consultation with interested parties	Re-consenting meeting held in Oct 2016	Yes
15. Optional review provision re. adverse effects attributable to discharge	No further reviews available, expired June 2015 (renewal being processed)	N/A
16. Optional review provision re. environmental effects	No further reviews available, expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Improvement required** **High**

N/A = not applicable

Table 18 Summary of performance for Consent 3902

Purpose: ***To discharge stormwater into Tangahoe River***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option to prevent or minimise adverse effects	Site inspections	Yes
2. Catchment area not to exceed 10 ha	Site inspections	Yes
3. Consent holder to prepare and maintain contingency plan	Completed August 2014	Yes
4. Consent holder to prepare and maintain stormwater management plan	Completed August 2014	Yes
5. Effects on receiving waters	Site inspections, physicochemical analysis, freshwater biomonitoring surveys	Yes
6. No visible bacterial and/or fungal growths downstream	Site inspections and freshwater biomonitoring surveys	Yes
7. Limits on chemical composition of discharge	Physicochemical analysis	Yes
8. Maintenance of fencing and planting of riparian margin	Site inspections	Yes
9. Optional review provision re. environmental effects	Next optional review in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 19 Summary of performance for Consent 3907

Purpose: ***To discharge stormwater into Tawhiti Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option to prevent or minimise adverse effects	Site inspections	Yes
2. Catchment area not to exceed 13 ha	Site inspections	Yes
3. Consent holder to prepare and maintain contingency plan	Completed August 2014	Yes
4. Consent holder to prepare and maintain stormwater management plan	Completed August 2014	Yes

Purpose: ***To discharge stormwater into Tawhiti Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Effects on receiving waters	Site inspections, physicochemical analysis, freshwater biomonitoring surveys	Yes
6. No visible bacterial and/or fungal growths downstream	Site inspections and freshwater biomonitoring surveys	Yes
7. Limits on chemical composition of discharge	Physicochemical analysis	Yes
8. Maintenance of fencing and planting of riparian margin	Site inspections	Yes
9. Optional review provision re. environmental effects	Next optional review in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 20 Summary of performance for Consent 4103

Purpose: ***To discharge emissions to air from the manufacture and processing of milk products***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option to prevent or minimise adverse effects	Review of contingency and management plans and air quality monitoring	**No** See section 2.3
2. Measures representing best practicable option may be reviewed		N/A
3. Any alterations to the plant, processes or operations must be approved by Council	No alterations	N/A
4. Written report with regard to emissions, improvements and mitigation within five years and every six thereafter	Report submitted July 2013	Yes
5. BPO to minimise environmental effects	Liaison with consent holder, review of report submitted as per condition 4	**No** See section 2.3
6. Use of most appropriate process equipment and controls to minimise emissions and impacts	Report detailing emissions and technology received	Yes
7. Powder emissions to atmosphere <125 mg/m^3	Air quality monitoring	**No** Powder 2 exceeded limit
8. Limits on depositions beyond boundary	Air quality monitoring	Yes
9. PM_{10} not to exceed 50 $\mu g/m^3$	Air quality monitoring	Yes

Purpose: ***To discharge emissions to air from the manufacture and processing of milk products***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
10. No odour at or beyond boundary	Inspections	Yes
11. Monitoring of emissions	Air quality monitoring	Yes
12. Annual meeting with Council and submitters	Meeting undertaken with interested parties Oct 2016	Yes
13. Powder 5 can only process skim milk powder if Council are given 5 days notice and a monitoring programme for the emissions is developed		N/A
14. Review of conditions if Condition 13 activated		N/A
15. Council may review consent for the purpose of dealing with any adverse effects	Next optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**Improvement required**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 21 Summary of performance for Consent 4133

Purpose: ***To discharge stormwater to the unnamed coastal stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option to prevent or minimise adverse effects	Site inspections	Yes
2. Catchment area not to exceed 21 ha	Site inspections	Yes
3. Consent holder to prepare and maintain contingency plan	Completed August 2014	N/A
4. Consent holder to prepare and maintain stormwater management plan	Completed August 2014	N/A
5. Effects on receiving waters	Site inspections, physicochemical analysis, freshwater biomonitoring surveys	Yes
6. No visible bacterial and/or fungal growths downstream	Site inspections and freshwater biomonitoring surveys	Yes
7. Limits on chemical composition of discharge	Physicochemical analysis	Yes

Purpose: ***To discharge stormwater to the unnamed coastal stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
8. Maintenance of fencing and planting of riparian margin	Site inspections	Yes
9. Optional review provision re. environmental effects	Next optional review in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A= not applicable

Table 22 Summary of performance for Consent 4406

Purpose: ***To discharge laboratory wastes onto and into land***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of action likely to minimise adverse effects on the environment	Management plan reviewed by Council officers	Yes
2. Enacted in accordance with the terms of the application	No longer disposed of to land	N/A
3. Limitations on size of discharge	No longer disposed of to land	N/A
4. Management plan for discharge site provided	Reviewed by Council officers	Yes
5. Siting of discharge pits	No longer disposed of to land	N/A
6. Limitations on placing of discharge sites	No longer disposed of to land	N/A
7. Disposal pits cannot intercept water table	No longer disposed of to land	N/A
8. Contaminants entering other bodies of water not permitted	No longer disposed of to land	N/A
9. Cannot lead to adverse impacts on surrounding bodies of water	No longer disposed of to land	N/A
10. Items permitted to be discharged	No longer disposed of to land	N/A
11. Earth cover over discharge	No longer disposed of to land	N/A
12. Soil and vegetation cover over pits	No longer disposed of to land	N/A
13. Maintenance of soil cover	No longer disposed of to land	N/A
14. Records to be kept on pit usage	No longer disposed of to land	N/A
15. Optional review provision re. environmental effects	No further reviews available, expires June 2022	N/A

Purpose: *To discharge laboratory wastes onto and into land*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
Overall assessment of consent compliance and environmental performance in respect of this consent		**N/A consent not currently in use**

N/A = not applicable

Table 23 Summary of performance for Consent 4508

Purpose: *To abstract water from the Tangahoe Riverr*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Reserved right to temporarily suspend abstraction		N/A
2. Maintenance of a measuring device for recording daily rates of abstraction	Measuring device is well maintained	Yes
3. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 24 Summary of performance for Consent 4927

Purpose: To discharge river silt and sand to the Tawhiti Stream		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Discharge operated on a continuous purge basis		Yes
2. Raising the suspending solids of the receiving water not permitted	Freshwater biomonitoring originally took place but was stopped due to no adverse effects	Yes
3. Adverse effects not to be present below discharge	Biological inspection, fish survey	Yes
4. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 25 Summary of performance for Consent 4953

Purpose: ***To erect, place and maintain earth dams at the headwaters of an unnamed tributary of the Tangahoe River***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Safe maintenance and operation of dams	Management plan and site inspections	Yes
2. Notification of maintenance work		N/A
3. Prevention of discharge into the watercourse during maintenance		N/A
4. Removal of structures when no longer required		N/A
5. Optional review provision re. environmental effects	Consent expired June 2016 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 26 Summary of performance for Consent 4977

Purpose: ***To erect, place and maintain a marine outfall***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification of maintenance work		N/A
2. Construction and maintenance in accordance with documentation		N/A
3. Adoption of action likely to minimise adverse effects on the environment		N/A
4. Reinstatement of intertidal construction area		N/A
5. Visibility of outfall pipeline	Site inspections	Yes
6. Removal of outfall pipeline when no longer required		N/A
7. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 27 Summary of performance for Consent 5013

Purpose: ***To construct and maintain a rock seawall***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works	Maintenance not required during the period under review	N/A
2. To be constructed and maintained in accordance with the application		N/A
3. Minimisation of disturbance to seabed and foreshore		N/A
4. Revegetation following the completion of the wall		N/A
5. Monitoring of erosion	Marine ecological inspections	Yes
6. Compensation to neighbours in the event of loss of land from erosion		N/A
7. Removal of rock wall when no longer required		N/A
8. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 28 Summary of performance for Consent 5015

Purpose: ***To dam an unnamed stream between the Tangahoe River and the Waihi Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works	No works undertaken during period under review	N/A
2. To be constructed and maintained in accordance with the application		Yes
3. Minimisation of discharge of contaminants		N/A
4. Removal of dam when no longer required		N/A
5. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**N/A consent not in use during period under review**

N/A = not applicable

Table 29 Summary of performance for Consent 5016

Purpose: ***To divert an unnamed stream between the Tangahoe River and the Waihi Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works	No works undertaken during period under review	N/A
2. To be constructed and maintained in accordance with the application	Maintenance not required during the period under review	N/A
3. Minimisation of discharge of contaminants		N/A
4. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**N/A consent not in use during period under review**

N/A = not applicable

Table 30 Summary of performance for Consent 5017

Purpose: ***To drain and excavate the bed of an unnamed stream between the Tangahoe River and Waihi Stream and to erect, place, use and maintain outfall and stream diversion pipelines and associated structures***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works	No works undertaken during period under review	N/A
2. To be constructed and maintained in accordance with the application	Maintenance not required during the period under review	N/A
3. Natural colour of outfall		Yes
4. Revegetation of site following construction		Yes
5. Removal of dam when no longer required		N/A
6. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**N/A consent not in use during period under review**

N/A = not applicable

Table 31 Summary of performance for Consent 5036

Purpose: ***To discharge waste material onto land***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of action likely to minimise adverse effects on the environment	Review of management plan	Yes
2. Disposal of unprocessable wastes via irrigation to comply with nitrogen and COD loading limits	Not monitored during period under review	N/A
3. Exercise of consent in accordance with applications	Site inspections and liaison with consent holder	Yes
4. Limits on discharge of stormwater sump cleanings and unprocessable dairy waste	Site inspections and liaison with consent holder	Yes
5. Consent holder to provide management plan	Latest version received January 2013	Yes
6. Discharge not within 50 m of bore, 25 m of surface water, 100 m from cliff	Site inspections	Yes
7. Disposal pit(s) not to intercept the water table	Site inspections	Yes
8. Exercise of consent not to lead to contaminants entering a water body via overland surface flows	Not monitored during period under review; no incidents reported	N/A
9. Exercise of consent not to result in adverse impacts on groundwater	Not monitored during period under review; no incidents reported	N/A
10. Discharged material to be covered by 50 mm soil	Site inspections	Yes
11. Liquid to be removed from disposal pits prior to covering	Site inspections	Yes
12. Only materials outlined in application to be discharged	Site inspections and requirements in management plan	Yes
13. Disposal pits to be reinstated and re-vegetated	Site inspections	Yes
14. Cover layer to be suitably maintained	Site inspections	Yes
15. Disposal not to give rise to objectionable or offensive odours beyond boundary	Site inspections	Yes
16. Consent holder to maintain records of discharge	Received November 2014	Yes
17. Discharge of unprocessable wastes to occur only after all other options have been exhausted	Site inspections, liaison with consent holder	Yes
18. Optional review provision re. environmental effects	No further reviews available, expires June 2022	N/A

Purpose: ***To discharge waste material onto land***		
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**

N/A = not applicable

Table 32 Summary of performance for Consent 5044

Purpose: ***To discharge emissions into the air from the disposal of laboratory wastes, and stormwater and sump cleanings onto and into land***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of action likely to minimise adverse effects on the environment	Set out in management plan and emission report submitted to Council	Yes
2. To be constructed and maintained in accordance with the application	Site inspections	Yes
3. Approval of a management plan	Reviewed by Council officers	Yes
4. Discharges resulting in no objectionable odours at site boundary	Site inspections	Yes
5. Characteristics of an objectionable odour		N/A
6. Optional review	No further reviews available, expires June 2022	Yes
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 33 Summary of performance for Consent 5143

Purpose: ***To erect, place, use and maintain a water intake structure in the bed of the Tangahoe River for industrial water supply purposes***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works		N/A
2. To be constructed and maintained in accordance with the application	Maintenance not required during the period under review	N/A
3. Adoption of action likely to minimise adverse effects on the environment	Requirements of the management plan and visited during site inspections	Yes
4. Minimisation of disturbance to the riverbed	Management plan and site inspections	Yes
5. Removal of infrastructure when no longer required		N/A

Purpose: *To erect, place, use and maintain a water intake structure in the bed of the Tangahoe River for industrial water supply purposes*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 34 Summary of performance for Consent 10208

Purpose: *To construct, place and use a water intake structure in the bed of the Tangahoe River*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Structure shall be constructed in accordance with specified documentation	Site inspections and liaison with consent holder	Yes
2. Signage requirements	Site inspections and liaison with consent holder	Yes
3. Meet with a Council Officer prior to commencement of works	Site inspections and liaison with consent holder	Yes
4. Erosion control requirements	Site inspections and liaison with consent holder	Yes
5. Sediment control requirements	Site inspections and liaison with consent holder	Yes
6. Earthwork stabilisation requirements	Site inspections and liaison with consent holder	Yes
7. Works notification requirement	Liaison with consent holder	Yes
8. Concrete work to be isolated from running water	Site inspections and liaison with consent holder	Yes
9. Concrete to remain isolated from running water for 48 hours	Site inspections and liaison with consent holder	N/A
10. Bank protection structures shall be installed following the installation of the coffer dam (in accordance with specified documentation)	Site inspections and liaison with consent holder	N/A
11. No instream works between 1 May and 31 October inclusive	Site inspections and liaison with consent holder	Yes
12. Streambed disturbance to be minimised and reinstated as far as practicable	Site inspections and liaison with consent holder	Yes
13. Reasonable steps taken to minimise instream effects from sediment	Site inspections and liaison with consent holder	Yes
14. Adopt best practicable option to prevent/ minimise adverse effects	Site inspections and liaison with consent holder	Yes
15. Water flow shall not be adversely affected	Site inspections and liaison with consent holder	Yes

Purpose: *To construct, place and use a water intake structure in the bed of the Tangahoe River*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
16. Following works, river banks shall not be steeper than the existing natural banks	Site inspections and liaison with consent holder	N/A
17. Works to remain responsibility of Consent Holder (and subsequent erosion, etc)	Site inspections and liaison with consent holder	N/A
18. Protocols adopted if archaeological remains are discovered	Site inspections and liaison with consent holder	N/A
19. Consent lapse clause	Consent has been exercised	N/A
20. Consent review clause	Next optional review in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 35 Summary of performance for Consent 5148

Purpose: *To discharge river silt and sand into the Tangahoe River*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Discharge operated on a continuous purge basis	Management plan	Yes
2. Discharge cannot cause specified adverse effects beyond mixing zone	Site inspections and previous freshwater biomonitoring surveys	Yes
3. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 36 Summary of performance for Consent 5337

Purpose: *To dam an unnamed tributary of the Tawhiti Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to maintenance works	No maintenance work undertaken during monitoring period	N/A
2. Adoption of action likely to minimise discharge of contaminants and adverse effects on the environment	Management plan and site inspections	Yes

Purpose: ***To dam an unnamed tributary of the Tawhiti Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
3. Safe operation and maintenance of the dam		N/A
4. Optional review provision re. environmental effects	Consent expired June 2016 (renewal being processed)	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 37 Summary of performance for Consent 5845

Purpose: ***To remove, reconstruct, erect, place and maintain a dam structure and associated fish pass on the Tawhiti Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification before removal of structure		N/A
2. Notification before maintenance work	No maintenance work undertaken during monitoring period	N/A
3. To be constructed and maintained in accordance with the application		Yes
4. Adoption of action likely to minimise discharge of contaminants and adverse effects on the environment	Management plan and site inspection	Yes
5. Adoption of action likely to minimise discharge of contaminants and adverse effects on water quality	Reviewed in management plan	Yes
6. Minimisation of disturbance to streambed		N/A
7. Reinstatement of disturbed areas		Yes
8. Obstruction of fish passage not permitted	Fish survey not undertaken during monitoring period, next due in 2016-2017	N/A
9. Design of fish passage required prior to construction		N/A
10. Screening of intake		Yes
11. Maintenance of structures		Yes
12. Reinstatement of area after structure no longer required		N/A
13. Optional review provision re. environmental effects	Consent expired June 2015 (renewal being processed)	N/A

Purpose: *To remove, reconstruct, erect, place and maintain a dam structure and associated fish pass on the Tawhiti Stream*		
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**

N/A = not applicable

Table 38 Summary of performance for Consent 6257

Purpose: *To discharge emissions to air from dual fuel boilers*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option to prevent or minimise adverse environmental effects	Consent not yet exercised	N/A
2. Exercise of consent in accordance with application	Consent not yet exercised	N/A
3. Characteristics of coal similar to that described in application	Consent not yet exercised	N/A
4. Report on best practicable option within 3 months of commissioning	Consent not yet exercised	N/A
5. Review of measures relating to best practicable option	Consent not yet exercised	N/A
6. Minimisation of emissions	Consent not yet exercised	N/A
7. Minimum height of discharges 60 m	Consent not yet exercised	N/A
8. Approval from Council prior to plant alterations	Consent not yet exercised	N/A
9. Discharges not to exceed 20% obscuration	Consent not yet exercised	N/A
10. Discharges of particulate not to exceed 100 mg/Nm^3	Consent not yet exercised	N/A
11. Sulphur dioxide discharges not to exceed 385 kg/hr	Consent not yet exercised	N/A
12. Discharges of particulate not to exceed 43 kg/hr	Consent not yet exercised	N/A
13. Discharges of nitrogen oxides not to exceed 319 kg/hr	Consent not yet exercised	N/A
14. Maximum ground level concentration of sulphur dioxide not to exceed 350 mg/m^3	Consent not yet exercised	N/A

Purpose: ***To discharge emissions to air from dual fuel boilers***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
15. Maximum ground level concentration of nitrogen dioxide not to exceed 350 mg/m^3	Consent not yet exercised	N/A
16. Maximum ground level concentration of PM_{10} not to exceed 50 mg/m^3	Consent not yet exercised	N/A
17. Maximum ground level concentration of each or any metal not to exceed guideline values	Consent not yet exercised	N/A
18. Maximum ground level concentration of other contaminants not to exceed workplace exposure standards	Consent not yet exercised	N/A
19. Discharges not to give rise to significant ecological effects	Consent not yet exercised	N/A
20. Analysis of coal on a monthly basis	Consent not yet exercised	N/A
21. Consent holder to install and maintain various measuring devices	Consent not yet exercised	N/A
22. Consent holder to undertake annual source emission monitoring	Consent not yet exercised	N/A
23. Monitoring programme prepared	Provisional programme in place	Yes
24. Reporting regarding advances in technology	Consent not yet exercised	N/A
25. Reporting regarding emissions	Due 12 months from exercise of consent	N/A
26. Cultural impact report	Due 12 months from exercise of consent	N/A
27. Consent holder to undertake annual liaison meetings	Within 12 months of commissioning of energy centre	N/A
28. Consent lapse		N/A
29. Review of conditions	Next optional review in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**N/A Consent not yet exercised**

N/A = not applicable

Table 39 Summary of performance for Consent 6273

Purpose: ***To discharge emissions into the air from 'Cogen I' and 'Cogen II' gas-fired co-generation energy generating plants***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practical option to minimise adverse effects on environment	Site inspections, report as required by condition 4	Yes
2. Review of best practical option measures	No review undertaken	N/A
3. Approvals to be obtained for alterations	No alterations during period under review	N/A
4. Report on emissions and new technologies	Next report due in 2020	N/A
5. Carbon monoxide < 10 mg/m^3 (8 hour exposure) or <30 mg/m^3 (one-hour exposure)	Not monitored during period under review	N/A
6. Sum of nitrogen oxides not to exceed 48 g/s	Not monitored during period under review	N/A
7. Nitrogen dioxide not to exceed 200 $\mu g/m^3$ (one-hour average) or 100 $\mu g/m^3$ (24-hour average)	Air quality monitoring	Yes
8. PM_{10} not to exceed 50 $\mu g/m^3$ (24-hour average)	Air quality monitoring	Yes
9. Control of emissions so that max concentration of any contaminant is not increased by more than $1/30^{th}$ of the relevant Workplace Exposure Standard	Not monitored during period under review	N/A
10. Minimum height of discharge 17.5 m above ground		Yes
11. Minimisation of emissions and impacts by selection of most appropriate equipment etc.	Air quality monitoring As discussed in Report required by condition 4	Yes
12. Consent holder to undertake monitoring of emissions and their effects	Monitoring plan in place	Yes
13. No emissions of visible smoke or plume of water vapour	Inspections	Yes
14. Water treatment regime to the satisfaction of Council	Inspections	Yes
15. Optional review of consent	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**

N/A = not applicable

Table 40 Summary of performance for Consent 7465

Purpose: ***To discharge emissions into the air from the combustion of waste wood packaging***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Only untreated timber packaging to be burned	Site inspections	Yes
2. Total volume not to exceed $4m^3$	Site inspections	Yes
3. Best practicable option to minimise environmental effects	Site inspections	Yes
4. Regard to wind and weather conditions	Site inspections	Yes
5. Discharge not to give rise to contaminants beyond boundary	No complaints received	Yes
6. Discharge not to give rise to odour beyond the boundary	No complaints received	Yes
7. Records to be maintained of burning events		Yes
8. Consent lapse if not given effect before 2014	Activity undertaken	N/A
9. Optional review of consent	Next scheduled optional review in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

During the 2015-2016 year, Fonterra demonstrated an overall level of environmental performance which required improvement. A high level of administrative performance was demonstrated. Ratings are defined in Section 1.1.4. Due to two incidents requiring Infringement Notices, improvement was required in Fonterra's compliance and environmental performance concerning resource consents 4103 and 1450. Fonterra's compliance and environmental performance was deemed high for the remaining 22 consents that were assessed.

3.4 Recommendations from the 2014-2015 Annual Report

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

1. THAT monitoring of air emissions from the Whareroa plant in the 2015-2016 year continues at the same level as in 2014-2015.

2. THAT monitoring of water discharges (including stormwater) and abstractions for the Whareroa plant in the 2015-2016 year continues at the same level as in 2014-2015.

3. THAT freshwater and marine ecological monitoring in the 2015-2016 year continues at the same level as in 2014-2015.

4. THAT combined inspections of the Whareroa plant for monitoring of air emissions and of water abstractions and discharges in the 2015-2016 year continues at the same level as in 2014-2015.

These recommendations were all implemented during the 2015-2016 period.

3.5 Alterations to monitoring programmes for 2016-2017

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 RMA;
- its obligations to monitor emissions/discharges and effects under the RMA; and
- to report to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

In the case of the Whareroa site, the programme for 2015-2016 was unaltered from 2014-2015.

It is proposed that for 2016-2017, the monitoring programme remains unaltered from that of 2015-2016.

A recommendation to this effect is attached to this report.

4. Recommendations

1. THAT monitoring of air emissions from the Whareroa plant in the 2016-2017 year continues at the same level as in 2015-2016.

2. THAT monitoring of water discharges (including stormwater) and abstractions for the Whareroa plant in the 2016-2017 year continues at the same level as in 2015-2016.

3. THAT freshwater and marine ecological monitoring in the 2016-2017 year continues at the same level as in 2015-2016.

4. THAT combined inspections of the Whareroa plant for monitoring of air emissions and of water abstractions and discharges in the 2016-2017 year continues at the same level as in 2015-2016.

Glossary of common terms and abbreviations

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

Anlene	Arrange of dairy products enriched with a scientifically-formulated complex of essential bone nutrients. These include vitamin D, zinc, magnesium and, in New Zealand and Asia, Phyto K or Phylloquinone, which acts to lock in bone nutrients. Anlene is available in 13 countries across Asia and Australasia. In New Zealand it is available as a fresh low-fat milk drink and yoghurt.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODCF	Carbonaceous filtered biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
Casein	Either acid casein or rennet casein. Acid casein is produced by the controlled acidification of pure, pasteurised skim milk to pH 4.6. Acidification is achieved by the addition of a mineral acid or lactic fermentation. Rennet casein is produced by the controlled precipitation of casein from pure, pasteurised skim milk through the action of rennet. Casein is suitable for making nutritional foods and processed cheese. Casein also has a long history of use in non-food applications such as paper and cardboard coating, adhesives, leather tanning and plastics.
cfu	Colony forming units. A measure of the concentration of bacteria.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
E.coli	*Escherichia coli,* an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as the number of colonies per 100 ml.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as the number of colonies per 100 ml.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as the number of colonies per 100 ml.
Free Cl_2	Free available chlorine.
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.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
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.
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 seven times the width of the stream at the discharge point.
MPC	Milk protein concentrates. Manufactured by membrane filtration through which dairy proteins are isolated from fresh skim milk. Milk protein concentrates are used in infant formula, adult medical foods, enteral foods, weight management products, liquid nutritional beverages, cheese products, cultured foods, powdered dietary supplements, and sports nutrition products.
mS/m	Millisiemens per metre.
NO_x	Nitrogen oxides in emissions to air.
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.
PLC	Programmable Logic Controller, a type of computer with multiple input and output arrangements commonly used in industry for automation of processes.

PM_{10}	Relatively fine airborne particles (less than 10 micrometre diameter.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and subsequent amendments.
SMP	Skim milk powder.
$SQMCI_S$	Takes into account taxa abundances as well as sensitivity to pollution.
SS	Suspended solids.
TDMP	Total deposited milk powder.
Temp	Temperature, measured in °C.
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.
WMP	Whole milk powder.
WPC	Whey protein concentrates are manufactured from fresh whey by membrane filtration processes. They are suitable for use in a variety of applications such as yoghurts, beverages, dairy desserts and meat systems, nutritional products and infant food.

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

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Appendix I

Resource consents held by Fonterra Whareroa

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

Water Permit

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Change To Conditions Date:	22 May 1998 [Granted: 1 May 1996]

Conditions of Consent

Consent Granted:	To take up to 30,000 cubic metres/day [347 litres/second] of water from the Tawhiti Stream in the Tangahoe Catchment for processing and manufacture of dairy products, cleaning of plant and cooling purposes, provided the total abstraction in the Tangahoe Catchment by the consent holder does not exceed 30,000 cubic metres/day at any time at or about GR: Q21:229-780
Expiry Date:	1 June 2015
Review Date(s):	June 1999, June 2004
Site Location:	Main South Road Hawera
Legal Description:	Lot 1 DP 3710 Pt Lot 1 DP 2629 Lot 1 DP 1087 Blk X Hawera SD
Catchment:	Tangahoe
Tributary:	Tawhiti

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

General conditions

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

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

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

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

Special conditions

1. That the abstraction shall be managed to ensure that a flow of not less than 50 litres/second is maintained at all times in the Tawhiti Stream, as measured at the flow recorder site at or about Q21:243-773.

2. That the consent holder shall maintain, to the satisfaction of the Chief Executive, Taranaki Regional Council, a measuring device capable of recording daily rates of abstraction and shall make such records available to the Chief Executive, Taranaki Regional Council, upon request.

3. That the Taranaki Regional Council reserves the right to temporarily suspend or reduce the abstraction during extreme low flow events, in order to protect the biological communities in the stream, in accordance with section 329 of the Resource Management Act 1991.

4. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 1999 and/or June 2004 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects of the abstraction on the environment.

5. That all times when the flow in the Tawhiti Stream, as measured at the flow recorder site at or about Q21:243-773, is less than 800 litres/second, and, when the turbidity of the Tangahoe River at or about Q21:258-742 is less than 150 nephelometric turbidity units [NTU], then, the maximum rate of abstraction shall not exceed 184 litres/second.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Coastal Permit

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Change To Conditions Date:	19 September 2006 [Granted: 12 September 1995]

Conditions of Consent

Consent Granted:	To discharge up to 40,000 cubic metres per day of dairy factory wastewater from the Whareroa Dairy Factory Complex via a marine outfall into the Tasman Sea at or about GR: Q21:214-747
Expiry Date:	1 June 2015
Review Date(s):	June 2007, June 2010
Site Location:	Tasman Sea, Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 & Foreshore Blks IX & X Hawera SD
Catchment:	Tasman Sea

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

General conditions

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

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

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

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

Special conditions

Conditions 1 to 2 - unchanged

1. All whey and whey permeate shall be removed from the wastewater to the satisfaction of the Chief Executive, Taranaki Regional Council, by 31 December 1996, except as provided for in condition 9.

2. The consent holder shall maintain, to the satisfaction of the Chief Executive, Taranaki Regional Council, a loss minimisation programme to reduce product losses to wastewater throughout the term of this consent.

Condition 3 – changed

3. Wastewater may include all wastewater from dairy factory processes and associated processes, and stormwater, and shall comply with the following standards, based on analysis of 24 hour composite time-proportioned samples:

suspended solids	≤ 1,000 milligrams/litre
total fats	≤ 800 milligrams/litre
chemical oxygen demand [COD]	≤ 7000 milligrams/litre

Conditions 4 to 13 – unchanged

4. The consent holder shall, by 31 August 1996, or such later time before 31 August 1997 as the Chief Executive, Taranaki Regional Council, may approve, install an outfall extension to the satisfaction of the Chief Executive, Taranaki Regional Council, which will result in the achievement of no significant visual, chemical or ecological impacts attributable to the discharge, outside a mixing zone, established in condition 6, or above mean low water spring level.

5. The consent holder shall supply plans and design details for the outfall extension and diffuser to the satisfaction of the Chief Executive, Taranaki Regional Council, by 28 February 1996.

6. Following the outfall extension, the discharge authorised by this consent shall not give rise to any of the following effects in the Tasman Sea beyond a mixing zone of 200 metres from the centre line of the outfall diffuser:

   a) the production of conspicuous oil or grease films, scums or foams, or floatable suspended materials;
   b) any conspicuous change in the colour or visual clarity
   c) any emission of objectionable odour;
   d) any significant adverse effects on aquatic life.

7. Up to such time as an outfall extension is installed and operational, the discharge shall comply with the following standards, based on analysis of 24-hour flow-proportioned samples:

suspended solids	< 1,000 milligrams/litre
fats [total]	< 600 milligrams/litre
pH	within range 4.5 - 11.5

8. There shall be no direct discharge of raw or treated domestic sewage from the Whareroa site pursuant to this consent.

9. The consent holder shall provide for written approval of the Chief Executive, Taranaki Regional Council, a contingency plan outlining all procedures to be undertaken in the event of a spillage of stored chemicals, accidental discharge, accumulation of off-specification effluent or accumulation under emergency conditions of whey or whey permeate which, if discharged, would result in the breaching of other conditions of this consent; such a plan to be in the hands of the Chief Executive, Taranaki Regional Council, no later than 1 December 1995.

10. The consent holder shall install, to the satisfaction of the Chief Executive, Taranaki Regional Council, a system to monitor pipeline structural performance.

11. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, a report reviewing any technological advances in dairy wastewater management and how these might be applicable at the Whareroa site, and detailing any measures taken by the consent holder to improve or minimise the wastewater discharge.

12. The consent holder and staff of the Taranaki Regional Council shall meet as appropriate, and at least once per year, with representatives of Tangahoe Iwi, Ngati Ruanui Iwi and other submitters to the consent, and any other interested party, at the discretion of the Chief Executive, Taranaki Regional Council, to discuss any matter relating to the exercise of this resource consent, in order to facilitate ongoing consultation.

13. The Taranaki Regional Council may review, under section 128 of the Resource Management Act 1991, the conditions of this consent if, at any time after the outfall extension is installed, any significant visual, chemical or ecological impacts attributable to the discharge occur beyond a mixing zone established in condition 6 or above mean low water spring level.

Condition 14 – changed

14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2007 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 19 September 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	14 February 2014
Commencement Date:	14 February 2014

Conditions of Consent

Consent Granted:	To discharge stormwater from the Whareroa milk processing site into an unnamed tributary of the Tangahoe River
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	89 Whareroa Road, Hawera
Legal Description:	Lot 1 DP 12929 Lots 1 & 2 DP 13689 Lot 1 DP 17308 Lot 1 DP 17686 Lots 1-3 DP 19722 Pt Sec 234 Blk X Hawera SD (Discharge source) Lot 2 DP 2777 Blk X Hawera SD (Discharge site)
Grid Reference (NZTM)	1711975E-5614565N
Catchment:	Tangahoe

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 10 hectares.

3. Before 31 August 2014, the consent holder shall prepare and maintain 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.

4. Before 31 August 2014, 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) cleaning procedures for the site catchments discharging to the Eastern Pond; and
   b) details of maintenance and cleaning programmes to remove the accumulated sediment from the ponds.

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

5. After allowing for reasonable mixing, within a mixing zone extending 10 metres below the discharge point, the discharge shall not 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 the colour or visual clarity;
   c. any emissions of objectionable odour;
   d. the rendering of fresh water unsuitable for consumption by farm animals; and
   e. any significant adverse effects on aquatic life, habitats or ecology.

6. There shall be no visible bacterial and/or fungal growths downstream of the discharge.

7. Constituents of the discharge shall meet the standards shown in the following table for eight of ten consecutive samples taken at least two weeks apart over the course of an annual monitoring period:

Constituent	Standard
Oil and grease	Concentration not greater than 5 gm^{-3}
pH	Within the range 6.0 to 9.0
Suspended solids	Concentration not greater than 30 gm^{-3}
BOD	Concentration not greater than 15 gm^{-3} for the first two years following the date of issue of this consent, and 10 gm^{-3} thereafter
Filtered carbonaceous BOD	Concentration not greater than 3.5 gm^{-3} for the first two years following the date of issue of this consent, and 2 gm^{-3} thereafter
Temperature	Not greater than 25°C
Total residual chlorine	Concentration not greater than 0.2 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.

8. The consent holder shall maintain the existing fencing and planting of the riparian margins of the receiving water body for a distance of 500 metres downstream of the discharge point for the purpose of mitigating the effects of the discharge.

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

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	14 February 2014
Commencement Date:	14 February 2014

Conditions of Consent

Consent Granted:	To discharge stormwater, back flushing from the sand filters and intermittent discharges of treated water from a reservoir, from the Whareroa milk processing site into an unnamed tributary of the Tawhiti Stream
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	89 Whareroa Road, Hawera
Legal Description:	Lot 1 DP 12929 Lots 1 & 2 DP 13689 Lot 1 DP 17308 Lot 1 DP 17686 Lots 1-3 DP 19722 Pt Sec 234 Blk X Hawera SD (Discharge source) Pt Lot 2 DP 15204 Blk X Hawera SD (Discharge site)
Grid Reference (NZTM)	1711919E-5615318N
Catchment:	Tangahoe
Tributary:	Tawhiti

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

General condition

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

Special conditions

1. The consent holder shall at all times 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 13 hectares.

3. Before 31 August 2014, the consent holder shall prepare and maintain 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.

4. Before 31 August 2014, 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) cleaning procedures for the site catchments discharging to the Northern Pond; and
   b) details of maintenance and cleaning programmes to remove the accumulated sediment from the ponds.

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

5. After allowing for reasonable mixing, within a mixing zone extending 10 metres below the discharge point, the discharge shall not 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 the colour or visual clarity;
   c. any emissions of objectionable odour;
   d. the rendering of fresh water unsuitable for consumption by farm animals; and
   e. any significant adverse effects on aquatic life, habitats or ecology.

6. There shall be no visible bacterial and/or fungal growths downstream of the discharge.

7. Constituents of the discharge shall meet the standards shown in the following table for eight of ten consecutive samples taken at least two weeks apart over the course of an annual monitoring period:

Constituent	Standard
Oil and grease	Concentration not greater than 5 gm^{-3}
pH	Within the range 6.0 to 9.0
Suspended solids	Concentration not greater than 30 gm^{-3}
BOD	Concentration not greater than 10 gm^{-3}
Filtered carbonaceous BOD	Concentration not greater than 2 gm^{-3}
Temperature	Not greater than 25°C
Total residual chlorine	Concentration not greater than 0.2 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.

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	4 October 2006
Commencement Date:	4 October 2006

Conditions of Consent

Consent Granted:	To discharge emissions into the air from the manufacture and processing of milk products and associated processes
Expiry Date:	1 June 2025
Review Date(s):	June 2015, June 2020
Site Location:	Whareroa Road, Hawera
Legal Description:	Lot 1 DP 12929 Lots 1 & 2 DP 13689 Lot 1 DP 17308 Lot 1 DP 17686 Lots 1-3 DP 19722 Pt Sec 234 Blk X Hawera SD
Grid Reference (NZTM)	1711450E-5614870N

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 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 into the environment from the site.

2. The measures representing the best practicable option may be reviewed in accordance with the procedure provided for in condition 15.

3. Prior to undertaking any alterations to the plant, processes or operations, as specified in applications 92/151, 95/141, 96/233, 97/112, 346, 391, and 2747 which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and any amendments.

4. The consent holder shall provide to the Taranaki Regional Council within five years from the granting of this consent, and every six years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, especially but not exclusively in respect of milk powder and other particulate emissions, how these might be applicable and/or implemented at the Whareroa site, and the costs and benefits of these advances; and

b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify following consultation with the consent holder; and

c) addressing any other issue relevant to the minimisation or mitigation of emissions from the Whareroa site that the Chief Executive, Taranaki Regional Council, considers should be included.

5. The consent holder shall be permitted to discharge into the air emissions of contaminants arising from the spray drying processes in the facilities known as WPC, Alamin, Powder-1, Powder-2, Powder-3, Powder-4, Powder-5, Casein-1 and Casein-2, together with other milk processing facility and supporting utility services, as described in applications 92/151, 95/141, 96/233, 97/112, 346, 391, and 2747 to the Taranaki Regional Council, at all times adopting the best practicable option or options to prevent or minimise the adverse effects of the discharges on the environment provided.

6. The consent holder shall minimise the emissions and impacts of air contaminants discharged from the site by the selection of the most appropriate process equipment, process control equipment, emission control equipment, methods of control, supervision and operation, and the proper and effective operation, supervision, control and maintenance of all equipment and processes.

7. Powder emissions to the atmosphere from the spray drying process cyclone exhausts shall not exceed 125 milligrams per cubic metre [mg/m^3] of gas flow, adjusted to 0 degrees Celsius, 1 atmosphere pressure, and dry gas basis.

8. The discharges authorised by this consent shall not give rise to suspended or deposited dust at or beyond the boundary of the site that, in the opinion of at least one enforcement officer of the Taranaki Regional Council, is offensive or objectionable. For the purposes of this condition, effects in excess of the following limits are deemed to be offensive or objectionable:

    a) deposition of milk powder equivalent to 0.13 grams total deposited milk powder per square metre per day [$g/m^2/day$]; and/or

    b) a suspended milk powder level of 1 milligram per cubic metre [mg/m^3].

9. The consent holder shall control all emissions of fine particulates [PM_{10}] to the atmosphere from the site, in order that the maximum ground level concentration of fine particulates [PM_{10}] arising from the exercise of this consent measured under ambient conditions does not exceed 50 micrograms per cubic metre [$\mu g/m^3$] [twenty-four hour average], at or beyond the boundary of the site.

10. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that, in the opinion of at least one enforcement officer of the Taranaki Regional Council, is offensive or objectionable.

11. The consent holder, in conjunction with the Taranaki Regional Council, shall undertake monitoring of emissions and their effects upon the environment as required by the Chief Executive, Taranaki Regional Council.

12. The consent holder shall convene an annual meeting of representatives of the Taranaki Regional Council, and interested submitters to application 2747, to discuss any matter relating to the exercise of this consent.

13. The Powder-5 facility may process skim milk powder only if the consent holder has:

    a) given five [5] days prior notice to the Chief Executive, Taranaki Regional Council,; and

    b) developed a monitoring programme for the emissions and their effects upon the environment as required by the Chief Executive, Taranaki Regional Council,.

14. The Council shall, within six [6] months of notice under condition 13, serve notice that it intends to review the conditions of this consent, in accordance with section 128(1)(a) of the Resource Management Act 1991, for the purpose of dealing with any significant adverse effect on the environment arising from the use of the Powder-5 plant for skim milk powder production.

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 within six months of receiving a report prepared by the consent holder pursuant to condition 4 of this consent, or in any case in June 2010 and/or June 2015 and/or June 2020, for the purposes of:

    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review; and/or

    b) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or

    c) to alter, add, or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant or contaminants; and/or

    d) taking into account any Act of Parliament, regulation, national policy statement, national environmental standard, regional policy statement or regional rule which relates to limiting, recording, or mitigating airborne contaminants and which is relevant to emissions from the milk and milk product processing plants and/or associated processes.

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	14 February 2014
Commencement Date:	14 February 2014

Conditions of Consent

Consent Granted:	To discharge stormwater from the Whareroa milk processing site into an Unnamed Stream 18
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	89 Whareroa Road, Hawera
Legal Description:	Lot 1 DP 12929 Lots 1 & 2 DP 13689 Lot 1 DP 17308 Lot 1 DP 17686 Lots 1-3 DP 19722 Pt Sec 234 Blk X Hawera SD (Discharge source) Lot 4 DP 2625 (Discharge site)
Grid Reference (NZTM)	1711403E-5614339N
Catchment:	Unnamed Stream 18

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 21 hectares.

3. Before 31 August 2014, the consent holder shall prepare and maintain 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.

4. Before 31 August 2014, 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) cleaning procedures for the site catchments discharging to the Southern Pond; and
   b) details of maintenance and cleaning programmes to remove the accumulated sediment from the ponds.

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

5. After allowing for reasonable mixing, within a mixing zone extending 10 metres below the discharge point, the discharge shall not 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 the colour or visual clarity;
   c. any emissions of objectionable odour;
   d. the rendering of fresh water unsuitable for consumption by farm animals; and
   e. any significant adverse effects on aquatic life, habitats or ecology.

6. There shall be no visible bacterial and/or fungal growths downstream of the discharge.

7. Constituents of the discharge shall meet the standards shown in the following table for eight of ten consecutive samples taken at least two weeks apart over the course of an annual monitoring period:

Constituent	Standard
Oil and grease	Concentration not greater than 5 gm^{-3}
pH	Within the range 6.0 to 9.0
Suspended solids	Concentration not greater than 100 gm^{-3}
BOD	Concentration not greater than 15 gm^{-3} for the first two years following the date of issue of this consent, and 10 gm^{-3} thereafter
Filtered carbonaceous BOD	Concentration not greater than 3.5 gm^{-3} for the first two years following the date of issue of this consent, and 2 gm^{-3} thereafter
Temperature	Not greater than 25°C
Total residual chlorine	Concentration not greater than 0.2 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.

8. The consent holder shall maintain the existing fencing and planting of the riparian margins of the receiving water body for a distance of 500 metres downstream of the discharge point for the purpose of mitigating the effects of the discharge.

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

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	3 February 2004
Commencement Date:	3 February 2004

Conditions of Consent

Consent Granted:	To discharge laboratory wastes onto and into land
Expiry Date:	1 June 2022
Review Date(s):	June 2016
Site Location:	Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 Blks IX & X Hawera SD
Grid Reference (NZTM)	1711450E-5613270N
Catchment:	Tangahoe Waihi

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 resource consent shall be undertaken generally in accordance with the documentation submitted in support of application 2746. In the case of any contradiction between the documentation submitted in support of application 2746 and the conditions of this consent, the conditions of this resource consent shall prevail.

3. The discharge authorised by this consent shall not exceed 1 m^3/day.

4. The consent holder shall provide a management plan for the discharge site to the Chief Executive, Taranaki Regional Council, for written approval within three months of the granting of this consent, and regularly updated as required, to ensure that the conditions of this consent can be met, including but not limited to:

   i) means of pit excavation;
   ii) pit preparation;
   iii) dimensions of each pit;
   iv) placement and covering of wastes;
   v) stormwater control;
   vi) site control;
   vii) nature of wastes;
   viii) location of all present and previous pits; and
   ix) an outline of the site options for future pit use.

5. The siting of each discharge pit shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

6. The discharge shall not occur within 50 metres of any bore, well or spring used for water supply purposes, nor within 25 metres of any surface water body, nor within 100 metres from the coastal cliff edge.

7. The disposal pit(s) shall not intercept the water table.

8. The exercise of this consent, including the design and management of the disposal pit(s), shall not lead to or be liable to lead to contaminants entering a water body from overland surface flows.

9. The exercise of this consent shall not result in any adverse impacts on groundwater as a result of leaching, or surface water including aquatic ecosystems, and/or result in a change to the suitability of use of the receiving water as determined by the Chief Executive, Taranaki Regional Council.

10. The only wastes to be discharged shall be petri dishes, their content and the plastic which they are wrapped in.

11. The discharged material shall be covered with up to 50 millimetres of earth or other suitable cover, within a period of four hours or less following each disposal.

12. Each disposal pit shall be reinstated with a low permeability, clean, compacted soil cover with a minimum thickness of 0.5 metre to be placed over the material, and vegetation re-established to the satisfaction of the Chief Executive, Taranaki Regional Council.

13. The consent holder shall compact, contour, and maintain the cover layer of soil so as to ensure its integrity at all times to the satisfaction of the Chief Executive, Taranaki Regional Council.

14. The consent holder shall keep records of all uses of the pits including date, volume discharged, and product type, and make these available to the Chief Executive, Taranaki Regional Council, upon request.

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

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Water Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	25 July 2016
Commencement Date:	25 July 2016

Conditions of Consent

Consent Granted:	To take up to 16,000 cubic metres/day [210 litres/second] of water from the Tangahoe River for processing and manufacture of dairy products, cleaning of plant and cooling purposes, provided the total abstraction in the Tangahoe Catchment by the consent holder does not exceed 30,000 cubic metres/day at any time
Site Location:	Tangahoe River Rail Bridge Abutment, Hicks Road, Hawera
Grid Reference (NZTM)	1715750E-5612470N
Catchment:	Tangahoe

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

General condition

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

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

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

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

Special conditions

1. The Taranaki Regional Council reserves the right to temporarily suspend or reduce the abstraction during extreme low flow events, in order to protect the biological communities in the stream, in accordance with section 329 of the Resource Management Act 1991.

2. The consent holder shall install and operate, to the satisfaction of the Chief Executive, Taranaki Regional Council, a measuring device capable of recording daily rates of abstraction and shall make such records available to the Chief Executive, Taranaki Regional Council, upon request.

3. Notwithstanding the maximum consented take authorised by this consent of 16,000 m^3/day, the consent holder may take up to 30,000 m^3/day from July through till 30 November in general accordance with the Commissioning Plan submitted to the Taranaki Regional Council with the application to change this consent on 04 July 2016, provided the minimum flow (as estimated from the flow in the Whenuakura River as per condition 2) does not fall below 495 l/s downstream of the intake.

4. The flow in the Tangahoe River during the Commissioning period shall be calculated by the following relationship, based on Whenuakura River data available on the Taranaki Regional Council website.
$Y=0.0271X^{1.3889} - T$; where:
X= Whenuakura River Flow (l/s)
Y = Tangahoe River Flow (l/s)
T= Water taken under this consent (l/s)

5. The consent holder shall notify Te Runanga o Ngaati Ruanui Trust at least 48 hours prior to commencement and within 48 hours of cessation of each commissioning phase.

6. The consent holder shall provide Te Runanga o Ngaati Ruanui Trust the flow information in condition 5 within 48 hours of the start of each day that water is taken throughout the commissioning phase.

Signed at Stratford on 25 July 2016

For and on behalf of
Taranaki Regional Council

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A D McLay
Director – Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	1 May 1996

Conditions of Consent

Consent Granted:	To discharge up to 1.05 cubic metres/day of river silt and sand from mechanical pre-filtering of river water during abstraction of water, by returning it into the Tawhiti Stream in the Tangahoe Catchment at or about GR: Q21:229-780
Expiry Date:	1 June 2015
Review Date(s):	June 1999, June 2004
Site Location:	Main South Road, Hawera
Legal Description:	Lot 1 DP 3710 Pt Lot 1 DP 2629 Lot 1 DP 1087 Blk X Hawera SD
Catchment:	Tangahoe
Tributary:	Tawhiti

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

General conditions

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

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

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

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

Special conditions

1. That the discharge must be operated on a continuous purge basis in order to mitigate adverse effects on the receiving water of the Tawhiti Stream.

2. That allowing for a mixing zone of 50 metres downstream of the discharge pipe, the discharge shall not raise the suspended solids of the receiving water by greater than 30% or by greater than 30 gm^{-3}, whichever is less.

3. That allowing for a mixing zone of 50 metres extending downstream of the discharge pipe, the discharge shall not give rise to any of the following effects in the receiving water of the Tawhiti Stream:

(i) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
(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;
(v) any significant adverse effects on aquatic life, habitats, or ecology.

4. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 1999 and/or June 2004 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects of the discharge on the environment.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Land Use Consent

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	20 January 1999
Commencement Date:	20 January 1999

Conditions of Consent

Consent Granted:	To erect, place and maintain two earth dams at the headwaters of an unnamed tributary of the Tangahoe River for stormwater collection and treatment purposes
Expiry Date:	1 June 2016
Site Location:	Whareroa Road Hawera
Legal Description:	Pt Sec 235 Pt Lot DP 2777 Blk X Hawera SD
Grid Reference (NZTM)	1711850E-5614770N
Catchment:	Tangahoe

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

General conditions

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

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

c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. That it is the responsibility of the consent holder to maintain and operate the dams in a safe and appropriate manner and the Taranaki Regional Council accepts no responsibility in this regard.

2. That the consent holder shall notify the Taranaki Regional Council at least 48 hours prior to commencement of any work or maintenance associated with the dams.

3. That during work or maintenance, the consent holder shall observe every practicable measure to prevent the discharge or placement of silt and/or organics and/or any other contaminant into the watercourse, to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. That the consent holder shall remove all structures covered by this consent and reinstate the area, to the satisfaction of the Chief Executive, Taranaki Regional Council, if and when they are no longer required.

5. 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 2004 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at that time.

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Coastal Permit

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	7 October 1996

Conditions of Consent

Consent Granted:	To erect, place and maintain a marine outfall and diffuser structure of approximately 1845 metres length in the coastal marine area adjacent to the end of Rifle Range Road, Hawera at or about GR: Q21:214-747
Expiry Date:	1 June 2015
Review Date(s):	June 2000, June 2005, June 2010
Site Location:	Off Rifle Range Road Hawera
Legal Description:	Pt Lot 13 DP 2625 And Foreshore Blks IX & X Hawera SD
Catchment:	Tasman Sea

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

General conditions

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

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

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

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

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council at least three days prior to the commencement of construction or any major maintenance works.

2. That the marine outfall and diffuser structure shall be constructed and maintained in accordance with the documentation submitted in support of application 96/109.

3. That during the construction phase and any subsequent maintenance works, the consent holder must observe every practicable measure to minimise any discharge of contaminants to the environment and to minimise the disturbance of the foreshore and seabed.

4. That following construction, the consent holder shall reinstate, as far as practicable, the intertidal construction area.

5. That the intertidal section of the outfall pipeline shall not be visible at any stage of the tide.

6. That the consent holder shall remove the marine outfall and diffuser structure covered by this consent and reinstate the area if and when it is no longer required.

7. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2000 and/or June 2005 and/or June 2010 for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects of the structure on the environment 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 that time.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Coastal Permit

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	30 August 1996

Conditions of Consent

Consent Granted:	To construct and maintain a rock wall 100 metres in length in the coastal marine area for the protection of outfall and stream diversion pipelines and associated structures at or about GR: Q21:214-747
Expiry Date:	1 June 2015
Review Date(s):	June 2000, June 2005, June 2010
Site Location:	Off Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 And Foreshore Blks IX & X Hawera SD
Catchment:	Tasman Sea

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

General conditions

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

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

c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council at least three days prior to the commencement of construction or any major maintenance works.

2. That the rock wall shall be constructed and maintained in accordance with the documentation submitted in support of application 96/160 and to the satisfaction of the Chief Executive, Taranaki Regional Council.

3. That the construction and maintenance of the rock wall shall be undertaken in a manner which minimises both disturbance of the seabed and foreshore and the discharge of contaminants, to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. That following completion of the rock wall, the consent holder shall revegetate and reinstate the construction site, to the satisfaction of the Chief Executive, Taranaki Regional Council.

5. That the consent holder shall monitor erosion at the cliff top at least 200 metres either side of the rock wall:
   a) at twelve monthly intervals; or
   b) immediately following storm events as requested by the Chief Executive, Taranaki Regional Council;

   in order to determine whether the rock wall is causing accelerated erosion to neighbouring properties.

6. That should the rock wall be shown to be causing accelerated erosion affecting neighbouring properties, the consent holder shall reasonably compensate any affected neighbours for the loss of land.

7. That the consent holder shall remove the rock wall covered by this consent and reinstate the area, to the satisfaction of the Chief Executive, Taranaki Regional Council, if and when it is no longer required.

8. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2000 and/or June 2005 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Land Use Consent

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	23 August 1996

Conditions of Consent

Consent Granted:	To dam an unnamed stream between the Tangahoe River and the Waihi Stream for stream flow control and marine outfall pipeline installation purposes at or about GR: Q21:214-747
Expiry Date:	1 June 2015
Review Date(s):	June 2000, June 2005, June 2010
Site Location:	Off Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 and Foreshore Blks IX & X Hawera SD
Catchment:	Waihi Tangahoe

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

General conditions

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

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

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

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

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council at least three days prior to the commencement of construction or any major maintenance works.

2. That the dam shall be constructed and maintained in accordance with the documentation submitted in support of application 96/162 and to the satisfaction of the Chief Executive, Taranaki Regional Council.

3. That during the construction period and any subsequent maintenance, the consent holder shall observe every practicable measure to prevent the discharge or placement of silt and/or organics and/or any other contaminant into the stream and to minimise disturbance of the stream bed, to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. That the dam and any associated structures covered by this consent shall be removed and the area reinstated, to the satisfaction of the Chief Executive, Taranaki Regional Council, if and when it is no longer required.

5. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2000 and/or June 2005 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Water Permit

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	23 August 1996

Conditions of Consent

Consent Granted:	To permanently divert an unnamed stream between the Tangahoe River and the Waihi Stream for the purpose of protecting an outfall pipeline and associated structures at or about GR: Q21:214-747
Expiry Date:	1 June 2015
Review Date(s):	June 2000, June 2005, June 2010
Site Location:	Off Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 and foreshore Blks IX & X Hawera SD
Catchment:	Waihi Tangahoe

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

General conditions

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

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

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

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

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council at least three days prior to the commencement of construction or any major maintenance works.

2. That the diversion shall be constructed and maintained in accordance with the documentation submitted in support of application 96/163 and to the satisfaction of the Chief Executive, Taranaki Regional Council.

3. That during the construction of the diversion and any subsequent maintenance, the consent holder shall observe every practicable measure to prevent the discharge or placement of silt and/or organics and/or any other contaminants into the stream and to minimise disturbance of the stream bed, to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2000 and/or June 2005 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Land Use Consent

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	23 August 1996

Conditions of Consent

Consent Granted:	To drain and excavate the bed of an unnamed stream between the Tangahoe River and the Waihi Stream and to erect, place, use and maintain outfall and stream diversion pipelines and associated structures in or on that bed at or about GR: Q21:214-747
Expiry Date:	1 June 2015
Review Date(s):	June 2000, June 2005, June 2010
Site Location:	Off Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 and foreshore Blks IX & X Hawera SD
Catchment:	Waihi Tangahoe

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

General conditions

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

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

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

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

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council at least three days prior to the commencement of excavation or construction or any major maintenance works.

2. That works associated with this consent shall be constructed and maintained in accordance with the documentation submitted in support of application 96/164 and to the satisfaction of the Chief Executive, Taranaki Regional Council.

3. That the outfall and stream diversion pipelines and any associated structures shall be of a colour in keeping with the natural character of the coastal environment.

4. That following construction, the consent holder shall revegetate the construction site, to the satisfaction of the Chief Executive, Taranaki Regional Council.

5. That the consent holder shall remove the outfall and stream diversion pipelines and any associated structures covered by this consent and reinstate the area, to the satisfaction of the Chief Executive, Taranaki Regional Council, if and when the structures are no longer required.

6. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2000 and/or June 2005 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the envirionment arising from the exercise of this consent.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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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:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date (Change):	19 December 2012
Commencement Date (Change):	19 December 2012 (Granted Date: 03 February 2004)

Conditions of Consent

Consent Granted:	To discharge waste material from stormwater sumps and road sump and unprocessable dairy factory wastes onto and into land
Expiry Date:	1 June 2022
Review Date(s):	June 2016
Site Location:	Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 Blks IX & X Hawera SD (Discharge source & site)
Grid Reference (NZTM)	1711451E-5613271N
Catchment:	Unnamed catchment 18

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. Wherever practicable, the consent holder shall seek to dispose of unprocessable dairy factory wastes as authorised by this consent by irrigation to land in accordance with the following application loading limits:

   Nitrogen (N) – 250 kg/ha/year

   Chemical Oxygen Demand (COD) – 4500 kg/ha/day

3. The exercise of this resource consent shall be undertaken generally in accordance with the documentation submitted in support of applications 2748, 3326 and 7284. In the case of any contradiction between the documentation submitted in support of applications 2748, 3326 and 7284 and the conditions of this consent, the conditions of this resource consent shall prevail.

4. The discharge of stormwater sump cleanings and road sump cleanings authorised by this consent shall not exceed 120 cubic metres per week. The discharge of unprocessable dairy wastes authorised by this consent shall not exceed 250 cubic metres per day.

5. The consent holder shall provide a management plan for the discharge site to the Chief Executive, Taranaki Regional Council, for written approval within three months of the granting of this consent, and regularly updated as required, to ensure that the conditions of this consent can be met, including but not limited to:

   For Pit Disposal;

   i) Means of pit excavation;
   ii) Pit preparation;
   iii) Dimensions of each pit;
   iv) Placement and covering of wastes;
   v) Stormwater control;
   vi) Site control;
   vii) Nature of wastes
   viii) Location of all present and previous pits;
   ix) An outline of site options for future pit use;

   For Irrigation Disposal;

   x) Location and area (ha) of area used for irrigation;
   xi) Volume of material applied;
   xii) Application loading rates (N and COD);
   xiii) Mitigation measures for odour control.

6. The discharge shall not occur within 50 metres of any bore, well or spring used for water supply purposes, nor within 25 metres of any surface water body, nor within 100 metres from the coastal cliff edge.

7. The disposal pit(s) shall not intercept the water table.

8. The exercise of this consent, including the design and management of the burial pit(s), shall not lead to or be liable to lead to contaminants entering a water body from overland surface flows.

9. The exercise of this consent shall not result in any adverse impacts on groundwater as a result of leaching, or surface water including aquatic ecosystems, and/or result in a change to the suitability of use of the receiving water as determined by the Chief Executive, Taranaki Regional Council.

10. Where the discharge is to pits, the discharged material shall be covered with up to 50 millimetres of earth or other suitable cover, within a period of 7 days or less following each discharge.

11. All liquid shall be removed from the disposal pit prior to the application of covering material as required in special condition 9.

12. Only those materials as authorised by this consent and outlined in applications 2748, 3326 and 7284 shall be discharged of to the disposal pits or irrigated to land. Prior to each discharge operation the consent holder shall remove all non-biodegradable material entrained in the material to be discharged, as far as is practicable to the satisfaction of the Chief Executive, Taranaki Regional Council.

13. Each disposal pit shall be reinstated with a low permeability, clean, compacted soil cover with a minimum thickness of 0.5 metre to be placed over the material, and vegetation re-established to the satisfaction of the Chief Executive, Taranaki Regional Council.

14. The consent holder shall compact, contour, and maintain the cover layer of soil so as to ensure its integrity at all times to the satisfaction of the Chief Executive, Taranaki Regional Council.

15. The disposal of wastes as authorised by this consent shall not give rise to objectionable or offensive odours beyond the property boundary.

16. The consent holder shall keep records of all discharges to land including date, volume discharged, disposal method, disposal location, product type, and the reason for discharge and make these available to the Chief Executive, Taranaki Regional Council, upon request.

17. The discharge of unprocessable dairy waste under this consent shall only occur after all other reasonable waste disposal options have been exhausted, and the consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing of the options assessed.

18. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2010 and/or June 2016, 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 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	3 February 2004
Commencement Date:	3 February 2004

Conditions of Consent

Consent Granted:	To discharge emissions into the air from the disposal of laboratory wastes, and stormwater and sump cleanings onto and into land
Expiry Date:	1 June 2022
Review Date(s):	June 2016
Site Location:	Rifle Range Road, Hawera
Legal Description:	Lot 13 DP 2625 Blks IX & X Hawera SD
Grid Reference (NZTM)	1711450E-5613270N

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 resource consent.

2. The exercise of this resource consent shall be undertaken generally in accordance with the documentation submitted in support of application 2749. In the case of any contradiction between the documentation submitted in support of application 2749 and the conditions of this resource consent, the conditions of this resource consent shall prevail.

3. The consent holder shall provide a management plan for the discharge site to the Chief Executive, Taranaki Regional Council, for written approval within three months of the granting of this consent, and regularly updated as required, outlining methods to adopt the best practicable option to prevent or minimise adverse effects on the environment with respect to discharges to air.

4. That the discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that is offensive or objectionable.

5. For the purposes of condition 4, without restriction, an odour shall be deemed to be offensive or objectionable if:

   (a) it is held to be so in the opinion of an officer of the Taranaki Regional Council, having regard to the duration, frequency, intensity and nature of the odour; and/or
   (b) an officer of the Taranaki Regional Council observes that an odour is noticeable, and either it lasts longer than three (3) hours continuously, or it occurs frequently during a single period of more than six (6) hours; and/or
   (c) no less than three individuals from at least two different properties that are affected at the time, each declare in writing that an objectionable or offensive odour was detected beyond the boundary of the site, provided the Council is satisfied that the declarations are not vexatious and that the objectionable or offensive odour was emitted from the site as specified in (b). Each declaration shall include the individuals' names and addresses, the date and time the objectionable or offensive odour was detected, the location of the individual when it was detected and the prevailing weather conditions during the event. The declarations shall be signed and dated.

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2010 and/or June 2016, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Land Use Consent

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	20 May 1997

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a water intake structure in the bed of the Tangahoe River for industrial water supply purposes at or about GR: Q21:258-742
Expiry Date:	1 June 2015
Review Date(s):	June 1999, June 2004
Site Location:	3 Hicks Road Hawera Property Owner: M Carr
Legal Description:	Lot 3 DP 5506 Pt Sec 248, 250 & 251 Patea District Blk X Hawera SD
Catchment:	Tangahoe

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

General conditions

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

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

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

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

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council, at least 48 hours prior to the commencement and upon completion of, the initial construction and again prior to and upon completion of, any subsequent maintenance works which would involve disturbance of, or deposition to the river bed or discharges to water.

2. That the structure authorised by this consent shall be constructed generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.

3. That the consent holder shall adopt the best practicable option to avoid or minimise the discharge of silt or other contaminants into water or onto the river bed and to avoid or minimise the disturbance of the river bed and any adverse effects on water quality .

4. That the consent holder shall ensure that the area and volume of river bed disturbance shall so far as is practicable, be minimised and any areas which are disturbed, shall so far as is practicable be reinstated.

5. That the structure authorised by this consent shall be removed and the area reinstated, if and when the structure is no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to structure removal and reinstatement.

6. 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 1999 and/or June 2004, 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.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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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:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	28 May 1997

Conditions of Consent

Consent Granted:	To discharge up to 1.2 cubic metres/day of river silt and sand from mechanical pre-filtering of river water during abstraction of water, by returning it into the Tangahoe River at or about GR: Q21:258-742
Expiry Date:	1 June 2015
Review Date(s):	June 1999, June 2004
Site Location:	Tangahoe River Rail Bridge Abutment, Hicks Road, Hawera
Legal Description:	Lot 3 DP 5506 Pt Sec 248, 250 & 251 Patea Dist Blk X Hawera SD
Catchment:	Tangahoe

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

General conditions

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

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

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

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

Special conditions

1. That the discharge must be operated on a continuous purge basis in order to mitigate the potential for adverse effects on the receiving water of the Tangahoe River.

2. That allowing for a mixing zone of 100 metres downstream of the discharge pipe, the discharge shall not give rise to all or any of the following effects in the receiving water of the Tangahoe River:

i) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;

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;

v) any significant adverse effects on aquatic life, habitats, or ecology.

3. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 1999 and/or June 2004 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects of the discharge on the environment 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.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

Land Use Consent

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	26 May 1998
Commencement Date:	26 May 1998

Conditions of Consent

Consent Granted:	To dam an unnamed tributary of the Tawhiti Stream in the Tangahoe Catchment for stormwater and backwash water collection and treatment purposes
Expiry Date:	1 June 2016
Site Location:	Unnamed Tributary Of Tawhiti Stream, Whareroa Road, Hawera
Legal Description:	Sub 2 Pt Sub 3 Secs 194, 195 Pt Secs 194-196, 231-234 Blk X Hawera SD
Grid Reference (NZTM)	1712150E-5615570N
Catchment:	Tangahoe
Tributary:	Tawhiti

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

General conditions

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

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

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

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

Special conditions

1. That the consent holder shall notify the Taranaki Regional Council at least 48 hours prior to commencement and upon completion of construction, and again at least 48 hours prior to and upon completion of any subsequent maintenance works which would involve disturbance of, or discharge to, the unnamed tributary.

2. That during the construction and any subsequent maintenance, the consent holder shall observe every practicable measure to prevent the discharge or placement of silt and/or organics and/or any other contaminants into, and to minimise the disturbance of, the bed of the unnamed tributary.

2. That it is the responsibility of the consent holder to maintain and operate a safe dam[s] and the Taranaki Regional Council accepts no responsibility in this regard.

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 2004 and/or June 2010 and/or in the twelfth month following the exercise of this 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 this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at that time.

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Land Use Consent

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

Name of Consent Holder:	Fonterra Co-operative Group Limited, Whareroa P O Box 444 HAWERA
Consent Granted Date:	31 July 2001

Conditions of Consent

Consent Granted:	To remove, reconstruct, erect, place and maintain a dam structure and associated fish pass on the Tawhiti Stream for water intake purposes at or about GR: Q21:229-780
Expiry Date:	1 June 2015
Review Date(s):	June 2004, June 2010
Site Location:	Main South Road, Hawera
Legal Description:	Pt Lot 1 DP 2629 Pt Lot 1 DP 3710 Sec 689 Blk X Hawera SD
Catchment:	Tangahoe
Tributary:	Tawhiti

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

General conditions

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

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

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

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

Special conditions

1. The consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 48 hours prior to the commencement of removal of the existing structure and upon completion of all works licensed by this consent.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 48 hours prior to any maintenance works of the structure[s] or fish pass licensed by this consent which would involve disturbance of, or deposition to, the streambed or discharges to water.

3. The works licensed by this consent shall be undertaken in accordance with the documentation submitted in support of application 1471.

4. During the works licensed by this consent, the consent holder shall observe every practicable measure to prevent the discharge or placement of silt and/or organics and/or cement products and/or any other contaminants into the watercourse and to minimise disturbance of the streambed.

5. The consent holder, during removal of the existing structure and reconstruction of the structure and fish pass and maintenance, shall adopt the best practicable option to avoid or minimise the discharge of silt or other contaminants into water or onto the streambed and to avoid or minimise any adverse effects on water quality.

6. The consent holder shall ensure that the area and volume of streambed disturbance shall, so far as is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.

7. All areas disturbed in association with the works, including the diversion channel, fences and replanting of vegetation, shall be reinstated to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. The structure[s] licensed by this consent shall not obstruct fish passage.

9. Prior to construction of the fish pass, the consent holder shall supply a final design for the approval of the Chief Executive, Taranaki Regional Council.

10. The consent holder shall ensure that the intake is appropriately screened to avoid the entrapment of native fish.

11. The structure[s] authorised by this consent shall be maintained to ensure the conditions of this consent are met.

12. The structure[s] authorised by this consent shall be removed and the area reinstated, if and when the structure is no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to the removal of the structures and reinstatement of the area.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2004 and/or June 2010, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

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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:	Fonterra Limited PO Box 444 Hawera 4640	
Decision Date (Change):	9 June 2015	
Commencement Date (Change):	9 June 2015	(Granted: 7 December 2005)

Conditions of Consent

Consent Granted:	To discharge emissions into the air from dual fuel boilers (gas or coal) with a maximum energy output of 250 MW together with associated processes
Expiry Date:	1 June 2034
Review Date(s):	June 2016, June 2022, June 2028
Site Location:	Whareroa Road, Hawera
Legal Description:	Pt Lot 2 DP 15204 Lot 1 DP 15204 Lot 3 DP 19882 Blk X Hawera SD
Grid Reference (NZTM)	1711850E-5615170N

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

Best practicable option and mitigation

1. The consent holder shall 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 into the environment from the site.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 2785. In the case of any contradiction between the documentation submitted in support of application 2785 and the conditions of this consent, the conditions of this consent shall prevail.

3. Other than as set out within this consent, the characteristics of any coal burned in the exercise of this consent shall be as generally described and/or achieve a similar level of environmental performance as set out in the documentation supporting the application for this consent.

4. A general outline of the methods, specifications, operating guidelines or other measures which represent the best practicable option at the time of commissioning shall be supplied by the consent holder to the Chief Executive, Taranaki Regional Council, within three months of the commissioning of the energy centre, and thereafter attached to this consent as Schedule A. Matters to be addressed in Schedule A shall include, but not be limited to: preferred fuel type and specification; air pollution abatement systems; combustion temperatures; definitions of 'cold start' and 'warm start'; measures to be used in the case of sudden loss of boiler capacity; minimum operating temperatures for baghouses; air fuel ratios; discharge (stack exit) velocities; and protocols for measuring the sulphur content of fuel on an on-going basis. This schedule can be amended by the consent holder at any time during the term of this consent to reflect changes in the methods, specifications, operating guidelines or other measures.

5. The measures representing the best practicable option may be reviewed in accordance with the procedure provided for in condition 29.

6. The consent holder shall minimise the emissions and impacts of air contaminants discharged from the site by the selection of the most appropriate process equipment, process control equipment, emission control equipment, methods of control, supervision and operation, and the proper and effective operation, supervision, control and maintenance of all equipment and processes.

7. The minimum height of discharges to the atmosphere from the energy centre boiler stack shall be 60 metres above the ground level prevailing at the time of lodging the application for this consent.

8. Prior to undertaking any alterations to the plant, processes or operations, as specified in application 2785, which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and any amendments.

Emission limits

9. Discharges to the atmosphere from the energy centre boiler stack shall not exceed 20% obscuration, as measured by the photoelectric obscuration gauge and corrected for path length and temperature as set out in Addendum No. 1 (1972) to 2BS2742:1969, or any replacement measurement standard, for any continuous period of 2 minutes or for more than 4 minutes cumulative in any 60 minute period, except:

   (a) for up to 120 hours (cumulative) per boiler for initial commissioning of each boiler; and

   (b) for up to 250 hours (cumulative) per year for the purpose of lighting up all boilers from cold; and

   (c) for up to 100 hours (cumulative) per year for the purpose of lighting up all boilers from warm.

10. Discharges to the atmosphere of particulate from the energy centre boiler stack shall not exceed 100 milligrams per cubic metre (mg/Nm^3) adjusted to 12% carbon dioxide (CO_2) on a dry gas basis, except during those circumstances described in special condition 9(a), 9(b), and 9(c).

11. The sum of all discharges to the atmosphere of sulphur dioxide from the energy centre boiler stack shall not exceed 385 kilograms per hour (kg/hr).

12. The sum of all discharges to the atmosphere of particulate from the energy centre boiler stack shall not exceed 43 kilograms per hour (kg/hr).

13. The sum of all discharges to the atmosphere of nitrogen oxides from the energy centre boiler stack shall not exceed 319 kilograms per hour (kg/hr).

Ambient and workplace limits

14. The consent holder shall control all discharges of sulphur dioxide to the atmosphere from the site, in order that the maximum ground level concentration of sulphur dioxide arising from the exercise of this consent measured under ambient conditions on land does not exceed 350 micrograms per cubic metre (one-hour average exposure) or 120 micrograms per cubic metre (twenty-four hour average exposure) at or beyond the boundary of the site.

15. The consent holder shall control all discharges of nitrogen dioxide or its precursors to the atmosphere from the energy centre boiler stack, whether alone or in conjunction with any other discharges to the atmosphere from the site, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 200 micrograms per cubic metre (one hour average exposure), or 100 micrograms per cubic metre (twenty-four hour average exposure), at or beyond the boundary of the site.

16. The consent holder shall control all discharges of particulate of effective diameter of less than 10 micrometres (PM_{10}) to the atmosphere from the energy centre boiler stack, whether alone or in conjunction with any other discharges to the atmosphere from the site, in order that the maximum ground level concentration of PM_{10} arising from the exercise of this consent measured under ambient conditions does not exceed 50 micrograms per cubic metre (twenty-four hour average exposure), at or beyond the boundary of the site, or at points within the site boundary where non-occupational exposure is likely to occur (such as residential dwellings).

17. The consent holder shall control all discharges of metals to the atmosphere from the energy centre boiler stack, whether alone or in conjunction with any other discharges to the atmosphere from the site, in order that the maximum ground level concentration of each or any metal arising from the exercise of this consent measured under ambient conditions does not exceed their respective guideline value set out in the 'Ambient Air Quality Guidelines 2002 Update', Air Quality Report No 32, Prepared by the Ministry for the Environment and the Ministry of Health, May 2002.

18. The consent holder shall control discharges to the atmosphere from the energy centre boiler stack of contaminants other than carbon dioxide and those addressed in conditions 10 to 17 above, whether alone or in conjunction with any discharges to the atmosphere from the site, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent measured at or beyond the boundary of the site, is not increased above background levels:

    (a) by more than $1/30^{th}$ of the relevant Workplace Exposure Standard-Time Weighted Average, or by more than the Workplace Exposure Standard-Short Term Exposure Limit at any time (all terms as defined in Workplace Exposure Standards, 2002, Department of Labour); or

    (b) if no Short Term Exposure Limit is set, by more than the General Excursion Limit at any time (all terms as defined in Workplace Exposure Standards, 2002, Department of Labour).

19. The discharges authorised by this consent shall not give rise to any direct significant adverse ecological effect on any ecosystems in the Taranaki region, including but not limited to habitats, plants, animals, microflora and microfauna.

Recording and reporting

20. Analysis of the coal (including but not limited to the sulphur and ash content of the coal) shall be undertaken on a monthly basis during the processing season. This shall be undertaken upon the coal blend that is supplied to the consent holder. The sampling of the coal blend shall be a composite sample generated by daily sub-sampling of the coal blend that is delivered to the consent holder. The information shall be provided to the Chief Executive, Taranaki Regional Council, upon request.

21. The consent holder shall install, operate, maintain and calibrate:

    (a) opacity meters;
    (b) sulphur dioxide meters;
    (c) temperature meters;
    (d) oxygen meters; and
    (e) carbon monoxide meters.

    for the measuring and recording of the respective parameters in the discharge stack from the boilers, to the satisfaction of the Chief Executive, Taranaki Regional Council.

22. The consent holder shall annually undertake source emission monitoring to the satisfaction of the Chief Executive, Taranaki Regional Council. The monitoring shall include a determination of the exhaust concentrations of sulphur dioxide, total suspended particulates, and PM_{10} particulates, in the manner set out in condition F1 within the application lodged for this consent, or to an equivalent standard. In addition, the consent holder shall monitor for mercury and arsenic, and the temperatures of the exhaust gases together with the generation loads prevailing at the time giving rise to those concentrations and mass emissions as determined in monitoring of the emissions. The results of the monitoring shall be provided to the Chief Executive, Taranaki Regional Council, and shall be made available annually to those invited to the liaison meeting convened under special condition 27.

23. A monitoring programme agreed between the consent holder and the Taranaki Regional Council, and provided to the Taranaki District Health Board and interested submitters to application 2785, shall be prepared within three months of the granting of this consent. The monitoring programme shall cover (at a minimum): monitoring for ground level ambient concentrations of sulphur dioxide; soil and vegetation levels of mercury, arsenic, and sulphates at reference sites; levels of mercury and arsenic within aquatic species; and a model validation monitoring survey for PM_{10} (monitoring to be carried out to a recognised standard, by an accredited laboratory).

24. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, within two years from the granting of this consent and again at four years from the granting of this consent and every six years thereafter a written report:

    (a) reviewing any technological advances in the reduction or mitigation of emissions, especially but not exclusively in respect of sulphur dioxide, dioxins, and heavy metals, how these might be applicable and/or implemented at the energy centre, and the costs and benefits of these advances; and

    (b) addressing any other issue relevant to the minimisation or mitigation of emissions from the site that the Chief Executive, Taranaki Regional Council, reasonably considers should be included.

25. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, within twelve months from the exercising of this consent and again every 12 months thereafter while the consent is being exercised, a written report:

    (a) detailing an inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify (in accordance with the emissions identified in the application) following consultation with the consent holder;

    (b) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the energy centre; and

    (c) detailing average sulphur content and maximum sulphur content (based on monthly analyses of daily representative samples) of all fuel consumed at the site and volume of fuel consumed, during the previous twelve months.

26. The consent holder shall develop or procure a cultural impact report within 12 months of the granting of this consent.

Liaison meeting

27. The consent holder shall invite staff of the Taranaki Regional Council and interested submitters to application 2785 to meet annually to discuss any matter relating to the exercise of this consent. The first liaison meeting shall be held within 12 months of the commissioning of the energy centre.

Lapse and review

28. This consent shall lapse on 1 June 2034, 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.

29. 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 within two months of receiving a report prepared by the consent holder pursuant to conditions 24, 25, and 26 of this consent, or following non-compliance with special condition 14, or in any case in June 2010 and / or June 2016 and / or June 2022 and / or June 2028, for the purposes of:

    (a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was either not foreseen at the time the application was considered or which it is appropriate to deal with at the time of the review;

    (b) requiring the holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge;

    (c) altering, adding, or deleting limits on discharge, receiving environment or ambient concentrations of any contaminant or contaminants, for the purpose of dealing with any significant adverse ecological effect on any ecosystem; or

    (d) taking into account any Act of Parliament, regulation, national policy statement or national environmental standard which relates to setting maximum discharge or ambient concentrations of any air contaminant, and / or limiting, recording, or mitigating emissions of carbon dioxide, PM_{10} particulate, heavy metals, sulphur dioxide, and / or nitrogen dioxide, and which is relevant to the air discharge from the consent holder's energy centre if it is the express intention of any such mechanism to apply retrospectively to existing activities.

Signed at Stratford on 9 June 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	4 October 2006
Commencement Date:	4 October 2006

Conditions of Consent

Consent Granted:	To discharge emissions into the air from 'Cogen-I' and 'Cogen-II' gas-fired co-generation energy generating plants with an energy output of 70 MW together with associated processes
Expiry Date:	1 June 2025
Review Date(s):	June 2015, June 2020
Site Location:	Whareroa Road, Hawera
Legal Description:	Lot 1 DP 12929 Lots 1 & 2 DP 13689 Lot 1 DP 17308 Lot 1 DP 17686 Lots 1-3 DP 19722 Pt Sec 234 Blk X Hawera SD
Grid Reference (NZTM)	1711450E-5614870N

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 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 into the environment from the site.

2. The measures representing the best practicable option may be reviewed in accordance with the procedure provided for in condition 15.

3. Prior to undertaking any alterations to the plant, processes or operations, as specified in applications 92/151, 95/141, 96/233, 97/112, 346, 391, and 2811 which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and any amendments.

4. The consent holder shall provide to the Taranaki Regional Council within five years from the granting of this consent and every six years thereafter a written report:

   a) reviewing any technological advances in the reduction or mitigation of emissions, how these might be applicable and/or implemented at the Whareroa site, and the costs and benefits of these advances; and

   b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify following consultation with the consent holder; and

   c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the Whareroa site; and

   d) addressing any other issue relevant to the minimisation or mitigation of emissions from the Whareroa site that the Chief Executive, Taranaki Regional Council, considers should be included.

5. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the site, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [mg/m^3] [eight- hour average exposure], or 30 milligrams per cubic metre [mg/m^3] [one-hour average exposure] at or beyond the boundary of the site.

6. The sum of all discharges to the atmosphere of nitrogen oxides from the cogeneration plant shall not exceed 48 grams per second [g/s].

7. The consent holder shall control all emissions of nitrogen dioxide or its precursors to the atmosphere from the site, so as to ensure that the maximum ground level concentration of nitrogen dioxide measured under ambient conditions does not exceed 200 micrograms per cubic metre [$\mu g/m^3$] [one-hour average], or 100 micrograms per cubic metre [$\mu g/m^3$] [twenty-four hour average], at or beyond the boundary of the site.

8. The consent holder shall control all emissions of fine particulates [PM_{10}] to the atmosphere from the site, in order that the maximum ground level concentration of fine particulates [PM_{10}] arising from the exercise of this consent measured under ambient conditions does not exceed 50 micrograms per cubic metre [$\mu g/m^3$] [twenty-four hour average], at or beyond the boundary of the site.

9. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent measured at or beyond the boundary of the site is not increased above background levels:

    a) by more than $1/30^{th}$ of the relevant Workplace Exposure Standard-Time Weighted Average, or by more than the Workplace Exposure Standard Short Term Exposure Limit at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour]; or

    b) if no Short Term Exposure Limit is set, by more than the General Excursion Limit at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

10. The minimum height of discharge of products of combustion from the Cogen I plant shall be 15 metres above ground level, and from Cogen II plant shall be 17.5 metres above ground.

11. The consent holder shall minimise the emissions and impacts of air contaminants discharged from the site by the selection of the most appropriate process equipment, process control equipment, emission control equipment, methods of control, supervision and operation, and the proper and effective operation, supervision, control and maintenance of all equipment and processes.

12. The consent holder, in conjunction with the Taranaki Regional Council, shall undertake monitoring of emissions and their effects upon the environment as required by the Chief Executive, Taranaki Regional Council.

13. Notwithstanding conditions 1 and 11 above, the co-generation plants shall not be operated so as to generate emissions of visible smoke, nor shall any plume of visible water vapour from the cooling towers cross the boundary of the site.

14. The water treatment regime used in the cooling water system associated with Cogen I and Cogen II shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.

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 within six months of receiving a report prepared by the consent holder pursuant to condition 4 of this consent, or in any case in June 2010 and/or June 2015 and/or June 2020, for the purposes of:

    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review; and/or

    b) requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or

    c) to alter, add, or delete limits on mass discharge quantities or discharge or ambient concentrations of any contaminant or contaminants; and/or

    d) taking into account any Act of Parliament, regulation, national policy statement, national environmental standard, regional policy statement or regional rule which relates to limiting, recording, or mitigating products of combustion and which is relevant to emissions from the co-generation plants.

Transferred at Stratford on 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	31 March 2009
Commencement Date:	31 March 2009

Conditions of Consent

Consent Granted:	To discharge emissions into the air from the combustion of waste wood packaging
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	Rifle Range Road, Hawera
Legal Description:	Pt Lot 13 DP 2625 Blks IX & X Hawera SD
Grid Reference (NZTM)	1711447E-5613278N

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 only authorises the combustion of untreated timber packing waste originating from the Whareroa Dairy Factory site.

2. The total volume of waste that can be burned in calendar month shall not exceed 4 cubic metres.

3. 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 by ensuring proper and effective methods of control and supervision of the discharge at all times.

4. The consent holder, prior to lighting any fire, shall have regard to wind direction and speed so as to minimise adverse effects upon neighbours. No burning shall occur during foggy conditions.

5. The discharges authorized by this consent shall not give rise to a level of a contaminant or contaminants at or beyond the boundary of the site that is noxious or toxic.

6. The discharges authorized by this consent shall not give rise to an odour at or beyond the boundary of the site that is offensive or objectionable.

7. The consent holder shall maintain a record of each burning event, including: the date, time and duration; the wind conditions [strength and direction] over the duration of the burning; any problems or issues that occurred; and details of any complaints received about the burning. This record shall be made available to the Chief Executive, Taranaki Regional Council upon request.

8. This consent shall lapse on 31 March 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.

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/or June 2022 for the purpose or purposes 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 13 April 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Land Use Consent

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

Name of Consent Holder:	Fonterra Limited PO Box 444 Hawera 4640
Decision Date:	25 February 2016
Commencement Date:	25 February 2016

Conditions of Consent

Consent Granted:	To construct, place and use a water intake structure in the bed of the Tangahoe River for industrial water supply purposes, including associated discharge of construction stormwater from the site
Expiry Date:	1 June 2034
Review Date(s):	June 2022, June 2028
Site Location:	135 Hicks Road, Hawera
Legal Description:	Lot 2 DP 372563 (Site of structure)
Grid Reference (NZTM)	1715770E-5612494N
Catchment:	Tangahoe

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 water intake structure shall be constructed in accordance with information provide with the application, specifically:
   - The Assessment of Environmental effects prepared by *Planz Consultants Limited*, referenced *14425* and dated *December 2015*;
   - *Intake Screen Concept Plans* prepared by *Beca Consultants Limited*, referenced *3253783-CE*, drawing numbers *5000; 5001 & 5002* and dated *16/11/15*; and
   - *Fonterra Water Intake – Tangahoe Stream Crossing Sections*, prepared by *BTW Consultants Limited*, drawing number and dated *19/01/15*.

   In the case of any contradiction between the drawing(s) and the conditions of this consent, the conditions of this consent shall prevail.

2. Prior to the commencement of the works, the consent holder shall install suitable signage at the upstream and downstream approach of the site, advising the public of the potential navigation hazard. The signage shall be maintained throughout the life of the water-intake structure.

3. Before commencing any earthworks, the consent holder shall ensure that they (or their representatives) meet on site with a Taranaki Regional Council officer who is directly responsible for monitoring compliance with the conditions of this consent. The purpose of the meeting shall be to obtain specific advice from the Taranaki Regional Council about the measures required to ensure compliance with conditions 5 and 6.

4. The consent holder shall ensure that prior to the commencement of earthworks, the erosion control measures are installed in accordance with the *Erosion and Sediment Control Plan* prepared by *Fulton Hogan Limited*, titled, *Tangahoe Intake Upgrade: Erosion and Sediment Control: Stream Control / Construction Methodology*, referenced *ESC #001* and dated *25 January 2016*.

5. The sediment control measures necessary to comply with the conditions of this consent shall be constructed before soil is exposed at the site and shall remain in place, in respect of any particular area, until that area is stabilised. The obligation described in this condition shall cease to apply, and accordingly the erosion and sediment control measures may be removed, in respect of any particular area only when the site is stabilised.

   Note: For the purpose of conditions 5 and 6, 'stabilised' in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in the Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an officer of the Taranaki Regional Council, an 80% vegetative cover has been established.

6. All earthworked areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after the completion of soil disturbance activities.

7. At least 7 working days prior to the commencement of works the consent holder shall notify the Taranaki Regional Council of the proposed start date for the work. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz.

8. Any concrete work carried out in the river bed shall be completely separated from running water, by a temporary coffer-dam and/or diversion using sand bags or some other form of contained fill.

9. The consent holder shall ensure that any concrete placed in the channel is not exposed to flowing water for a period of 48 hours after it has been placed.

10. The consent holder shall ensure that the placement of the bank protection structures (gabions and/or mass block) proposed in Stage 3 of the Erosion and Sediment Control Plan (ESCP) is undertaken when the coffer dam proposed under Stage 2 of the ESCP is in place. The bank protection structures shall be embedded in the bed of the stream by at least 500 mm.

11. No instream works shall take place between 1 May and 31 October inclusive.

12. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

13. The consent holder shall take all reasonable steps to:

    a. minimise the amount of sediment discharged to the stream;
    b. minimise the amount of sediment that becomes suspended in the stream; and
    c. mitigate the effects of any sediment in the stream.

14. 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.

15. During the exercise of this consent, and on completion of the works, no stockpiles, mounds, depressions, trees/vegetation, holes or surplus material shall be left in a position where it may adversely affect the flow of water.

16. On completion of works, the banks of the Tangahoe River shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical.

17. The works shall remain the responsibility of the consent holder and be maintained so that any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.

18. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.

19. This consent shall lapse on 31 March 2021, 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.

20. 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 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 25 February 2016

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Appendix II

Biomonitoring report

To Job Manager, Emily Roberts
From Scientific Officer, Brooke Thomas
Report No BT057
Doc. No. 1668766
Date 13 April 2016

Biomonitoring of unnamed tributaries of the Tangahoe River and the Tawhiti Stream, and an unnamed coastal stream which receive stormwater discharges from the Fonterra Whareroa dairy factory, February 2016

Introduction

Fonterra Co-operative Group Limited holds a number of resource consents for activities associated with the operations of the Whareroa dairy processing complex near Hawera. The resource consents most relevant to this biomonitoring survey are summarised in Table 1 below:

Table 1 Summary of resource consents held by Fonterra which are most relevant to this biological survey.

Consent no.	Purpose
3902-2	To discharge up to 6,825 cubic metres/day [500 litres/second] of stormwater from a milk processing industry site into an unnamed tributary of the Tangahoe River
3907-2	To discharge stormwater, back flushing from the sand filters, and intermittent discharges of treated water from a reservoir, from a milk processing industry site into an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment
4133-2	To discharge up to 5,400 cubic metres/day [500 litres/second] of stormwater from a milk processing industry site into an unnamed coastal stream between the Tangahoe River and the Waihi Stream
5819-1	To discharge treated farm dairy effluent from an oxidation pond treatment system and a constructed wetland into an unnamed tributary of the Tangahoe River

There are three stormwater catchments covering the Whareroa dairy complex site. Stormwater from the northern catchment of the site is directed to a detention pond system before being discharged into an unnamed tributary of the Tawhiti Stream (Consent 3907-2). This pond system was upgraded from a single pond to a three pond system in 1998 to increase the holding capacity of the system to better reflect stormwater loadings.

On the eastern side of the site, stormwater is conveyed to a two-pond detention system prior to discharge into an unnamed tributary of the Tangahoe River (Consent 3902-2). This pond system has been in place since May 1996. Treated dairy farm effluent is also discharged from a pond treatment system, through a tertiary treatment wetland and into the same unnamed tributary of the Tangahoe River, downstream of the Fonterra Whareroa eastern stormwater catchment discharge (Figure 1, 5819-1).

Stormwater from the southern end of the site is directed through a single pond and wetland system prior to discharge into an unnamed coastal stream (Consent 4133-2).

Biological surveys have been performed in the unnamed tributaries of the Tawhiti Stream and the Tangahoe River and the unnamed coastal stream since the mid-1990's to assess the effects of these stormwater discharges on the macroinvertebrate communities in these streams.

This summer survey was the only one scheduled for the 2015-2016 monitoring period. Surveys are conducted annually but due to an oversight no survey was completed for the 2013/14 sampling period. Results from previous biological surveys performed in relation to the Whareroa site are discussed in numerous biomonitoring reports listed in the references.

Methods

This survey was undertaken on 15 February 2016, at two established sites in an unnamed tributary of the Tawhiti Stream (B1 and B2), at three sites in an unnamed tributary of the Tangahoe Stream (1, 2 and 3) and at one site in an unnamed coastal stream (S2) (Table 2 and Figure 1). All of these sampling sites are located downstream of stormwater outfalls from the Fonterra Whareroa plant. The discharge point for the treated dairy farm effluent into the unnamed tributary of the Tangahoe River authorised under consent 5819-1 is located between sites 1 and 2 (Figure 1).

The Tawhiti Stream tributary site B1 was relocated further upstream during the spring 2006, closer to the discharge point from Fonterra Whareroa stormwater ponds (TWH000473), as it was thought that this may be a more appropriate monitoring site in terms of habitat.

Table 2 Biomonitoring sites in unnamed tributaries of the Tawhiti Stream and Tangahoe River, and an unnamed coastal stream.

Stream	Site No.	Site code	Method of sampling	Time of sampling (NZST)	Water temperature (°C)
Tawhiti Stream tributary	B1	TWH000478	Vegetation sweep	0825	18.8
	B2	TWH000479	Vegetation sweep	0800	18.8
Unnamed tributary of the Tangahoe River	1	TNH000470	Vegetation sweep	1025	17.2
	2	TNH000473	Vegetation sweep	1005	17.1
	3	TNH000477	Vegetation sweep	0945	16.5
Unnamed coastal stream	S2	UND001340	Kick/ sweep	1120	16.7

In this survey, the standard 'vegetation sweep' sampling technique was used at sites B1, B2, 1, 2, and 3 to collect streambed macroinvertebrates (Table 2). This 'sweep-net' 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).

A combination of 'vegetation sweep' sampling and 'kick-sampling' was used at site S2 (Table 2). This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark *et al*, 2001).

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

Macroinvertebrate taxa found in each sample were recorded as:

R (rare) = less than 5 individuals;
C (common) = 5-19 individuals;
A (abundant) = 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. Recently, a similar scoring system has been developed for macroinvertebrate taxa found in soft bottomed streams (SBMCI) (Stark and Maxted, 2004, 2007). The SBMCI is not included in this report due to varying sampling techniques (both over time and between samples), which can make comparisons difficult.

Although the MCI was designed for use in stony streams, it can be useful in weedy stream habitats if there is a baseline of weedy stream macroinvertebrate data for comparison. MCI results from weedy streams are naturally lower than MCI results from most stony streams. The MCI was designed as a measure of the response of macroinvertebrate communities to the effects of organic pollution, however, MCI results can also reflect the effects of warm temperatures, and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities inhabit less polluted waterways. Weedy, silt bottom stream macroinvertebrate communities tend to be dominated by more 'tolerant' taxa than stony stream communities, and therefore it may require more severe organic pollution to cause a significant decline in weedy stream MCI values. A difference of 11 units or more in MCI values is considered significantly different (Stark 1998).

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 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the $SQMCI_s$ is not multiplied by a scaling factor of 20, therefore $SQMCI_s$ values range from 1 to 10.

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

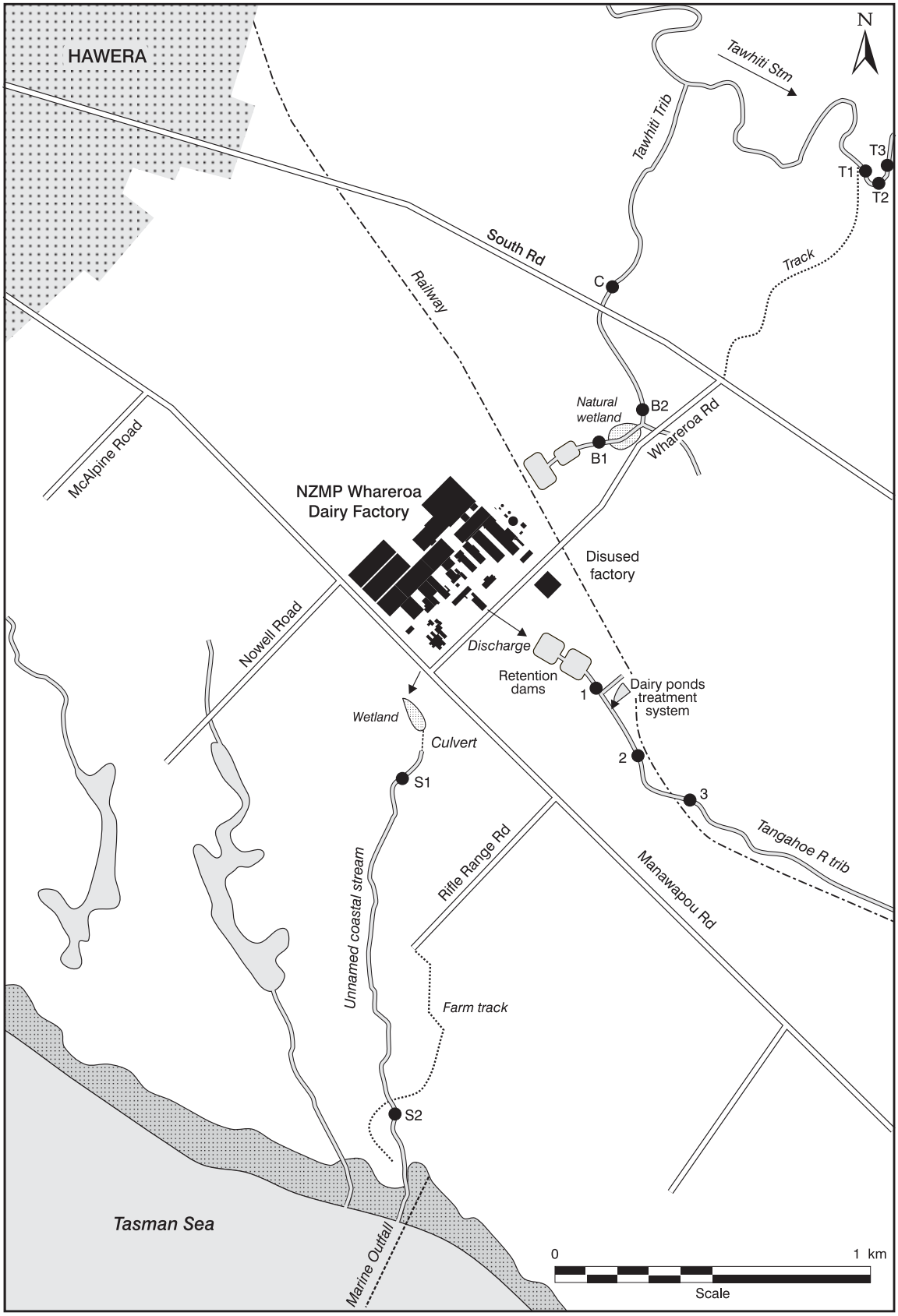

Figure 1 Biomonitoring sites related to the Fonterra Whareroa dairy factory discharges.

Results

Site characteristics and hydrology

This February 2016 survey followed a period of 140 days since a fresh in excess of three times median flow and 156 days since a fresh in excess of seven times median flow.

At the time of this survey, water temperature in the unnamed tributary of the Tawhiti Stream was 18.8°C. There was an uncoloured, cloudy, low and slow flow at B1 and an uncoloured, clear and moderate flow at B2. Site B1 had a silt substrate with a small amount of wood/root. Site B2 had a predominantly silt, sand and fine gravel substrate with some coarse gravel. Site B2 had a soft layer of sediment at the edge of the stream, overlain by a thick mat of macrophytes. Macrophytes were also recorded growing on the bed of the stream. At site B1 macrophytes were recorded growing at the edges of the stream only. No periphyton was recorded at B1, whereas patchy filaments were recorded at B2. Both sites were shaded by overhanging vegetation.

In the Tangahoe River tributary, water temperatures ranged from 16.5°C to 17.2°C. There was a low, slow or very slow flow of uncoloured and clear water. The substrate at all three sites comprised entirely of silt. No periphyton was recorded at any site on the Tangahoe River tributary. Macrophytes were recorded growing at the edges and on the bed of the stream at all three sites. All sites were shaded by overhanging grasses. Accessibility was poor at the Tangahoe River tributary sites as a result of thick and widespread grasses that surrounded the sites. Sites were barely visible and thus only small areas were surveyed in the Tangahoe River tributary.

The water temperature recorded at site S2 in the unnamed coastal stream was 16.7°C. A low, slow flow of uncoloured and cloudy water was recorded at this site. The substrate was comprised predominantly of hard clay, wood and root with some silt, sand and fine and coarse gravels. There was no periphyton or moss recorded at the site but there were patchy leaves and wood observed on the streambed. Macrophytes were recorded growing at the edges of the stream. The stream bed was partially shaded by overhanging vegetation.

Heterotrophic growths

No undesirable biological growths were observed in any of the three streams, at the sites sampled, nor were they found during sample processing.

Macroinvertebrate communities

Previous results from surveys performed at the six sites around the Fonterra, Whareroa plant, together with current results, are summarised in Table 3 with the full results presented in Table 4, Table 5 and Table 6.

Table 3 Summary of results from previous macroinvertebrate surveys performed at sites in tributaries of the Tawhiti Stream and Tangahoe River, and unnamed coastal stream, together with current results.

Site	No. surveys	Numbers of taxa			MCI scores			SQMCI$_s$ scores			
		Range	Median	Current	Range	Median	Current	No. surveys	Range	Median	Current
B1	44	3-26	15	12	40-83	67	72	33	1.2-4.0	2.6	3.4
B2	43	6-26	18	18	37-83	70	71	34	2.4-4.4	4.0	4.4
1	25	15-27	19	11	65-79	71	73	25	1.7-3.9	2.9	1.7
2	56	5-29	17	14	44-74	66	74	34	1.2-4.4	2.7	4.9
3	46	6-32	19	17	50-91	71	91	34	1.1-5.2	3.1	4.5
S2	33	6-23	18	15	58-90	73	95	24	2.7-5.0	4.0	4.3

Tawhiti Stream tributary

The full results of the current survey for sites in the Tawhiti Stream tributary are presented in Table 4.

Table 4 Macroinvertebrate fauna of an unnamed tributary of the Tawhiti Stream in relation to Fonterra, Whareroa sampled on 15 February 2016.

Taxa List	Site Number	MCI score	B1	B2
	Site Code		TWH000478	TWH000479
	Sample Number		FWB16065	FWB16066
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	R	-
NEMERTEA	Nemertea	3	C	C
NEMATODA	Nematoda	3	-	R
ANNELIDA (WORMS)	Oligochaeta	1	A	R
	Lumbricidae	5	-	R
HIRUDINEA (LEECHES)	Hirudinea	3	-	R
MOLLUSCA	Lymnaeidae	3	R	R
	Physa	3	C	A
	Potamopyrgus	4	VA	XA
	Sphaeriidae	3	A	-
CRUSTACEA	Ostracoda	1	R	C
	Paracalliope	5	R	XA
	Paraleptamphopidae	5	-	R
	Talitridae	5	-	R
HEMIPTERA (BUGS)	*Microvelia*	3	-	R
COLEOPTERA (BEETLES)	Dytiscidae	5	-	R
TRICHOPTERA (CADDISFLIES)	*Oxyethira*	2	-	A
	Triplectides	5	-	R
DIPTERA (TRUE FLIES)	*Paralimnophila*	6	R	-
	Zelandotipula	6	R	-
	Empididae	3	-	C
ACARINA (MITES)	Acarina	5	R	C
		No of taxa	12	18
		MCI	72	71
		SQMCIs	3.4	4.4
		EPT (taxa)	0	1
		%EPT (taxa)	0	6
'Tolerant' taxa	'Moderately sensitive' taxa		'Highly sensitive' taxa	

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

Site B1 (TWH000478)

A moderately low taxa richness of 12 taxa was found at site B1 at the time of the survey which was three taxa less than the median number recorded for the site (median taxa richness 15; Table 3) and five taxa more than the number recorded by the previous sample (taxa richness seven; Figure 2).

The MCI score of 72 units indicated a community of 'poor' biological health which was similar to the median value recorded for the site (median MCI score 67 units; Table 3) and significantly higher (Stark, 1998) than the previous survey score (MCI score 57 units; Figure 2). The $SQMCI_S$ score of 3.4 units was higher than the median value recorded at the site (median $SQMCI_S$ score 2.6 units; Table 3) but slightly lower (by 0.5 unit) than the previous survey result ($SQMCI_S$ score 3.9 units).

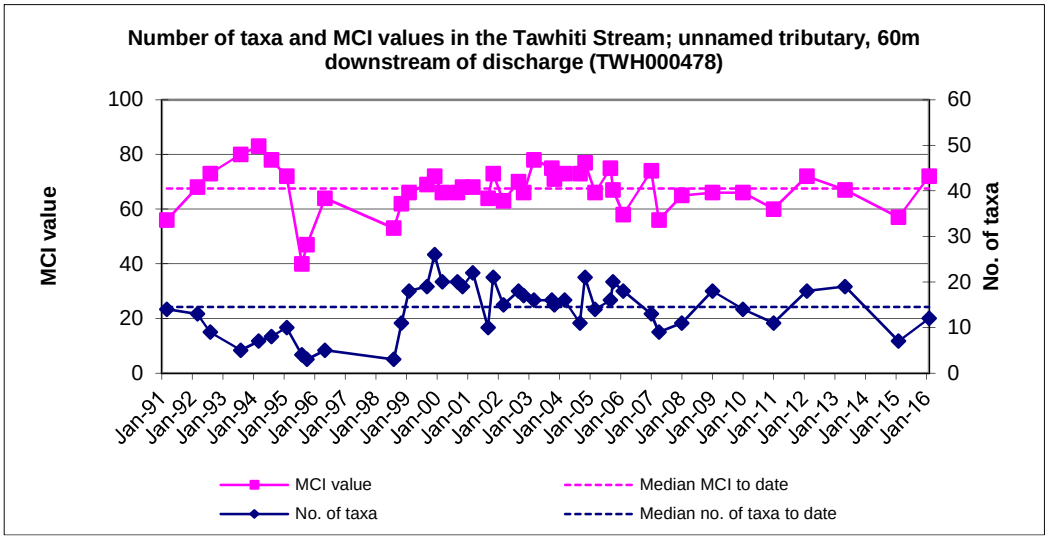

Figure 2 Number of taxa and MCI values recorded since 1991 at site B1.

The community was characterised by three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*) and fingernail clams (Sphaeriidae)] (Table 4).

Site B2 (TWH000479)

A moderate taxa richness of 18 taxa was found at site B2 at the time of the survey which was the same as the median number recorded for the site (Table 3) and five taxa more than the number recorded in the previous sample (taxa richness 13; Figure 3).

The MCI score of 71 units indicated a community of 'poor' biological health which was similar to the median value recorded for the site (median MCI score 70 units; Table 3) but significantly lower (Stark, 1998) than the previous survey score (MCI score 83 units; Figure 3). The $SQMCI_S$ score of 4.4 units was similar to the median value recorded at the site (median $SQMCI_S$ score 4.0 units; Table 3) and also similar to the previous survey ($SQMCI_S$ score 4.0 units).

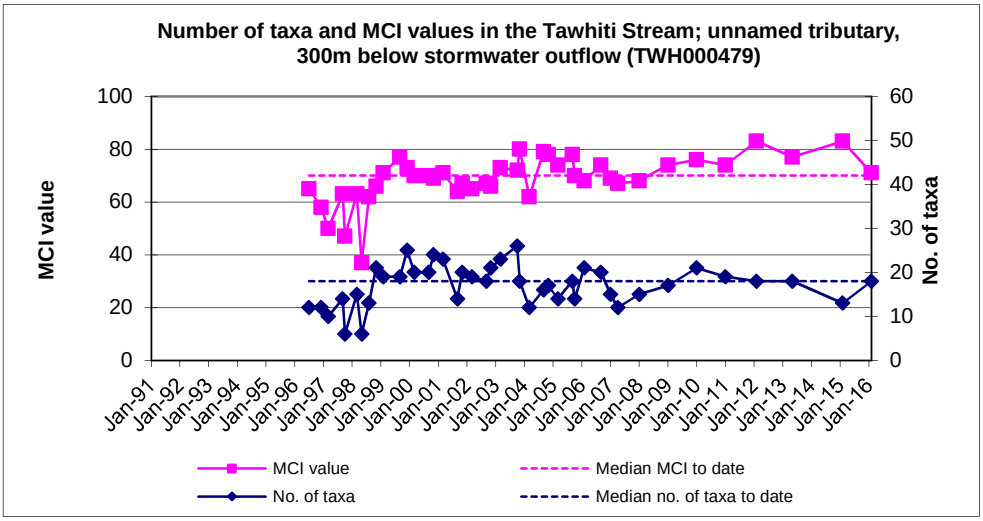

Figure 3 Number of taxa and MCI values recorded since 1996 at site B2.

The community was characterised by three 'tolerant' taxa [snails (*Physa*) and (*Potamopyrgus*) and axehead caddis (*Oxyethira*)] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] (Table 4).

Tangahoe River tributary

The full results of the current survey for sites in the Tawhiti Stream tributary are presented in Table 5.

Table 5 Macroinvertebrate fauna of an unnamed tributary of Tangahoe River in relation to Fonterra Whareroa sampled on 15 February 2016.

Taxa List	Site Number	MCI score	1	2	3
	Site Code		TNH000470	TNH000473	TNH000477
	Sample Number		FWB16067	FWB16068	FWB16069
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	R	R	-
ANNELIDA (WORMS)	Oligochaeta	1	XA	C	C
	Lumbricidae	5	-	-	C
MOLLUSCA	Lymnaeidae	3	-	-	R
	Potamopyrgus	4	VA	A	XA
	Sphaeriidae	3	A	-	-
CRUSTACEA	Ostracoda	1	A	C	-
	Isopoda	5	R	-	-
	Paracalliope	5	R	XA	XA
	Paraleptamphopidae	5	-	R	C
	Paranephrops	5	R	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	-	-	C
	Zephlebia group	7	-	-	C
HEMIPTERA (BUGS)	*Microvelia*	3	-	-	R
	Saldula	5	-	R	-
COLEOPTERA (BEETLES)	Dytiscidae	5	-	R	-
TRICHOPTERA (CADDISFLIES)	*Hydrobiosis*	5	-	-	R
	Hydropsyche (Orthopsyche)	9	-	-	C
	Polyplectropus	6	-	C	-
DIPTERA (TRUE FLIES)	*Paralimnophila*	6	R	-	-
	Chironomus	1	-	R	-
	Orthocladiinae	2	R	-	-
	Polypedilum	3	-	C	R
	Tanypodinae	5	-	R	-
	Empididae	3	-	R	R
	Ephydridae	4	-	-	C
	Austrosimulium	3	-	-	C
ACARINA (MITES)	Acarina	5	A	R	A
		No of taxa	11	14	17
		MCI	73	74	91
		SQMCIs	1.7	4.9	4.5
		EPT (taxa)	0	1	4
		%EPT (taxa)	0	7	24

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

Site 1 (TNH000470)

A low taxa richness of 11 taxa was found at site 1 at the time of the survey which was eight taxa less than the median number recorded for the site (median taxa richness 19; Table 3) and seven taxa less than that recorded by the previous sample (taxa richness 18; Figure 4). It was also the lowest number of taxa recorded at this site to date.

The MCI score of 73 units indicated a community of 'poor' biological health which was not significantly different (Stark, 1998) to the previous survey score (MCI score 79 units (Figure 4) or to the median value recorded for the site (median MCI score 71 units; Table 3). The $SQMCI_S$ score of 1.7 units was significantly (Stark, 1998) lower than the median value recorded at the site (median $SQMCI_S$ score 2.9 units; Table 3) and also significantly lower than that recorded by the previous survey ($SQMCI_S$ score 3.8 units). It was also equivalent to the lowest $SQMCI_S$ score recorded at this site to date.

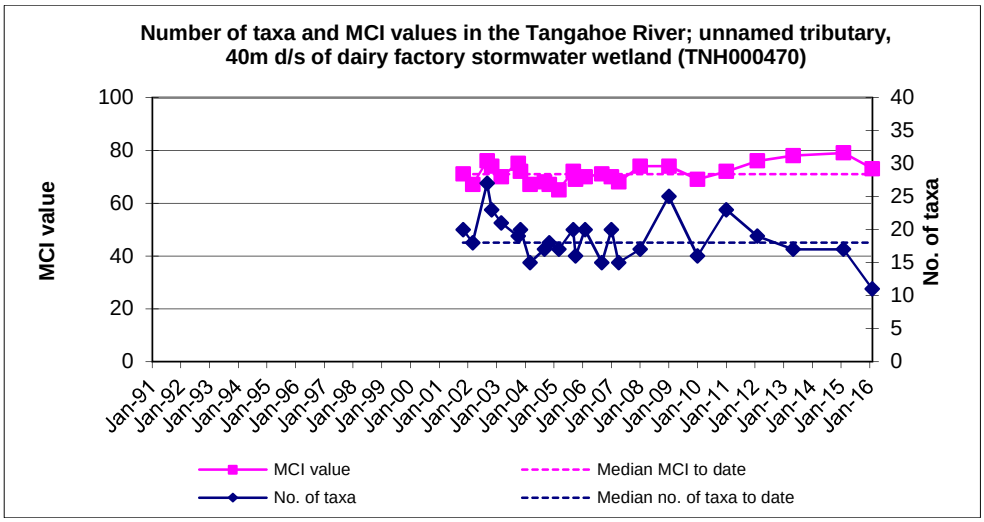

Figure 4 Number of taxa and MCI values recorded since 2001 at site 1.

The community was characterised by four 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), fingernail clam (Sphaeriidae) and ostracod seed shrimp] and one 'moderately sensitive' taxon [Acarina mites] (Table 5).

Site 2 (TNH000473)

A moderately low taxa richness of 14 taxa was found at site 2 at the time of the survey which was three taxa less than the median number recorded for the site (median taxa richness 17; Table 3) and 15 taxa less than the previous sample (taxa richness 29; Figure 5).

The MCI score of 74 units indicated a community of 'poor' biological health which was not significantly different (Stark, 1998) to the median value recorded for the site (median MCI score 66 units; Table 3) and to the previous survey score (MCI score 70 units; Figure 5).This score was equivalent to the highest MCI score recorded at this site to date (Figure 5).The $SQMCI_S$ score of 4.9 units was markedly higher than the median value recorded at the site (median $SQMCI_S$ score 2.7 units; Table 3) and higher than the score recorded by the previous survey ($SQMCI_S$ score 4.1 units).

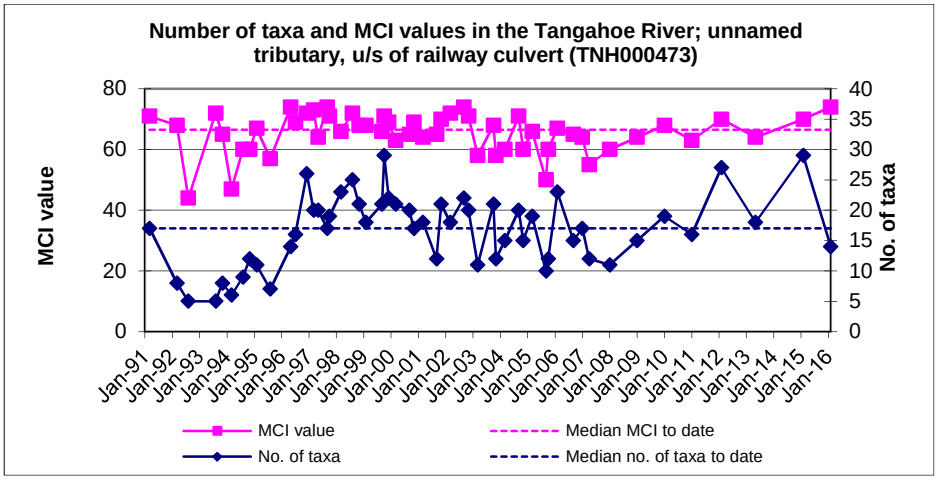

Figure 5 Number of taxa and MCI values recorded since 1991 at site 2.

The community was characterised by one 'tolerant' taxon [snail (*Potamopyrgus*)] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] (Table 5).

Site 3 (TNH000477)

A moderate taxa richness of 17 taxa was found at site 3 at the time of the survey which was slightly lower than the median number recorded for the site (median taxa richness 19; Table 3) and slightly lower than the number recorded by the previous sample (taxa richness 19; Figure 6).

The MCI score of 91 units indicated a community of 'fair' biological health which was significantly (Stark, 1998) higher than the median value recorded for the site (median MCI score 71 units; Table 3) and to the previous survey score (MCI score 76 units; Figure 6). This MCI score was equivalent to the highest MCI score recorded at this site to date (Figure 6). The $SQMCI_S$ score of 4.5 units was markedly higher than the median value recorded at the site (median $SQMCI_S$ score 3.1 units; Table 3) but was slightly lower than the previous survey result ($SQMCI_S$ score 4.8 units).

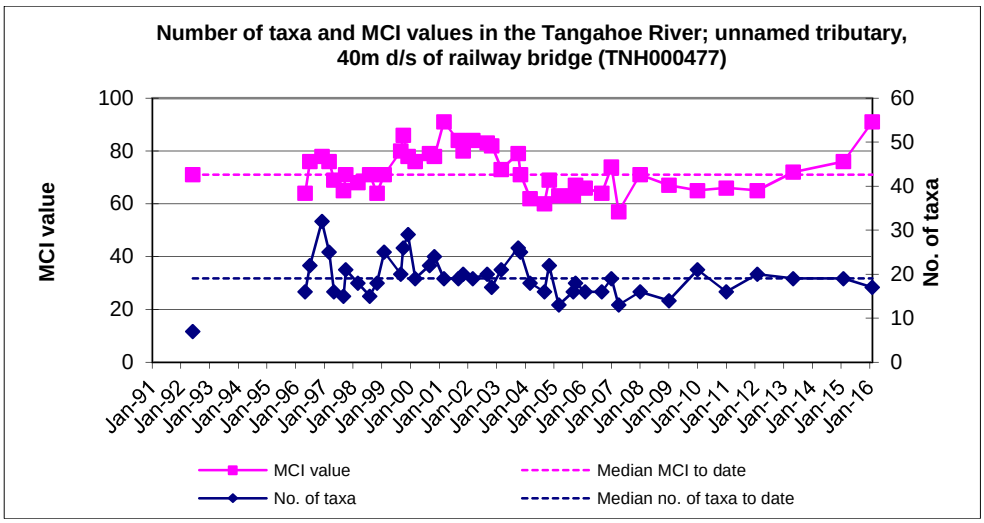

Figure 6 Number of taxa and MCI values recorded since 1992 at site 3.

The community was characterised by one 'tolerant' taxon [snail (Potamopyrgus)] and two 'moderately sensitive' taxa [amphipod (*Paracalliope*) and Acarina mites] (Table 5).

Unnamed coastal stream

The full results of the current survey for sites in the unnamed coastal stream are presented in Table 6.

Table 6 Macroinvertebrate fauna of an unnamed coastal stream relation Fonterra, Whareroa sampled on 15 February 2016.

Taxa List	Site Number	MCI score	S2
	Site Code		UND001340
	Sample Number		FWB16070
ANNELIDA (WORMS)	Oligochaeta	1	C
MOLLUSCA	*Potamopyrgus*	4	VA
CRUSTACEA	*Paracalliope*	5	VA
	Paraleptamphopidae	5	C
	Paranephrops	5	R
EPHEMEROPTERA (MAYFLIES)	*Zephlebia group*	7	R
HEMIPTERA (BUGS)	*Microvelia*	3	R
COLEOPTERA (BEETLES)	Hydrophilidae	5	R
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Orthopsyche)*	9	R
DIPTERA (TRUE FLIES)	*Paralimnophila*	6	R
	Zelandotipula	6	R
	Paradixa	4	C
	Empididae	3	C
	Austrosimulium	3	A
ACARINA (MITES)	Acarina	5	C
		No of taxa	15
		MCI	95
		SQMCIs	4.3
		EPT (taxa)	2
		%EPT (taxa)	13
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa	

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

Site S2 (UND001340)

A moderate taxa richness of 15 taxa was found at site S2 at the time of the survey which was three taxa lower than the median number recorded for the site (median taxa richness 18; Table 3) and three taxa higher than the previous sample (taxa richness 12; Figure 7).

The MCI score of 95 units indicated a community of 'fair' biological health which was significantly higher (Stark, 1998) than the median value recorded for the site (median MCI score 73 units; Table 3) and five units above the historical maximum score this site. However, it was not significantly different (Stark, 1998) to the previous survey score (MCI score 90 units; Figure 7). The $SQMCI_S$ score of 4.3 units was similar to the median value recorded at the site (median $SQMCI_S$ score 4.0 units; Table 3) and higher than the previous survey ($SQMCI_S$ score 3.6 units).

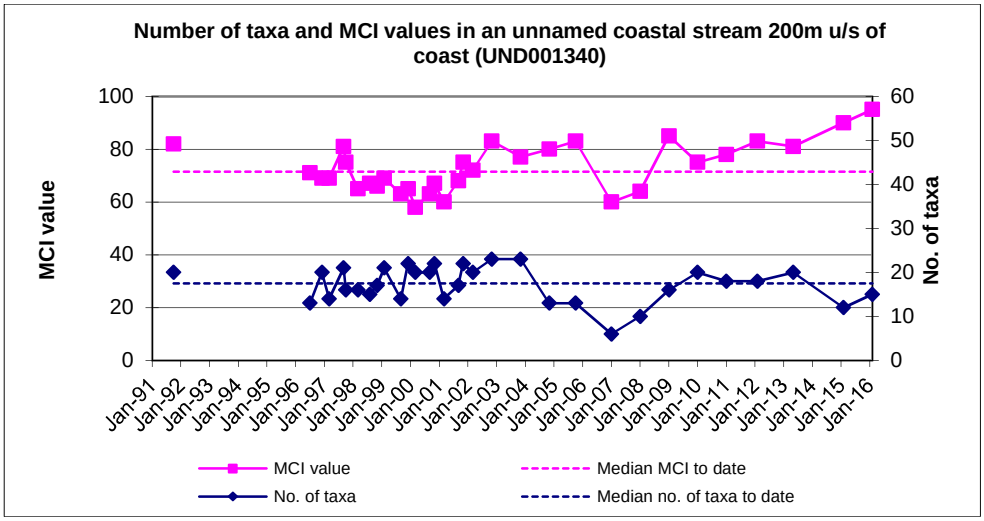

Figure 7 Number of taxa and MCI values recorded since 1996 at S2.

The community was characterised by two 'tolerant' taxa [snail (*Potamopyrgus*) and black fly larvae (*Austrosimulium*)] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] (Table 6).

Discussion

Unnamed tributary of the Tawhiti Stream

Results from the 2011 survey indicated the occurrence of an unauthorised wastewater discharge which resulted in a proliferation of 'sewage fungus' in the stream. As a result of this incident, improvements were made to the stormwater management system at the Whareroa site to rectify the problem. In the 2012 and 2013 surveys, the absence of heterotrophic growths (including 'sewage fungus') at both sample sites in the tributary during both surveys suggested that improvements to the stormwater system had been effective in improving the quality of the stormwater discharge into the stream. The current survey also found no heterotrophic growths. The low scoring 'tolerant' *Chironomus* blood worm was found to be very 'abundant' at site B1 in the 2011 survey, probably as a result of the unauthorised discharge. The abundance of this taxon can be indicative of the presence of an organic discharge although it can also be found in water with low dissolved oxygen. The absence of this taxon from site B1 in the 2012, 2013 and 2015 surveys along with the current survey provides further evidence that current stormwater discharges did not have high levels of organic waste.

Results from the current survey indicated that site B1 had 'poor' macroinvertebrate community health. Results indicated a significant (Stark, 1998) improvement in MCI score (by 15 units) at site B1 since the previous survey. The MCI score was also above the historical median (by 5 MCI units).The $SQMCI_s$ score was insignificantly lower than that recorded by previous survey (by 0.5 unit), but was higher than historical median for the site (by 0.8 unit).

In this survey, there were no significant changes recorded at site B2 in $SQMCI_s$ score between the current survey, previous survey and historic median. The MCI score was

similar to the historical median but significantly (Stark, 1998) lower than the previous survey score (by 12 MCI units).The 'poor' MCI score of 71 units is a reflection of the dominance of 'tolerant' taxa in the macroinvertebrate community (61%). MCI scores were similar between site B1 and B2, however the $SQMCI_s$ score recorded at site B2 was significantly higher than that recorded at site B1.The difference in the SQMCI scores between the two sites can mainly be attributed to an increase in favourable habitat (macrophyte beds) at B2 and the consequent increase in abundance of one 'moderately sensitive' taxon in particular [amphipod (*Paracalliope*)].

Overall there was no evidence that discharges into the unnamed tributary of the Tawhiti Stream were effecting water quality at site B1 or site B2.

Unnamed tributary of the Tangahoe River

The macroinvertebrate communities present at the three sites in the unnamed tributary of the Tangahoe River were of 'poor' (site 1 and 2) and 'fair' (site 3) quality at the time of the current survey, a reflection of the nature of the habitat present at the sites. There were no significant changes in MCI scores between the current survey, previous survey and historic medians at sites 1 and 2, however site 3 recorded a MCI score significantly (Stark, 1998) higher than both the historical median (by 20 units) and the previous survey score (by 15 units). The MCI score of 91 units was also equivalent to the highest score recorded at site 3 to date and was significantly higher than that recorded by site 1 and 2 (by 18 and 17 units respectively). This is a reflection of slightly better habitat (greater flow) at this site in comparison to the two upstream sites.

$SQMCI_s$ scores at site 2 and site 3 were significantly (Stark, 1998) higher than historical medians. Site 3 also recorded a $SQMCI_s$ score higher than the previous survey result. Site 1 recorded a SQMCIs score significantly lower than the previous survey result, significantly lower than the historical median and significantly lower than the two downstream sites. It is thought this result is likely to be habitat related rather than related to any effects from stormwater discharges. Is it likely a large quantity of sediment was sampled at site 1 as indicated by the presence of 'extremely abundant' (Oligochaete worms), and thus has impacted upon the results.

Overall there was no evidence for discharges significantly effecting water quality.

Unnamed coastal stream

The macroinvertebrate community at site S2 contained a moderate number of taxa dominated by low scoring 'tolerant' snails (*Potamopyrgus*) and black fly larvae (*Austrosimulium*) and one 'moderately sensitive' taxon amphipod (*Paracalliope*). The MCI score of 95 units indicated a macroinvertebrate community of 'fair' health which was the highest ever MCI score recorded at the site (33 surveys in total) and was significantly higher than the historical median for the site. This suggests that macroinvertebrate community health has improved at the site.

Overall the improvement in the health of the macroinvertebrate community and subsequent increases in MCI scores over the past eight years has been attributed to the fencing and planting of the stream in the vicinity of the site.

Summary

A six site biomonitoring survey was undertaken using either the Council's standard '400 ml sweep-net' method or a combination of '400 ml sweep-net' and 'kick-sampling' methods, in tributaries of the Tawhiti Stream (two sites), Tangahoe River (three sites) and an unnamed coastal stream (one site) to assess whether stormwater discharges had had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site. They were also checked for heterotrophic growths.

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 abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored. The presence of masses of heterotrophic organisms can be an indicator of organic enrichment within a stream.

An unauthorised discharge recorded in the unnamed tributary of the Tawhiti Stream in 2011 resulted in the proliferation of undesirable heterotrophic growths 'sewage fungus' at site B1 and to a lesser extent at site B2 downstream of the stormwater discharge. In response to this incident, Fonterra carried out a number of improvements to the stormwater management system at the Whareroa site between February and April 2011. Results from the 2012, 2013 and 2015 surveys suggested an improvement in water quality at these sites since the stormwater upgrade was completed in April 2011. Results from current survey also suggest a continued improvement in preceding water quality at these sites. The $SQMCI_S$ score, although slightly lower than the previous survey results was markedly higher than the historical median at site B1. No significant changes, from historical median scores were recorded at site B2.The macroinvertebrate community was dominated by species that would be expected in this soft sediment, slower flowing and weedy stream (amphipods (*Paracalliope*) and snails (*Potamopyrgus*)).

In the unnamed tributary of the Tangahoe Stream, the macroinvertebrate communities present at the three sites were of 'poor' (site 1 and 2) and 'fair' (site 3) quality at the time of the current survey. This is a typical result for sites 1 and 2, but an improvement for site 3. There were no significant changes in MCI scores between the current survey, previous survey and historic medians at sites 1 and 2, however site 3 recorded a MCI score significantly higher than both the historical median and the previous survey score. The MCI score recorded at site 3 was also equivalent to the highest score recorded at this site to date, a reflection of slightly better habitat (greater flow) at this site in comparison to the two upstream sites. There were improvements in $SQMCI_s$ scores from historical medians at site 2 and 3 but not site 1. Site 1 recorded a $SQMCI_s$ score significantly lower than the historical median and the previous survey result. It is thought this result is likely to be habitat related and related to the large proportion of fine sediment sampled at the time of survey.

The results of this survey continued to reflect improvements in the macroinvertebrate community that have been recorded over the past eight years at site S2 in the unnamed

coastal stream. This improvement has been attributed to the fencing and planting of the stream in the vicinity of this site. There was no evidence of any effects of the stormwater discharge on the macroinvertebrate community in the unnamed coastal tributary.

The results of this February 2016 survey of the three small streams around the Fonterra Whareroa factory indicated that stormwater discharges from the factory had not had recent detrimental effects upon the streambed communities in the unnamed tributaries of the Tawhiti Stream and the Tangahoe River, or the unnamed coastal stream.

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Appendix III

Freshwater biological survey

To	Job Manager, Emily Roberts
From	Scientific Officer, Darin Sutherland
Report No	DS036
Document No.	1611438
Date	4 December 2015

Biological inspection of unnamed tributaries of the Tawhiti Stream and Tangahoe River, and an unnamed coastal stream, in relation to the discharge of stormwater from the Fonterra Whareroa dairy factory, December 2015

1. Introduction

Fonterra Co-operative Group Limited holds a number of resource consents for activities associated with the operations of the Whareroa dairy processing complex near Hawera. This includes three consents to discharge stormwater into three separate streams: an unnamed tributary of the Tawhiti Stream, an unnamed tributary of the Tangahoe River, and an unnamed coastal stream. A brief biological inspection was scheduled in the 2015-2016 monitoring year to monitor the effects of these discharges. This was conducted on the 3 December 2015. This is fourth time that this biological inspection has been undertaken, with the results of previous inspections discussed in reports included in the reference section.

A full biomonitoring survey of these streams is also scheduled during summer for the 2015-2016 monitoring period. The inclusion of a spring biological inspection in the monitoring programme is a direct response to the results of water quality and biological monitoring undertaken in January 2011 (Jansma, 2011). At this time, the discharge to the Tawhiti Stream tributary was found to have caused the establishment of undesirable heterotrophic growths. It became apparent that these growths may have been present since spring. As a result, the monitoring programme was augmented to include a spring biological inspection, to increase monitoring at a time when factory throughput is often the highest.

Due to the layout of the stormwater treatment systems, no upstream site is available in any of the tributaries. As a result only downstream observations were possible. The inspection included the collection of small samples which were sorted on site to assess what live invertebrates were present. As the sorts were not performed using magnification, the level of identification was quite low, except for those invertebrates that could be easily identified to a higher taxonomic level e.g. the sandfly *Austrosimulium*.

2. Observations

Tawhiti Tributary

The stream flowing from the stormwater ponds had a moderate and steady flow, which was clear and uncoloured. The stream temperature at the time of the inspection was 17.7^{o}C. The macroinvertebrate habitat downstream of the stormwater discharge

was comprised of macrophytes and woody debris. The substrate of the stream was predominantly silt and was very easily disturbed. No heterotrophic growths, periphyton, iron oxide or moss was noted at this partially shaded site. An invertebrate sample was collected using the 'vegetation-sweep' method, which was live-sorted on site. This sample had very few taxa, most of which were pollution tolerant, and all taxa had low abundances. The sample contained: midge (Chironomidae), oligochaete worms, sandfly (*Austrosimulium*), mite (Acarini), seed shrimp (Ostracod), and snail (*Potamopyrgus*). No *Chironomus* blood worms were observed in the sample. The presence of *Chironomus* can be an indication of organic enrichment.

The results of the live sort indicate that the macroinvertebrate community was in poor health. Previous samples from the stream have also indicated that the macroinvertebrate community was of poor quality. Generally, soft bottom streams often have more 'tolerant' taxa than hard substrate streams but the low taxonomic richness and abundances suggests that other factors are causing a diminished macroinvertebrate community. No heterotrophic growths were recorded indicating that there was not high organic enrichment at the site and dissolved oxygen was unlikely to be an issue given the site was also partially shaded reducing water temperatures and photosynthetic rates.

At the time of the survey water clarity was good but given that a deep layer of soft sediment exists on the bed of the stream suspended sediment may be an issue. The stream is also small and is fed by stormwater ponds. Very low flows would likely reduce taxa richnesses and abundances and this may explain the observed results.

No heterotrophic growths were also observed further downstream and water clarity continued to be satisfactory.

Overall, dishcarges from the dairy factory site does not appear to have had a significant adverse effect on the macroinvertebrate communities of the unnamed tributary of the Tawhiti Stream.

Tangahoe Tributary

The Tangahoe tributary near the ponds had a low and steady flow that was clear and uncoloured. The stream temperature at the time of the inspection was 16.1^{o}C. The substrate was comprised predominantly of hard clay covered in a fine silt layer. The site was partially shaded by steep-sided banks and overhanging grasses. No heterotrophic growths, periphyton, iron oxide or moss was noted. An invertebrate sample was collected using a combination of the 'vegetation-sweep' and 'streambed kick' methods, which was then live-sorted on site. The sample contained: midge (*Chironomus* and Dixidae), oligochaete worms, sandfly (*Austrosimulium*), amphipod (*Paracalliope*), seed shrimp (Ostracod), water striders (*Microvelia*) and snail (*Potamopyrgus*). Both the amphipods and sandflies were reasonably abundant. The live-sort results indicate a mildly eutrophic stream typical of lowland farmland. Though pollution 'tolerant' blood worms (*Chironomus*) and oligochate worms were present in the sample there numbers were low and combined with the lack of heterotrophic growths suggests limited organic enrichment. There was also little evidence for significant sediment issues, water clarity was good and the streambed did not have substantial deposited sediment.

Further downstream at two biomonitoring sites the Tangahoe Tributary had very low, slow flows and clear, uncoloured water. Stream width at both sites was very narrow

(15-20 cm) with little water in the stream which was obscured by long grasses on the riparian margins. There was no visible sewage fungus but the streambed had a very thick layer of soft sediment. Low flows and deposited sediment is likely to negatively affect the macroinvertebrate communities present in the tributary.

Overall, these results, including the lack of undesirable heterotrophic growths on the streambed, indicate that discharges from the dairy factory site had not had a significant adverse effect on the macroinvertebrate communities of the unnamed tributary of the Tangahoe River.

Unnamed coastal Stream

The unnamed coastal stream was inspected at several sites from the point below the stormwater pond to the biomonitoring survey site. At the point below the stormwater pond, the stream had a moderate, slow flow and the water was uncoloured and clear. The streambed had a layer of soft sediment suggesting some silt sedimentation within the stream. Unlike the previous survey, no long green filamentous algae was recorded growing on the streambed and no macrophytes were recorded growing at the edges of the stream.

Along the reach between the stormwater pond and the biomonitoring site the water was uncoloured and clear with a moderate, steady flow. No heterotrophic growths were observed. Crayfish (*Paranephrops*) were observed along several sections of the stream and one site had two frogs present.

A live sample was collected using a combination of the 'vegetation-sweep' and 'streambed kick' sampling methods. This live sample contained: midge (Chironomidae), oligochaete worms, sandfly (*Austrosimulium*), amphipod (*Paracalliope*), water strider (*Microvelia*), leptophlebid mayflies, caddisfly (*Hydropsyche*), crayfish (*Paranephrops*) and snail (*Potamopyrgus*). The live sort indicated a moderately healthy macroinvertebrate community with both 'sensitive' and 'tolerant' taxa present, though taxa that prefer mildly eutrophic conditions (sandflies, snails and amphipods) were the most abundant taxa in the sample suggesting some enrichment.

Overall, these results, including the lack of undesirable heterotrophic growths on the streambed, indicate that discharges from the dairy factory site had not had a significant adverse effect on the macroinvertebrate communities of the unnamed tributary coastal stream.

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Appendix IV

Marine ecological monitoring reports

Memorandum

To: Science Manager – Hydrology/Biology, Regan Phipps
From: Scientific Officer, Emily Roberts and Technical Officer Thomas McElroy
File: 1616097
Date: 11 January 2016

Fonterra Whareroa/Hawera Municipal Combined Outfall – Marine Ecological Survey October/November 2015

Introduction

Consent 1450 allows the discharge of dairy factory wastewater from the Fonterra Whareroa factory via a marine outfall. The consent allowing this discharge was renewed in September 1995, requiring the Company to install a long outfall by 31 August 1997. Prior to the renewal of this consent, the wastewater was discharged via a short marine outfall at approximately mean low water spring (MLWS) level which caused significant adverse effects on marine intertidal ecology to at least 1000 m southeast of the outfall.

In February 2001, wastewater from the Hawera Oxidation Ponds was connected to the long outfall by consent 5079, allowing a municipal wastewater discharge of 10,000 m^3/day. By comparison, the Fonterra Whareroa wastewater discharge limit was 26,000 m^3/day. As of 19 September 2006, the permitted volume of wastewater discharge increased to 40,000 m^3/day. The oxidation pond discharge was also increased to 12,000 m^3/day in December 2007.

Special condition 6 of consent 1450 and special condition 3 of consent 5079 requires there to be no significant visual, chemical or ecological impacts outside of a 200 m mixing zone or within the intertidal zone. Specifically, consent 5079 requires the consent holder to ensure that a monitoring programme is established to record and analyse the effects on the intertidal reefs and water quality adjacent to the discharge. Accordingly, two surveys of the intertidal zone were scheduled for the 2015-2016 monitoring programme for the combined marine outfall. The first survey for the 2015-2016 monitoring period was conducted at four sites between 27 October and 24 November 2015.

Methods

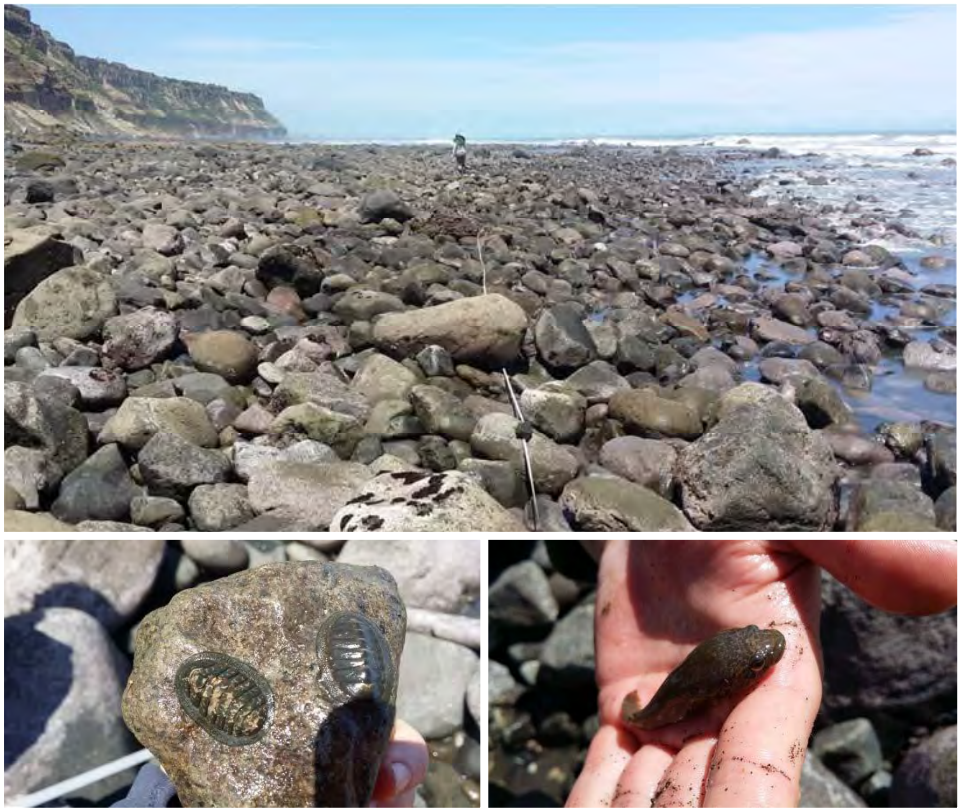
Field Work

Of the four sites surveyed, three have been identified by NIWA as having shoreline contact with the wastewater discharged from the outfall (Palliser *et al*., 2013): 350 m northwest of the outfall (SEA906049), 200 m southeast of the outfall (SEA906057) and 1.55 km southeast of the outfall on Pukeroa Reef (SEA906067) (Photographs 1-3, Figure 1). The control site at Waihi Reef (Photograph 4, Figure 1), approximately 4.5 km northwest of the outfall (SEA906025), has been identified by NIWA as unlikely to be impacted by the discharged wastewater (Palliser *et al*., 2013).

Photograph 1 Surveying the potential impact site 350 m northwest of the outfall (October 2015)

Photograph 2 Surveying the potential impact site 200 m southeast of the outfall (October 2015)

Photograph 3 Surveying Pukeroa Reef; a potential impact site (October 2015)



Photograph 4 Survey control site Waihi Reef (November 2015)

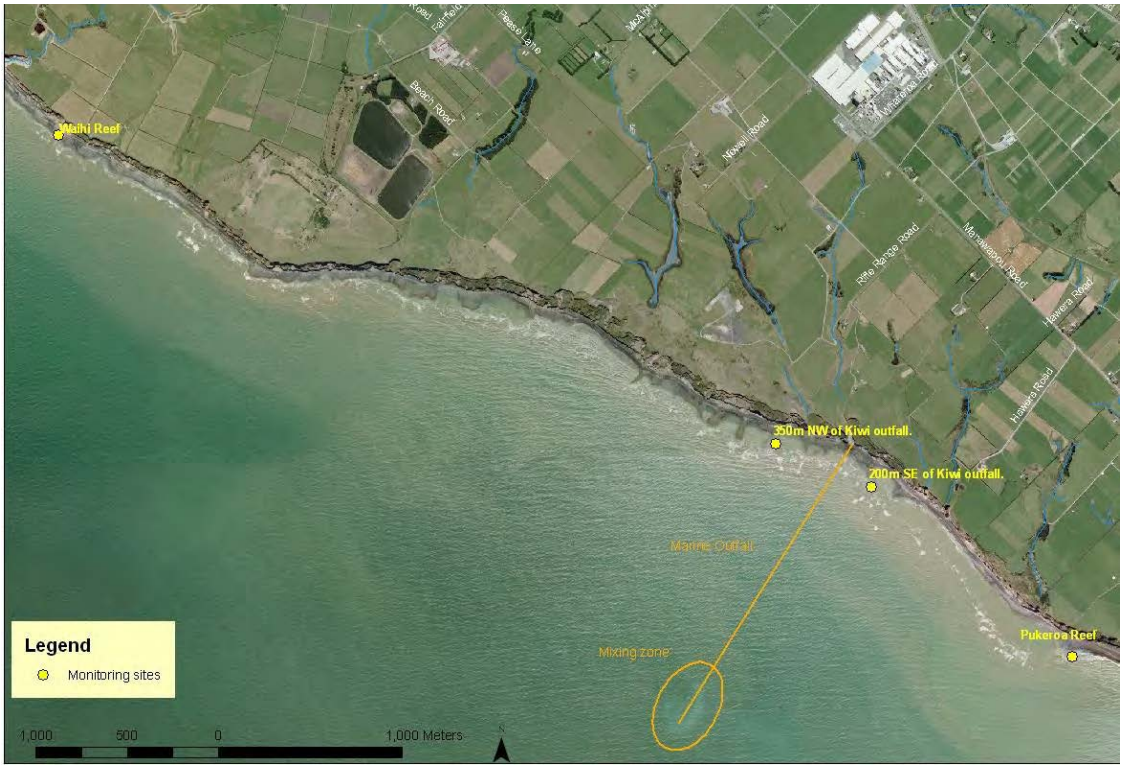


Figure 1 Survey sites in relation to the outfall

At each site, a 50 m transect was used to establish five 5 m x 3 m blocks. Within each block, five random 0.25 m² quadrats were laid giving a total of 25 random quadrats (Photograph 5). For each quadrat the percentage cover of algae and encrusting animal species was estimated using a grid. For all other animal species, individuals larger than 3 mm were counted. Under boulder biota was counted where rocks and cobbles were easily overturned.

Photograph 5 Past survey 200 m southeast of the outfall showing the transect used

Results

Summary statistics, including the mean number of species per quadrat and the mean Shannon-Weiner indices, are shown in Table 1. The Pukeroa Reef site had the highest mean number of species, followed by 350 m NW, then Waihi Reef and finally 200 m SE. The site 350 m NW of the outfall had the highest mean diversity (Shannon-Wiener Index), followed by Pukeroa Reef, then Waihi Reef and finally 200 m SE.

Table 1 Mean results for the October/November 2015 survey

Site	No. of quadrats	Mean number of species per quadrat			Mean Shannon-Weiner indices per quadrat		
		Algae	Animals	Total Species	Algae	Animals	Total Species
Waihi Reef	25	2.52	7.08	9.60	0.316	0.715	0.848
350 m NW	25	3.60	6.52	10.12	0.504	0.673	0.884
200 m SE	25	0.00	0.00	0.00	0.000	0.000	0.000
Pukeroa Reef	25	2.68	7.84	10.52	0.386	0.743	0.868

Number of Species per Quadrat

Figure 2 shows the total number of species per quadrat as a box and whisker plot. The notched area of the box represents the median plus and minus a 95% confidence interval for the median. This form of graphical representation allows a quick comparison to be made between sites. Generally, if the notched areas of the boxes for the different sites do not overlap, one would expect to obtain a significantly different result with ANOVA.

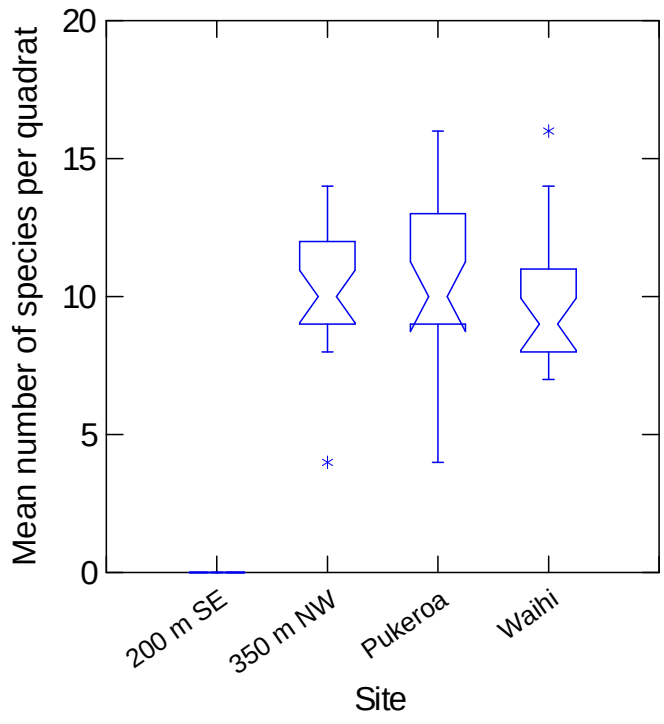


Figure 2 Box and whisker plots of mean number of species per quadrat

The Lilliefors test of normal distribution was not conducted as the data already deviated from the ANOVA assumptions due to the uneven data variance between 200 m SE and the remaining sites. Accordingly, a non-parametric approach was adopted.

There was a significant difference in the mean number of species per quadrat between sites (Kruskal-Wallis, H = 56.604, degrees of freedom (df) = 3, $P < 0.001$). Significant differences between sites were determined using the Wilcoxon signed-ranks test (Table 2). There were significantly less species found at the site 200 m SE of the outfall when compared to the other three sites. There was no significant difference in the mean number of species between these remaining three sites.

Table 2 Wilcoxon signed ranks test of number of species per quadrat

Site	Waihi	350 m NW	200 m SE
350 m NW	NS		
200 m SE	SIG	SIG	
Pukeroa Reef	NS	NS	SIG

Key: SIG = significant difference at 95% confidence level
NS = no significant difference

The anomalous data from the site 200 m SE of the outfall appeared to skew the comparison between sites. So, in order to maximise the power to detect differences between the remaining three sites, the analyses were intended to be repeated using ANOVA without the 200 m SE site. However, using both raw and transformed data (with natural logarithm), the data deviated from the normal distribution for at least one site during each test (Lilliefors test, n=25, $P \leq 0.05$).

Shannon-Weiner Diversity Index

Figure 3 shows the mean Shannon-Weiner index data at each site as a box and whisker plot.

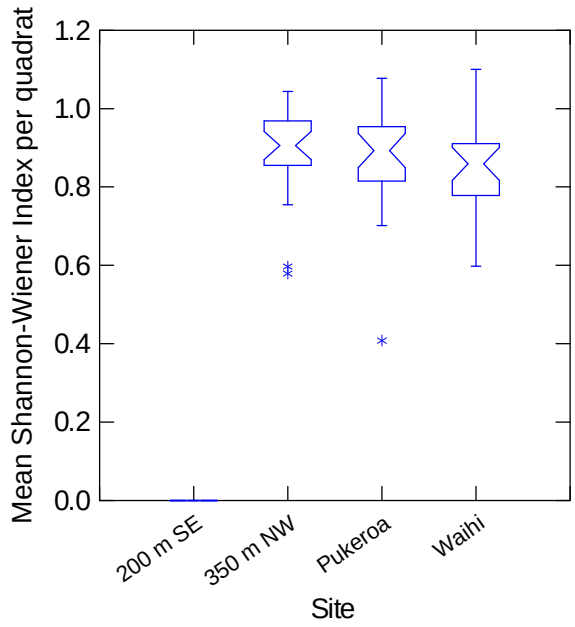


Figure 3 Box and whisker plots of mean Shannon-Weiner indices per quadrat

The Lilliefors test of normal distribution was not conducted as the data already deviated from the ANOVA assumptions due to the uneven data variance between 200 m SE and the remaining sites. Accordingly, a non-parametric approach was adopted.

There was a significant difference in the mean Shannon-Wiener Index per quadrat between sites (Kruskal-Wallis, $H = 56.231$, $df = 3$, $P < 0.001$). Significant differences between sites were determined using the Wilcoxon signed-ranks test (Table 3). The mean Shannon-Wiener index was significantly lower at the site 200 m SE of the outfall when compared to the other three sites. There was no significant difference in the mean Shannon-Wiener index between these remaining three sites.

Table 3 Tukey multiple comparison test of Shannon-Weiner index per quadrat

Site	Waihi	350 m NW	200 m SE
350 m NW	NS		
200 m SE	SIG	SIG	
Pukeroa Reef	NS	NS	SIG

SIG = Significant difference
NS = No significant difference

The anomalous data from the site 200 m SE of the outfall appeared to skew the comparison between sites. So, in order to maximise the power to detect differences between the remaining three sites, the analyses were intended to be repeated using ANOVA without the 200 m SE site. However, using both raw and transformed data (with natural logarithm), the data deviated from the normal distribution for at least one site during each test (Lilliefors test, $n=25$, $P \leq 0.05$).

Sand, silt and mud coverage

The level of sand cover was low (<2%) at the Pukeroa and Waihi Reef sites (Table 4, Figure 4). Sand cover was moderate at the site 350 m NW of the outfall, and high at the site 200 m SE of the outfall. Abundance and diversity of intertidal species/communities can be significantly impacted by sand cover of 30% and higher.

Table 4 Mean percentage sand cover per quadrat observed during 2015 spring survey

Site	Sand	Silt and mud	Total
Waihi Reef	1.44	0.00	1.44
350 m NW	9.28	1.36	10.64
200 m SE	32.84	8.48	41.32
Pukeroa Reef	0.40	0.4	0.8

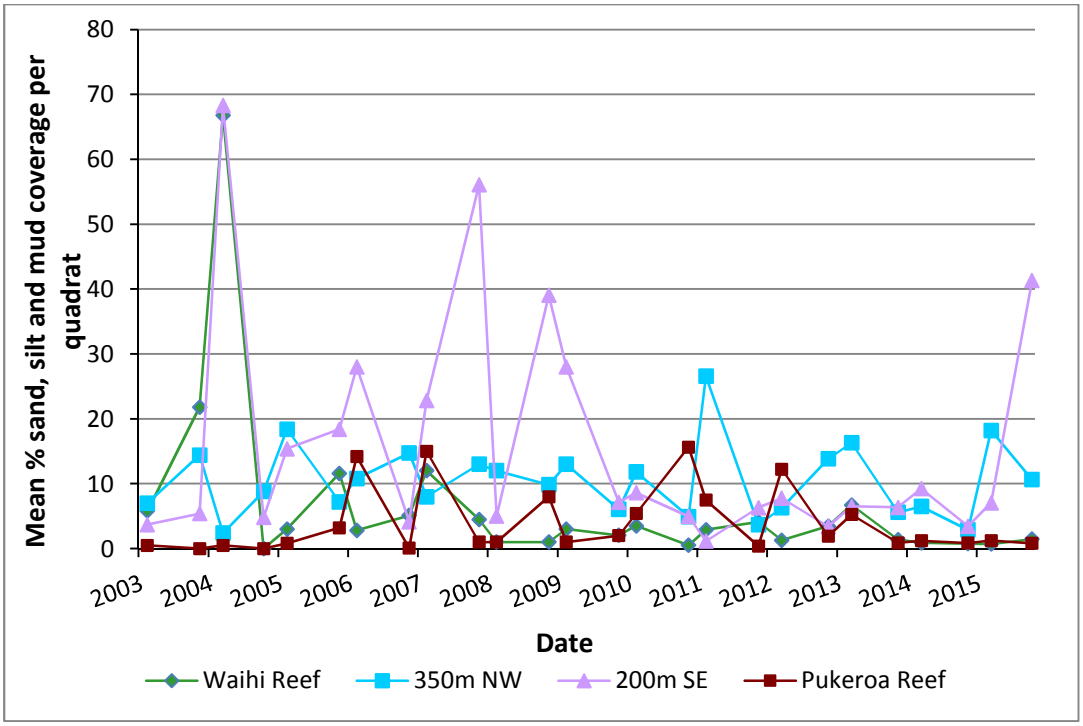


Figure 4 Mean percentage of sand, silt and mud cover per quadrat from summer 2003 to spring 2015

Trends over time

Species number and diversity

Comparisons of the mean number of species per quadrat (Figure 5) and mean Shannon-Weiner diversity index per quadrat (Figure 6) for all spring surveys undertaken since November 1992 are shown below.

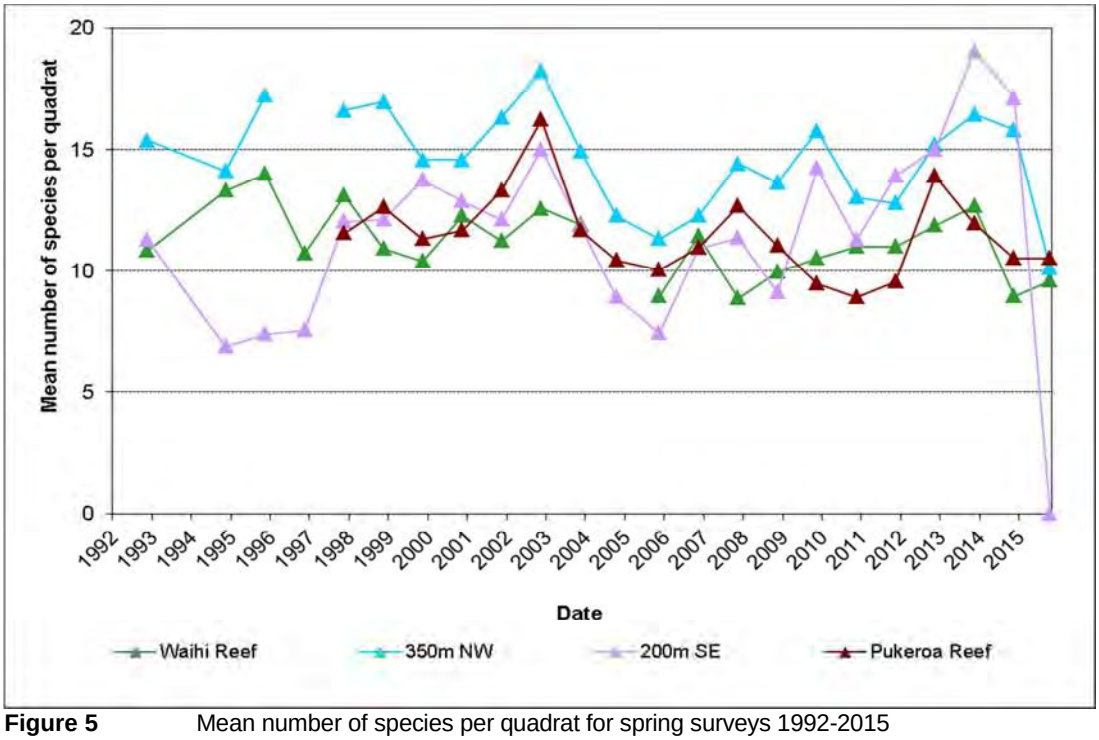


Figure 5 Mean number of species per quadrat for spring surveys 1992-2015

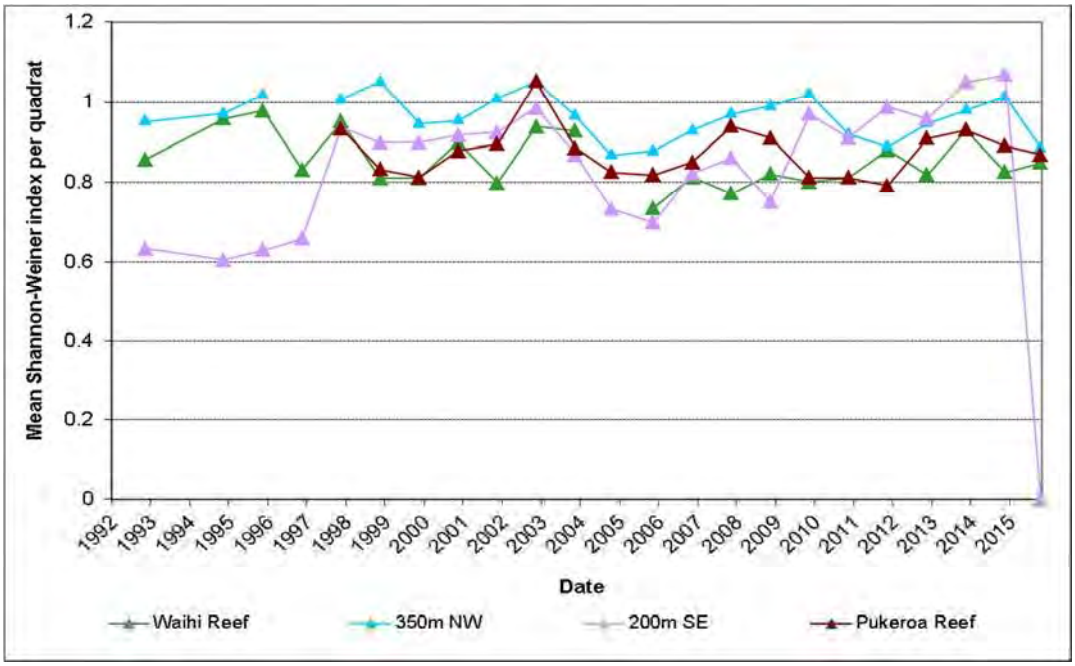


Figure 6 Mean Shannon-Weiner indices per quadrat for spring surveys 1992-2015

Prior to the installation of the long marine outfall in August 1997, both number of species and Shannon-Weiner Index per quadrat at the impact site 200 m SE were generally lower than at the control site at Waihi Reef (Figures 5 and 6). Since then (1997), sites have shown interannual variability in both number of species and Shannon-Weiner Index, but there has been no noticeable difference in trends between the impact site and the control sites over this period, with the exception of years with heavy sand inundation (e.g. 2000 and 2002 at 200 m SE, Figures 5 and 6).

The results of the 2015 spring survey show large decreases in the mean number of species at the two impact sites closest to the outfall (200 m SE and 350 m NW, Figure 5). A slight increase in the mean number of species was observed at Waihi Reef, while there was no change at Pukeroa Reef (Figure 5). At nearly every site, the change in Shannon-Wiener index from the previous year followed the same direction as the change in mean number of species (Figure 6). Pukeroa Reef was the only exception as there was a slight decrease in Shannon-Wiener index from the previous year, whereas the mean number of species had not changed.

Discussion

Previous surveys have shown that the dairy factory wastewater discharged through the near-shore outfall prior to 1997 (Photograph 1) was having significant adverse effects on the local intertidal community. The adverse effects recorded included the coating of rocks and tidal pools with fats, significant coverage by filamentous bacterial growths and a significant decrease in ecological diversity. The nature and magnitude of adverse effects varied with distance from the outfall, and were most apparent at the sites 30 m and 200 m southeast of the outfall (note that the former site is no longer surveyed as of 2007). In 1997 the dairy company installed a long outfall to discharge the wastewater nearly 2 km offshore in order to mitigate the adverse effects occurring along the coastline. Numerous spring and summer intertidal surveys have now been undertaken along the Hawera coastline subsequent to installation of the long outfall. Results show a general improvement in the health of intertidal communities following installation of the outfall. In February 2001 the Hawera Oxidation Ponds municipal wastewater was also connected to the long outfall.

Photograph 6 Discharge from the dairy factory near-shore outfall prior to 1997

Of all four sites, the two sites closest to the outfall showed the greatest decreases in species richness and diversity when compared to the previous survey. However, these decreases can not be attributed to the marine outfall. Indeed, impacts of the marine outfall discharge on the local intertidal communities were not evident from the 2015 spring survey results.

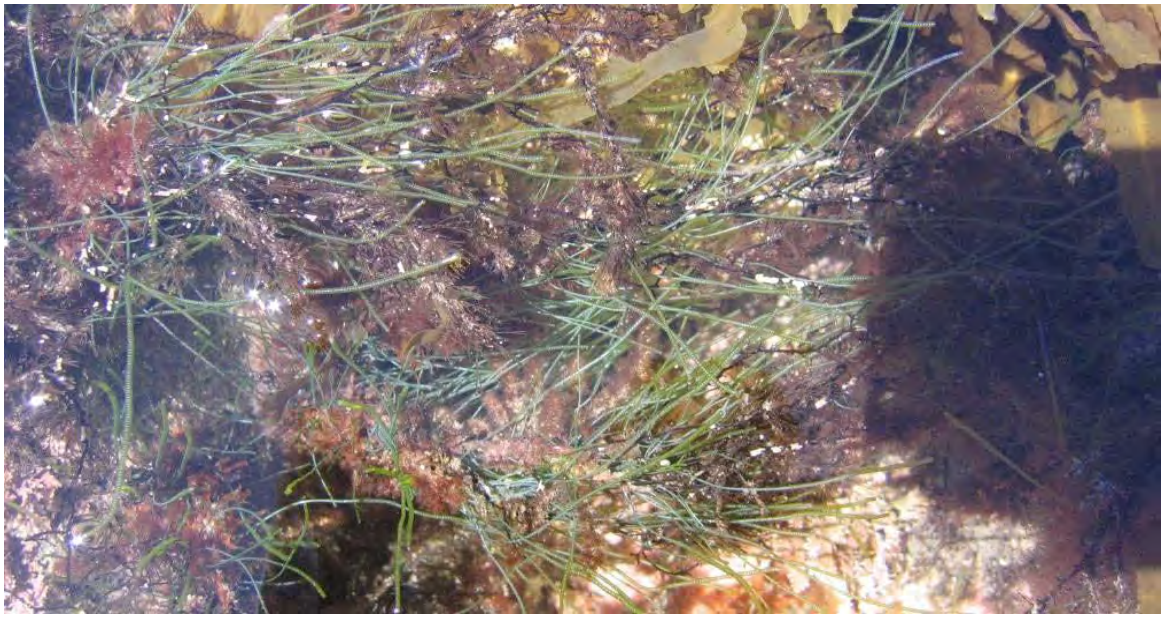
The most influential factor affecting the surveyed reef communities was land-based erosion. This was epitomised by the site 200 m SE of the outfall, which recorded no marine species along the surveyed transect. This section of reef had been completely buried by cliff material spanning from the foot of the cliff down to the low water mark. Similarly, when surveying the site 350 m NW of the outfall, it appeared that some sections of the transect appeared to have been recently buried; presumably by eroded cliff material. The extent of the erosion at the other two survey sites was far less (although still notable). It is possible that the impact of the eroding cliffs may have concealed any adverse effect that the outfall was having on the nearby reefs. However, not including the site 200 m SE of the outfall, there were no significant differences in species richness and diversity between the remaining two impact sites and the control site.

The historical record of survey results (Figures 5 and 6) showed no obvious impact of the marine outfall discharge on the local intertidal communities since installation of the long outfall in 1997. Both control and potential impact sites showed interannual variability and there were no obvious declining trends at the impact sites closest to the outfall relative to the control site. It must be noted that the high energy receiving environment combined with the effects of suspended sediments from nearby rivers/streams and eroding cliffs prevent the development of stable biological communities along the South Taranaki coastline (Clark *et al*., 2012). Such communities could potentially mask any subtle ecological effects from the outfall wastewater discharge. However, in spite of these limitations, the long term record indicates that the intertidal surveys are useful for detecting more noticeable effects from the wastewater, as the impact on intertidal communities prior to installation of the outfall is clearly evident (Figures 5 and 6, Clark *et al*., 2012).

The most notable change in species composition since the commissioning of the long outfall is the decline of *Chaetomorpha* sp. (Photograph 8) and the absence of filamentous bacterial growths at 200 m SE (Figures 7 and 8). The adverse effects recorded prior to the long outfall also included the coating of rocks and tidal pools with fats and a significant decrease in ecological diversity.

As mentioned earlier, the inundation of earth, sand and silt resulting from cliff face erosion (Photograph 9) can be an important factor affecting species composition and diversity along the South Taranaki coastline. The coast is in a constant state of erosion with layers of sand and silt often smothering marine life at some sites. Not only does fallen cliff material cripple marine communities through disturbance and burial, observations indicate that freshly fallen boulders provide a poor habitat for intertidal organisms. This factor could limit the resilience of reef communities encountering erosion events by deterring organisms from settling and ultimately prolonging the recovery timeframe. Another consequence of erosion is an increased turbidity of the seawater which can affect light availability and ultimately impact on macroalgae. In the current survey, many of the intertidal pools within the transect at the Pukeroa Reef site were highly turbid (Photograph 7). The most likely cause of the turbidity was the eroding cliff face further up the coast, as the appearance of the silt was consistent with the fallen debris found at the survey sites near the outfall. It is possible that this turbidity may have lead to the survey under-representing the number of species at this site as it was difficult to examine the pools to the same degree as when the water was clear.

Photograph 7 Turbid intertidal pools at Pukeroa Reef



Photograph 8 Green filaments of *Chaetamorpha*, an algal genus often associated with high nutrient concentrations (North Taranaki)

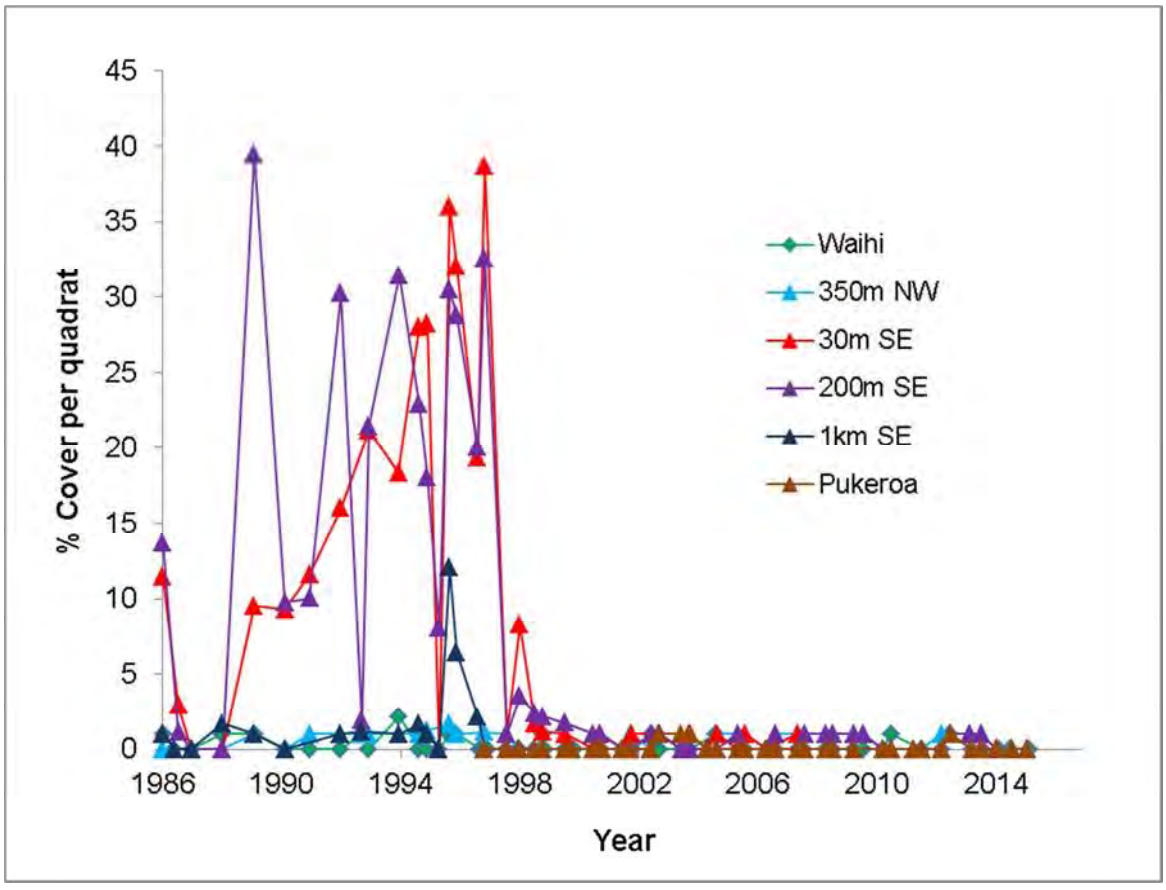


Figure 7 Percentage cover per quadrat of *Chaetomorpha* since 1986

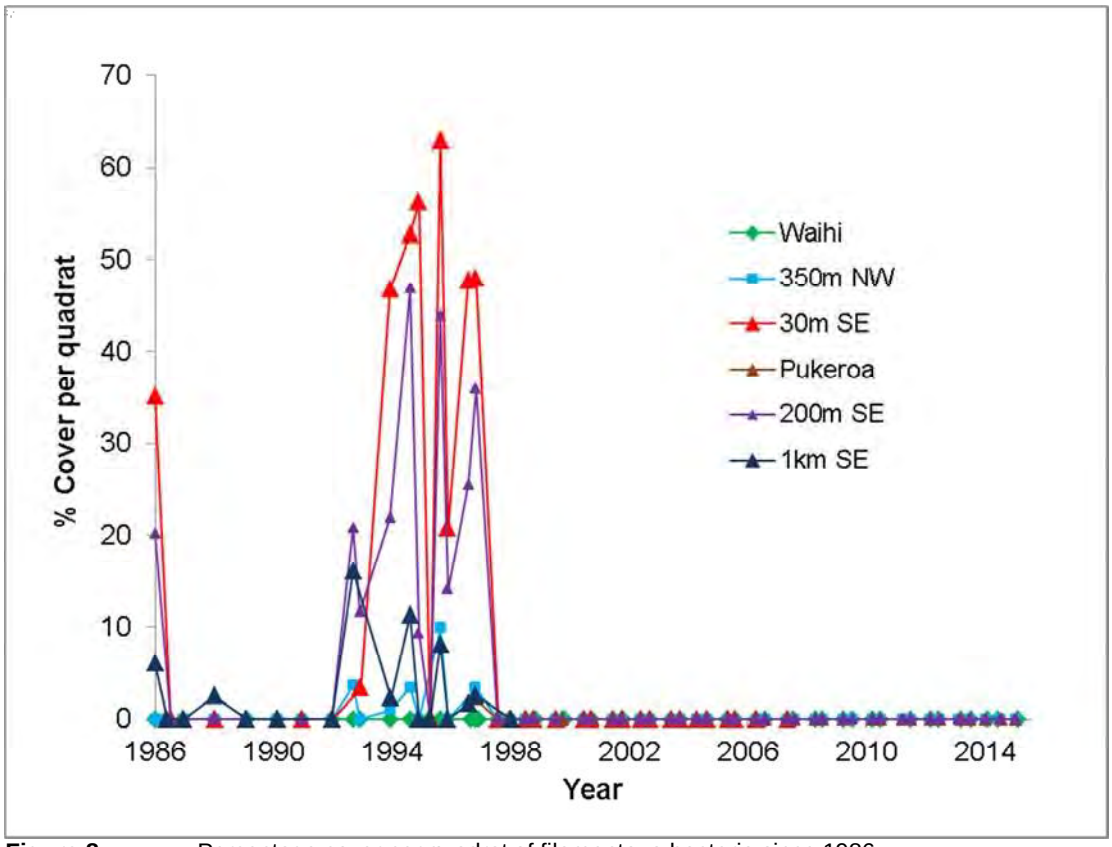


Figure 8 Percentage cover per quadrat of filamentous bacteria since 1986

N.B. Since 2007, the sites 30 m SE and 1 km SE are no longer monitored as part of the Fonterra Whareroa intertidal survey.

Photograph 9 Significant erosion over the reef site 200 m SE of the outfall October 2015 (A), Relatively intact cliffs covered in vegetation above the Pukeroa Reef site October 2015 (B), A large slip above Waihi Reef November 2015 (C)

Conclusions

In order to assess the effects of the Fonterra Whareroa and Hawera Waste Water Treatment Plant outfall discharge on the nearby intertidal communities, surveys were conducted between 27 October and 24 November 2015 at four sites. These surveys included three potential impact sites either side of the outfall (two southeast and one west) and one control site to the northwest. It is expected that adverse effects of the marine outfall discharge on the intertidal communities would have been evident as a significant decline in species richness and diversity at the potential impact sites relative to the control site.

Although the two impact sites closest to the outfall had the greatest declines in diversity and richness of all the sites when compared with the previous survey, these sites were also the worst affected from the cliff face erosion. Aside from this survey, results from the impact sites have not declined notably in relation to the control site in recent years. Accordingly, the results of this survey provide no evidence to suggest that the outfall is having any adverse effect on the intertidal reef communities of South Taranaki. Natural environmental factors, including coastal erosion, exposure and substrate mobility, appeared to be dominant drivers of species richness and diversity at the sites surveyed.

Emily Roberts
Scientific Officer - Marine Ecologist

Thomas McElroy
Technical Officer

References

Palliser, C., McBride, G., Goodhune, N., Bell, R., Stott, R. (2013) Fonterra Whareroa Dairy Factory and Hawera WWTP, Stage 2 QMRA based on the combines discharge. NIWA Client Report No. HAM2013-050

Clark, D., Barter, P., Clement, D., Tremblay, L., Forrest, R. (2013) Whareroa Marine Outfall ecological investigation 2012. Cawthron Report No. 2348

Memorandum

To: Science Manager – Hydrology/Biology, Regan Phipps
From: Scientific Officer, Emily Roberts and Technical Officer Thomas McElroy
Document: 1671273
Date: 2 May 2016

Fonterra Whareroa/Hawera Municipal Combined Outfall – Marine Ecological Survey Summer 2016

Introduction

Consent 1450 allows the discharge of dairy factory wastewater from the Fonterra Whareroa factory via a marine outfall. The consent allowing this discharge was renewed in September 1995, requiring the Company to install a long outfall by 31 August 1997. Prior to the renewal of this consent, the wastewater was discharged via a short marine outfall at approximately mean low water spring (MLWS) level which caused significant adverse effects on marine intertidal ecology to at least 1000 m southeast of the outfall.

In February 2001, wastewater from the Hawera Oxidation Ponds was connected to the long outfall by consent 5079, allowing a municipal wastewater discharge of 10,000 m^3/day. By comparison, the Fonterra Whareroa wastewater discharge limit was 26,000 m^3/day. As of 19 September 2006, the permitted volume of wastewater discharge increased to 40,000 m^3/day. The oxidation pond discharge was also increased to 12,000 m^3/day in December 2007.

Special condition 6 of consent 1450 and special condition 3 of consent 5079 requires there to be no significant visual, chemical or ecological impacts outside of a 200 m mixing zone or within the intertidal zone. Specifically, consent 5079 requires the consent holder to ensure that a monitoring programme is established to record and analyse the effects on the intertidal reefs and water quality adjacent to the discharge. By conducting two surveys a year (one in spring and one in summer) it is possible to capture information on the seasonal variation of the intertidal communities and any possible effects from the outfall. Accordingly, two surveys of the intertidal zone were carried out as part of the 2015-2016 monitoring programme for the combined marine outfall. The 2015-2016 summer survey was conducted at four sites between the 8th and the 11th of March 2016; the results are covered in this memo.

Methods

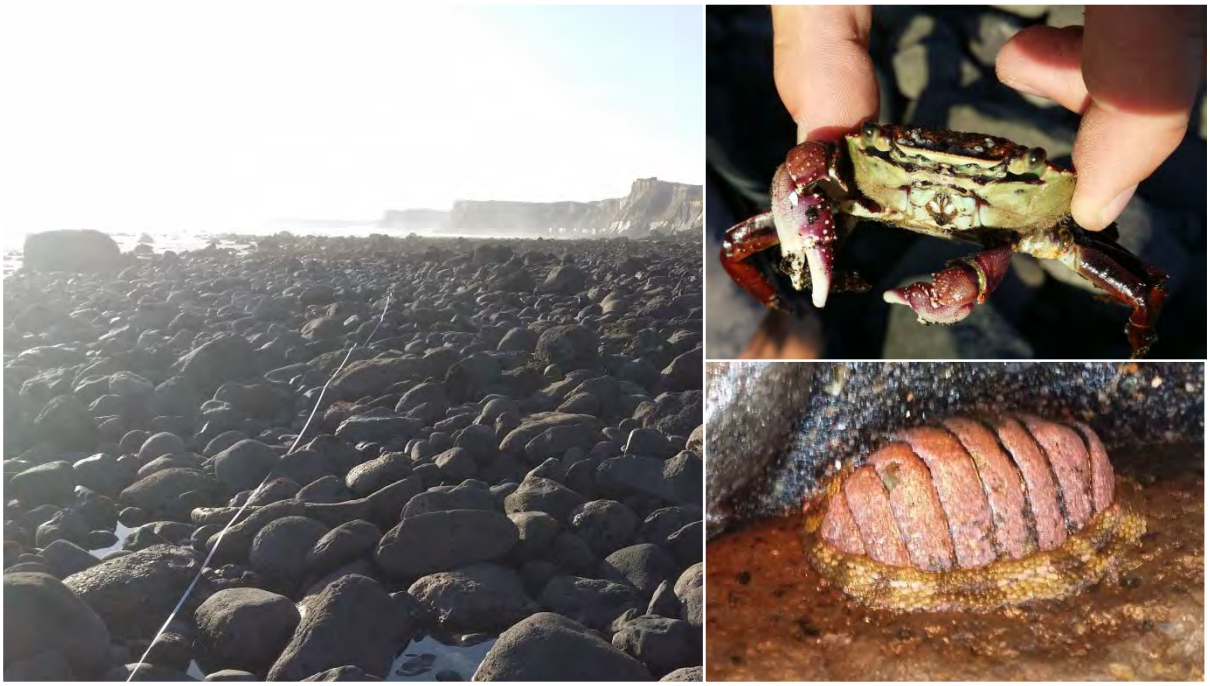
Field Work

Of the four sites surveyed, three have been identified by NIWA as having shoreline contact with the wastewater discharged from the outfall (Palliser *et al*., 2013): 350 m northwest of the outfall (SEA906049), 200 m southeast of the outfall (SEA906057) and 1.55 km southeast of the outfall on Pukeroa Reef (SEA906067) (Photographs 1-3, Figure 1). The control site at Waihi Reef (Photograph 4, Figure 1), approximately 4.5 km northwest of the outfall (SEA906025), has been identified by NIWA as unlikely to be impacted by the discharged wastewater (Palliser *et al*., 2013).

Photograph 1 Surveying the potential impact site 350 m northwest of the outfall (11 March 2016)

Photograph 2 Surveying the potential impact site 200 m southeast of the outfall (11 March 2016)

Photograph 3 Surveying Pukeroa Reef; a potential impact site (8 March 2016)



Photograph 4 Survey control site Waihi Reef (9 March 2016)

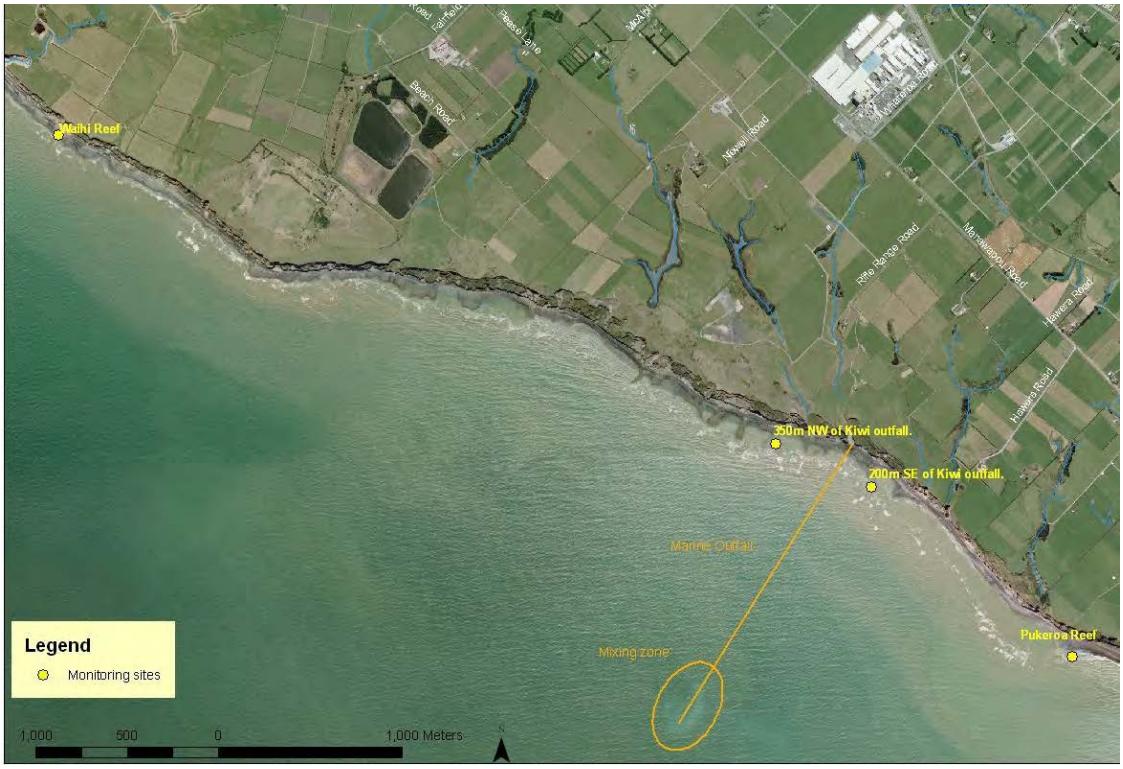


Figure 1 Survey sites in relation to the outfall

At each site, a 50 m transect was used to establish five 5 m x 3 m blocks. Within each block, five random 0.25 m² quadrats were laid giving a total of 25 random quadrats (Photograph 5). For each quadrat the percentage cover of algae and encrusting animal species was estimated using a grid. For all other animal species, individuals larger than 3 mm were counted. Under boulder biota was counted where rocks and cobbles were easily overturned.

Photograph 5 Survey at 200 m southeast of the outfall showing the transect used

Results

Summary statistics, including the mean number of species per quadrat and the mean Shannon-Weiner indices, are shown in Table 1. Both the mean number of species and Shannon-Wiener index were highest at the site 350 m NW of the outfall, followed by Pukeroa Reef, Waihi Reef and then the site 200 m SE of the outfall.

Table 1 Mean results for the 2016 summer survey

Site	No. of quadrats	Mean number of species per quadrat			Mean Shannon-Weiner indices per quadrat		
		Algae	Animals	Total Species	Algae	Animals	Total Species
Waihi Reef	25	2.60	9.04	11.64	0.312	0.660	0.777
350 m NW	25	4.08	10.72	14.80	0.513	0.810	0.941
200 m SE	25	0.00	1.56	1.56	0.000	0.196	0.196
Pukeroa Reef	25	3.16	8.76	11.92	0.404	0.760	0.877

Number of Species per Quadrat

Figure 2 shows the total number of species per quadrat as a box and whisker plot. The notched area of the box represents the median plus and minus a 95% confidence interval for the median. This form of graphical representation allows a quick comparison to be made between sites. Generally, if the notched areas of the boxes for the different sites do not overlap, one would expect to obtain a significantly different result with ANOVA.

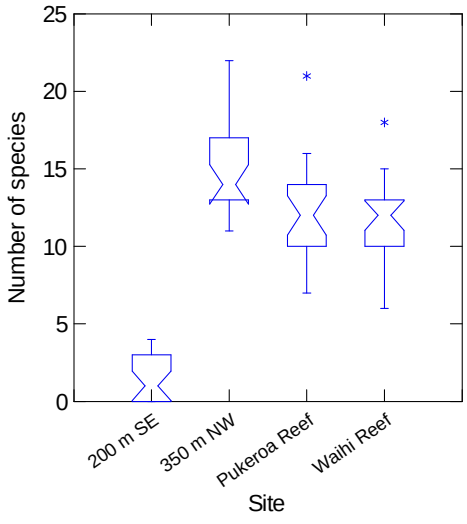


Figure 2 Box and whisker plots of the number of species per quadrat at the four sites

Only the data obtained from the Waihi Reef site conformed to the assumption of normal distribution. The data from the remaining three sites significantly deviated from the normal distribution at the 95% confidence level (Lilliefors test, $n = 25$, $P < 0.05$). A natural logarithmic transformation of the data was subsequently conducted. Only the data obtained from the Pukeroa Reef site conformed to the assumption of normal distribution following

this transformation. The data from the remaining three sites significantly deviated from the normal distribution at the 95% confidence level (Lilliefors test, n = 25, P < 0.05). As this ANOVA assumption could not be met the remaining analyses were conducted using the raw data with non-parametric tests.

There was a significant difference in the number of species per quadrat between sites[1] (Kruskal-Wallis, H = 64.65, degrees of freedom (df) = 3, P < 0.001). Significant differences between sites were determined using the Wilcoxon signed-ranks test (Table 2). There was no significant difference in the number of species between the Pukeroa and Waihi Reef sites. Both of these sites had a significantly greater number of species than at the site 200 m SE of the outfall and a significantly lower number of species than at the site 350 m NW of the outfall.

Table 2 Wilcoxon signed ranks test of number of species per quadrat

Site	Waihi	350 m NW	200 m SE
350 m NW	SIG		
200 m SE	SIG	SIG	
Pukeroa Reef	NS	SIG	SIG

Key: SIG = significant difference at 95% confidence level
NS = no significant difference

Shannon-Weiner Diversity Index

Figure 3 shows the distribution of Shannon-Weiner Indices recorded at each site as box and whisker plots.

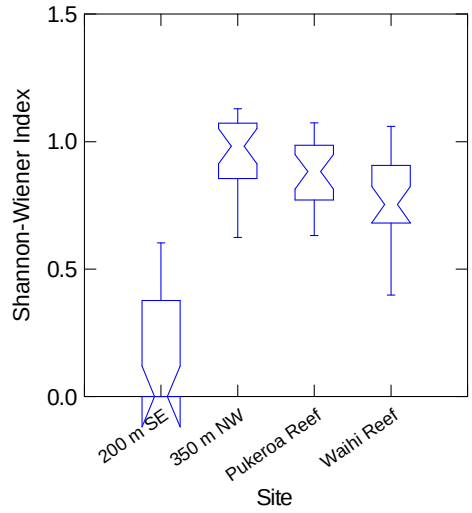


Figure 3 Box and whisker plots of Shannon-Weiner Indices at each site

The site 200 m SE of the outfall showed a significant deviation from normal distribution at the 95% confidence level (Lilliefors test, n = 25, P < 0.001). Additionally, the data variance at this site was not homogeneous with the other sites (Figure 3). As these ANOVA

[1]The Kruskal-Wallis and Wilcoxon signed ranks tests are both non-parametric tests. This means they are not testing for differences in sample means (or medians) but rather they are testing for differences in the locations of sample distributions.

assumptions could not be met the remaining analyses were conducted using the raw data with non-parametric tests.

There was a significant difference in the Shannon-Weiner Indices between sites (Kruskal-Wallis, H = 61.55, degrees of freedom (df) = 3, P < 0.001). Significant differences between sites were determined using the Wilcoxon signed-ranks test (Table 2). There was no significant difference in Shannon-Wiener Indices between the Pukeroa Reef site and the site 350 m NW of the outfall. These two sites had a significantly greater Shannon-Wiener Indices than the remaining two sites. Waihi Reef had a significantly greater Shannon-Wiener Index than the site 200 m SE of the outfall.

Table 3 Wilcoxon signed ranks test with Shannon-Weiner index between sites

Site	Waihi Reef	350 m NW	200 m SE
350 m NW	SIG		
200 m SE	SIG	SIG	
Pukeroa Reef	SIG	NS	SIG

Key: SIG = significant difference at 95% confidence level
NS = no significant difference

Note: Shannon Wiener Index analyses were also performed following the removal of the '200 m SE' from the dataset. The data from this site was negatively skewed (for reasons covered in the discussion), and so was causing the dataset to fail the ANOVA assumptions even though the remaining sites were conforming. The analysis is as follows:

No sites showed a significant deviation from normal distribution at the 95% confidence level (Lilliefors test, n = 25, P > 0.05). Homogenous data variance was also observed across all sites (excluding 200 m SE, Figure 3). As the data conformed to the ANOVA assumptions the remaining analyses were conducted using ANOVA with the raw data.

There was a significant difference in the mean Shannon-Wiener Index between sites ($F_{2,72}$ = 7.629, P = 0.001). Significant differences between sites were determined using the Tukey test (Table 4). The mean Shannon-Wiener Index was significantly higher at the site 350 m NW of the outfall than at the Waihi Reef site (Figure 3, Table 4). There were no other significant differences between sites.

Table 4 Tukey test with mean Shannon-Wiener Index between sites

Site	Waihi Reef	350 m NW
350 m NW	SIG	
Pukeroa Reef	NS	NS

Key: SIG = significant difference at 95% confidence level
NS = no significant difference

Sand coverage

The level of sand cover was low at the Pukeroa and Waihi Reef sites (Table 5, Figure 4). Sand cover was moderate at the two sites nearest the outfall. Abundance and diversity of intertidal species/communities can be significantly impacted by sand cover of 30% and higher.

Table 5 Mean percentage sand cover per quadrat observed during 2016 summer survey

Site	Mean sand coverage (%)	Mean silt coverage (%)	Total sand, silt and mud coverage (%)
Waihi Reef	4.00	0.00	4.00
350 m NW	9.80	1.28	11.08
200 m SE	8.00	5.36	13.36
Pukeroa Reef	1.00	0.84	1.84

Trends over time

Species number and diversity

Comparisons of the mean number of species per quadrat (Figure 4) and mean Shannon-Weiner diversity index per quadrat (Figure 5) for all summer surveys undertaken since January 1986 are shown below.

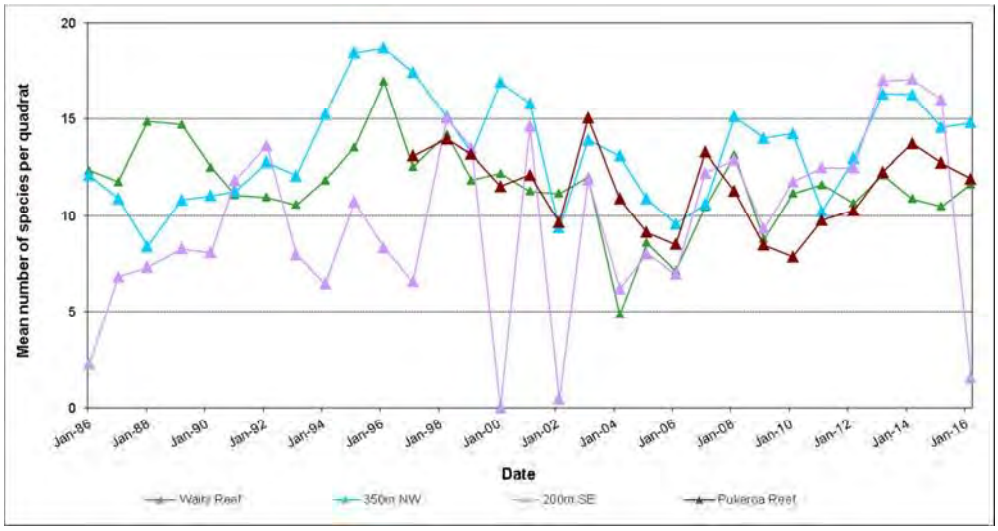


Figure Mean number of species per quadrat for summer surveys 1986-2016

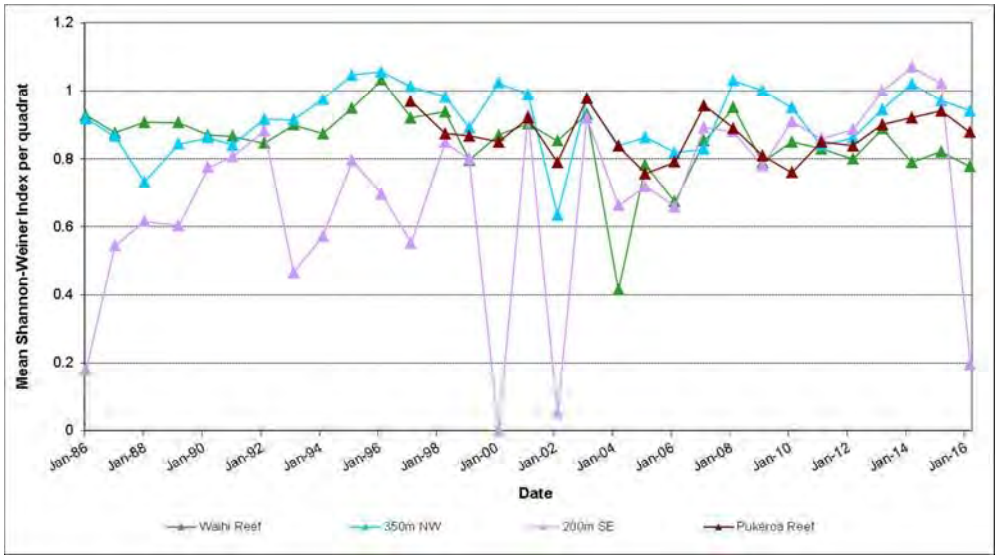


Figure 4 Mean Shannon-Weiner Indices per quadrat for summer surveys 1986-2016

Prior to the installation of the long marine outfall in August 1997, both number of species and Shannon-Weiner Index per quadrat at the impact site 200 m SE were generally lower than at the control site at Waihi Reef (Figures 6 and 7). Since then (1997), sites have shown interannual variability in both number of species and Shannon-Weiner Index, but there has been no noticeable difference in trends between the impact site and the control sites over this period, with the exception of years with heavy sand inundation or slips (e.g. 2000, 2002 and 2016 at 200 m SE, Figures 6 and 7).

The results of the 2016 summer survey show a decrease in the mean number of species at 200 m SE and Pukeroa Reef when compared with the previous summer (Figures 6 and 7). The remaining two sites have shown a slight increase in the mean number of species from the previous summer. Shannon-Weiner Index decreased at all four sites when compared with the previous summer (Figures 6 and 7).

Sand coverage

Over time, sand cover has generally remained low across the sites (Figure 7). Occasionally, however, the reefs experience events of sand inundation, where coverage increases substantially. Over the past ten years, the sites worst effected by inundation events have been those 200 m SE and 350 m NW of the outfall.

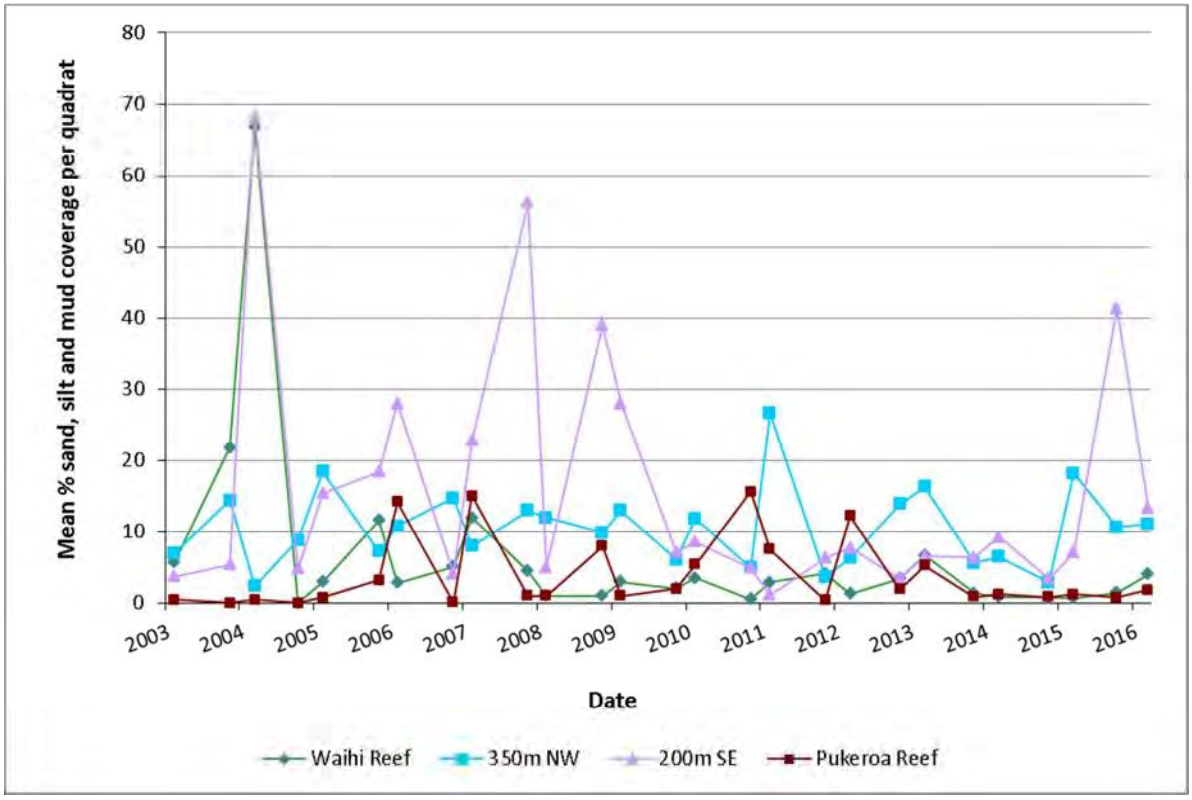


Figure 5 Mean percentage sand cover from 2003 to summer 2016 (including spring and summer surveys)

Discussion

Previous surveys have shown that the dairy factory wastewater discharged through the near-shore outfall prior to 1997 (Photograph 1) was having significant adverse effects on the local intertidal community. The adverse effects recorded included the coating of rocks and tidal pools with fats, significant coverage by filamentous bacterial growths and a significant decrease in ecological diversity. The nature and magnitude of adverse effects varied with

distance from the outfall, and were most apparent at the sites 30 m and 200 m southeast of the outfall (note that the former site is no longer surveyed as of 2007). In 1997 the dairy company installed a long outfall to discharge the wastewater nearly 2 km offshore in order to mitigate the adverse effects occurring along the coastline. Numerous spring and summer intertidal surveys have now been undertaken along the Hawera coastline subsequent to installation of the long outfall. Results show a general improvement in the health of intertidal communities following installation of the outfall. In February 2001 the Hawera Oxidation Ponds municipal wastewater was also connected to the long outfall.

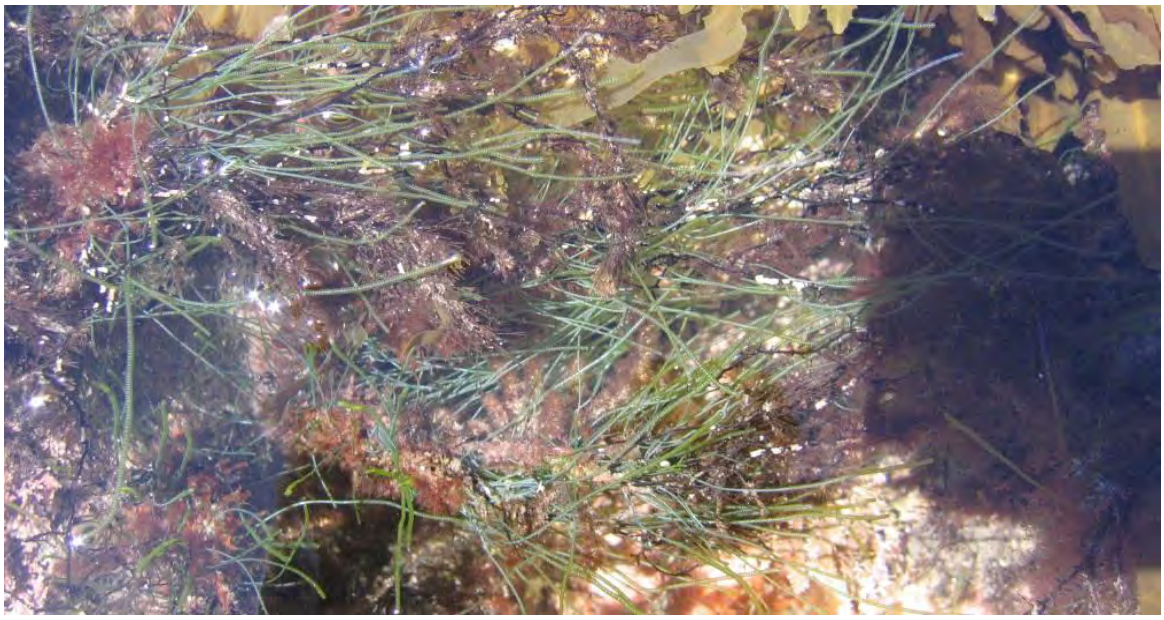
Photograph 6 Discharge from the dairy factory near-shore outfall prior to 1997

Impacts of the marine outfall discharge on the local intertidal communities were not evident from the 2016 summer survey results (Figures 4 and 5). Impact site 200 m SE decreased substantially from the previous summer in terms of mean number of species (species richness) and Shannon-Wiener Index (diversity). The results from this site were also significantly lower than those at the remaining sites. However, the decreases in species richness and diversity can be attributed to a large erosion event on the adjacent cliff-face, which consequently smothered the reef. Aside from this event, there were no considerable decreases in species richness or diversity at the impact sites in relation to the control site. Notably, impact site 350 m NW had significantly higher species richness and diversity scores than what was found at the control site, Waihi Reef.

Sand cover was low (<5%) at Pukeroa and Waihi Reefs during the 2016 summer survey. The sites 200 m SE and 350 m NW of the outfall had moderate sand cover (13.36 % and11.08 %, respectively). This elevated sand cover may have contributed to the slight decrease in mean diversity observed at 350 m NW when compared with the previous summer, whereas the coverage of slip material has likely had the greatest effect at 200 m SE as opposed to sand. Long term monitoring of intertidal rocky reefs around the Taranaki coastline have shown the abundance and diversity of these communities can be adversely affected when sand levels exceed 30% cover. High percentage sand cover (>30%) has previously been recorded at the site 200 m SE (Figure 6).

The historical record of survey results (Figures 4 and 5) show no obvious impact of the marine outfall discharge on the local intertidal communities since installation of the long outfall in 1997. Both control and potential impact sites show interannual variability and with no obvious declining trends at the impact sites closest to the outfall relative to the control site. It must be noted that the high energy receiving environment combined with the effects of suspended sediments from nearby rivers/streams and eroding cliffs prevent the development of stable biological communities along the South Taranaki coastline (Clark *et al*., 2012). Such communities could potentially mask any subtle ecological effects from the outfall wastewater discharge. However, in spite of these limitations, the long term record indicates that the intertidal surveys are useful for detecting more noticeable effects from the wastewater, as the impact on intertidal communities prior to installation of the outfall is clearly evident (Figures 5 and 6, Clark *et al*., 2012).

The most notable change in species composition since the commissioning of the long outfall is the decline of *Chaetomorpha* sp. (Photograph 7) and the absence of filamentous bacterial growths at 200 m SE (Figures 7 and 8). The adverse effects recorded prior to the long outfall also included the coating of rocks and tidal pools with fats and a significant decrease in ecological diversity.



Photograph 7 Green filaments of *Chaetamorpha*, an algal genus often associated with high nutrient concentrations (North Taranaki)

The inundation of earth, sand and silt resulting from cliff face erosion (Photograph 9) can be an important factor affecting species composition and diversity along the South Taranaki coastline. Indeed, the results from this survey and the spring 2015 survey have found land based erosion to be the single most influential factor affecting these intertidal communities; following the burial of the 200 m SE Reef site (Photograph 8). The coast is in a constant state of erosion with layers of earth, sand and silt often deposited in the intertidal zone. Not only does fallen cliff material cripple marine communities through disturbance and burial, observations indicate that freshly fallen boulders provide a poor habitat for intertidal organisms. This factor could limit the resilience of reef communities encountering erosion events by deterring organisms from settling and ultimately prolonging the recovery timeframe. In the current survey, it was noted that some species are starting to return to the

200 m SE Reef site, with some of the slip material slowly getting washed away. Newly settled barnacles were noted on patches of exposed rock (Photograph 8). Another consequence of erosion is increased suspended sediment in the seawater which can impact on filter feeding organisms and also algal growth through affecting light availability.

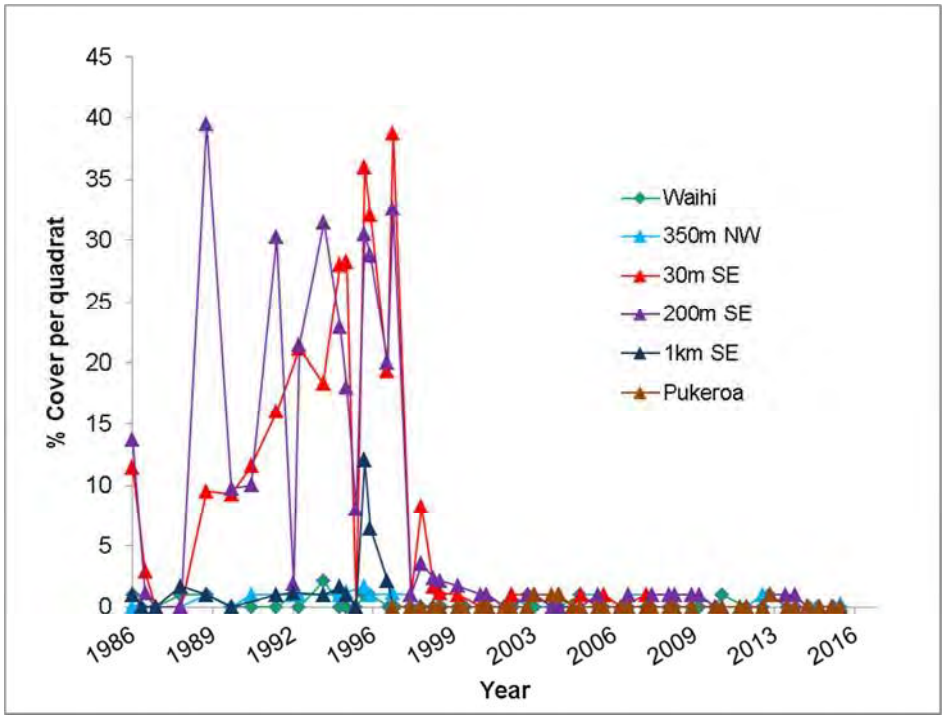


Figure 6 Percentage cover per quadrat of *Chaetomorpha,* 1986 – 2016

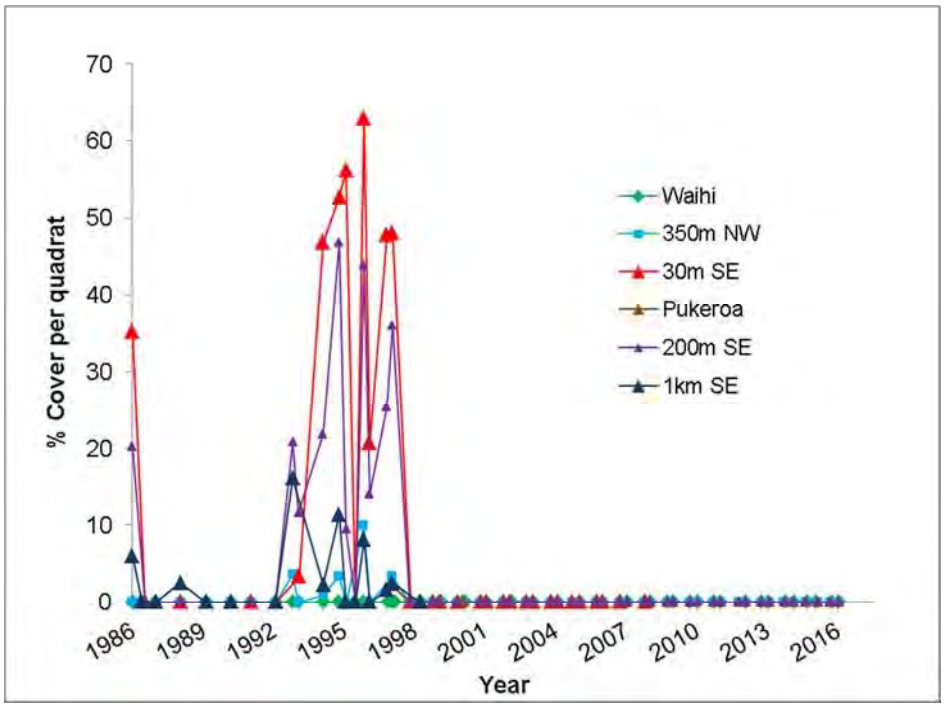
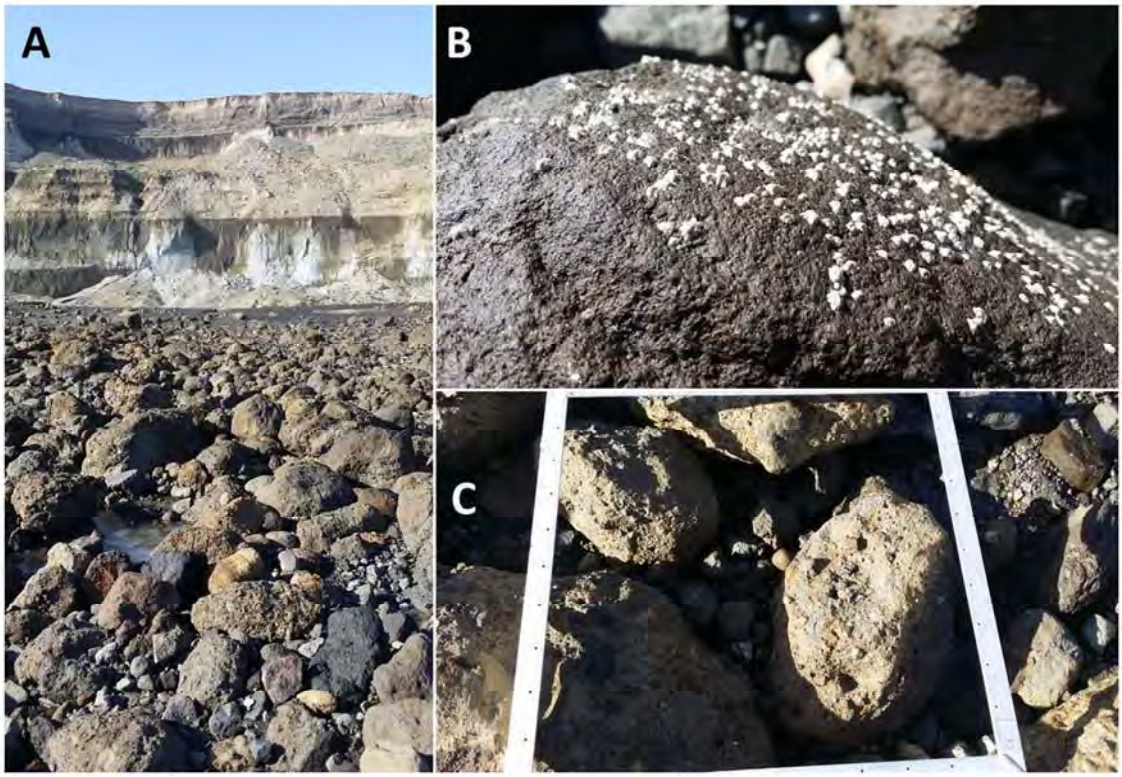


Figure 7 Percentage cover per quadrat of filamentous bacteria, 1986 - 2016

N.B. Since 2007, the sites 30 m SE and 1 km SE are no longer monitored as part of the Fonterra Whareroa intertidal survey.



Photograph 8 Reef site 200 m SE of the outfall. (A) Eroded cliffs with slip material covering reef. (B) New settlement of banacles (*Austrominius modestus*) on a patch of exposed reef. (C) Close up view of slip material on the reef.

Conclusions

In order to assess the effects of the Fonterra Whareroa and Hawera Waste Water Treatment Plant outfall discharge on the nearby intertidal communities, surveys were conducted between the 8th and 11th of March 2016 at four sites. These surveys included three potential impact sites either side of the outfall (two southeast and one west) and one control site to the northwest. It is expected that adverse effects of the marine outfall discharge on the intertidal communities would have been evident as a significant decline in species richness and diversity at the potential impact sites relative to the control site.

With the exception of the reef site 200 m SE of the outfall, which was adversely impacted by natural processes unrelated to the wastewater outfall, none of the potential impact sites showed significant declines in species richness or diversity in relation to the control site. Instead, the reef site 350 m NW of the outfall had significantly greater species richness and diversity than Waihi Reef (the control site), and there was no significant difference between the control site and Pukeroa Reef. Furthermore, there is no evidence of the potential impact sites declining in species richness or diversity over time, relative to the control site.

These results indicate that the marine outfall discharge was not having detectable adverse effects on the intertidal reef communities of South Taranaki. Natural environmental factors, including coastal erosion, exposure and substrate mobility, appear to remain the dominant drivers of species richness and diversity at the sites surveyed.

Emily Roberts
Scientific Officer - Marine Ecologist

Thomas McElroy
Technical Officer

References

Palliser, C., McBride, G., Goodhune, N., Bell, R., Stott, R. (2013) Fonterra Whareroa Dairy Factory and Hawera WWTP, Stage 2 QMRA based on the combines discharge. NIWA Client Report No. HAM2013-050

Clark, D., Barter, P., Clement, D., Tremblay, L., Forrest, R. (2013) Whareroa Marine Outfall ecological investigation 2012. Cawthron Report No. 2348

Appendix V

PM10 monitoring report

Memorandum

To	Job Manager, Emily Roberts Technical Officer, Thomas McElroy
From	Scientific Officer -Air Quality, Brian Cheyne
File	FRODO# 1779705
Date	November 18, 2016

PM 10 monitoring at Fonterra Whareroa Dairy Complex

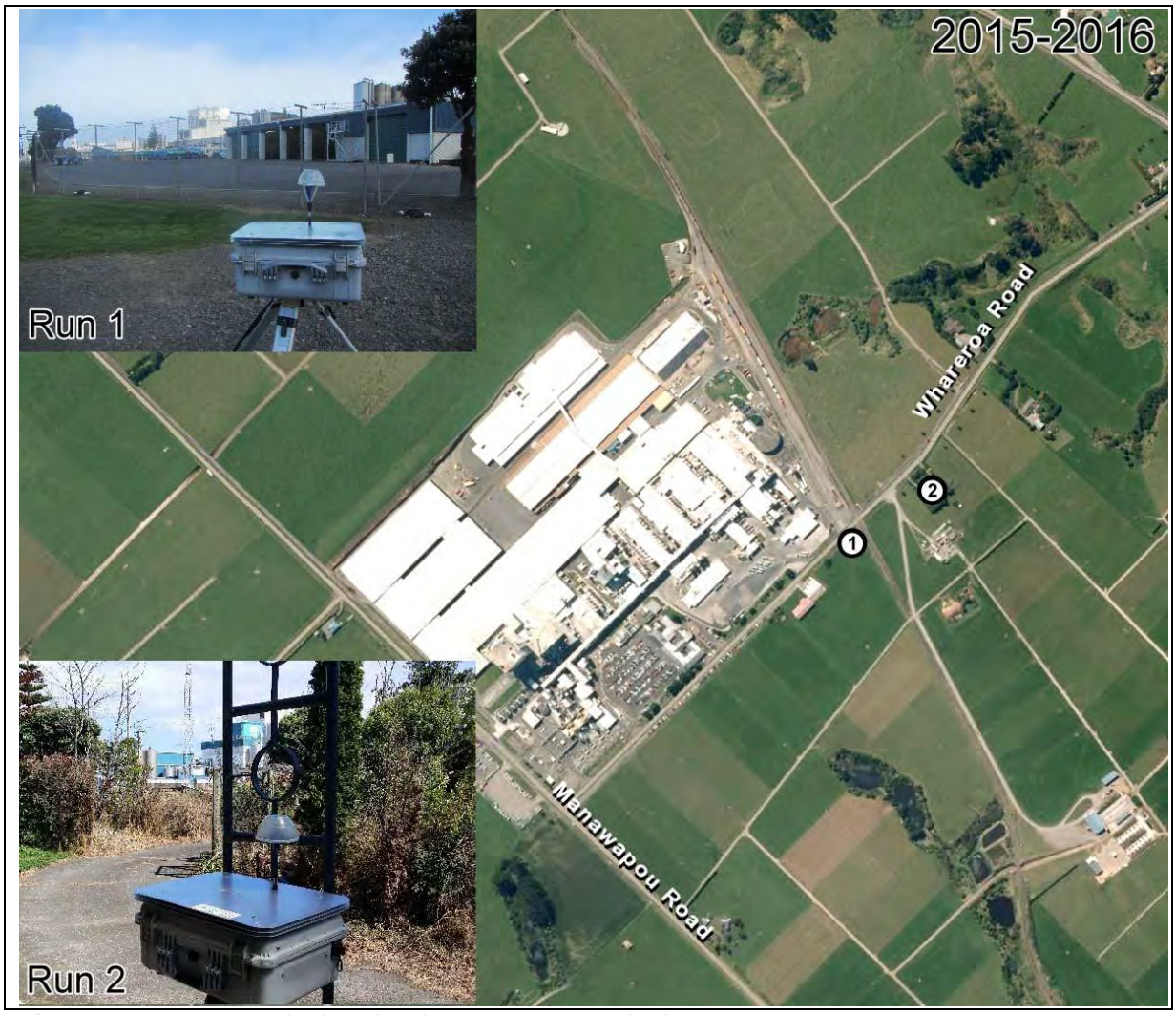


Figure 1 PM10 monitoring sites in 2015-2016 monitoring year

In September 2004 the Ministry for the Environment formally made public the National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM10 is 50 $\mu g/m^3$ (24-hour average). Special condition 9 of the Consent 4103 sets the same limit on the emissions of fine particulates [PM10] to the atmosphere from the site, that is –

"*the maximum ground level concentration of fine particulates [PM10] arising from the exercise of this consent measured under ambient conditions does not exceed 50 micrograms per cubic metre [50µg/m³] [twenty-four hour average], at or beyond the boundary of the site.*"

Particulates can be derived from many sources, including motor vehicles (particularly diesels), solid and oil-burning processes for industry and power generation, incineration and waste burning, photochemical processes, and natural sources such as pollen, abrasion, and sea spray.

PM10 particles are linked to adverse health effects that arise primarily from the ability of particles of this size to penetrate the defences of the human body and enter deep into the lungs significantly reducing the exchange of gases across the lung walls. Health effects from inhaling PM10 include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases.

During the reporting period, a "DustTrak" PM10 monitor was deployed on two occasions in the vicinity of the dairy complex. The deployments lasted from approximately 44 to 49 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The locations of the "DustTrak" monitor during the sampling runs are shown in Figure 1.

The details of the sample runs are presented in Figure 2 and Table 1. Figure 3 presents wind roses for the two monitoring periods.

	Run 1 (27-29/10/2015)		Run 2 (23-25/02/2016)	
24 hr. set	Day 1	Day 2	Day 1	Day 2
Daily average	10.9 µg/m³	8.7 µg/m³	30.7 µg/m³	11.4 µg/m³
NES	50µg/m³			

Table 1 Daily mean of PM10 results during five days' monitoring at Whareroa dairy complex

Findings

First run:
During the first 44-hour run, from 27 October to 29 October 2015, the average recorded PM_{10} concentration for the first twenty-four hour period was 10.9µg/m³, and 8.7µg/m³ for the second twenty-four hour period. These daily means equate to 21.8% and 17.4%, respectively, of the 50 µg/m³ value that is set by both the National Environmental Standard and the resource consent.

Second run:
During the second 49-hour run, from 23 February to 25 February 2016, the average recorded PM_{10} concentration for the first twenty-four hour period was 9.0µg/m³ and 7.7µg/m³ for the second twenty-four hour period. These daily means equate to 18% and 15.4% respectively, of the 50 µg/m³ value that is set by both the National Environmental Standard and the resource consent 4103.

Background levels of PM_{10} in the region have been found to be around 11 µg/m³.

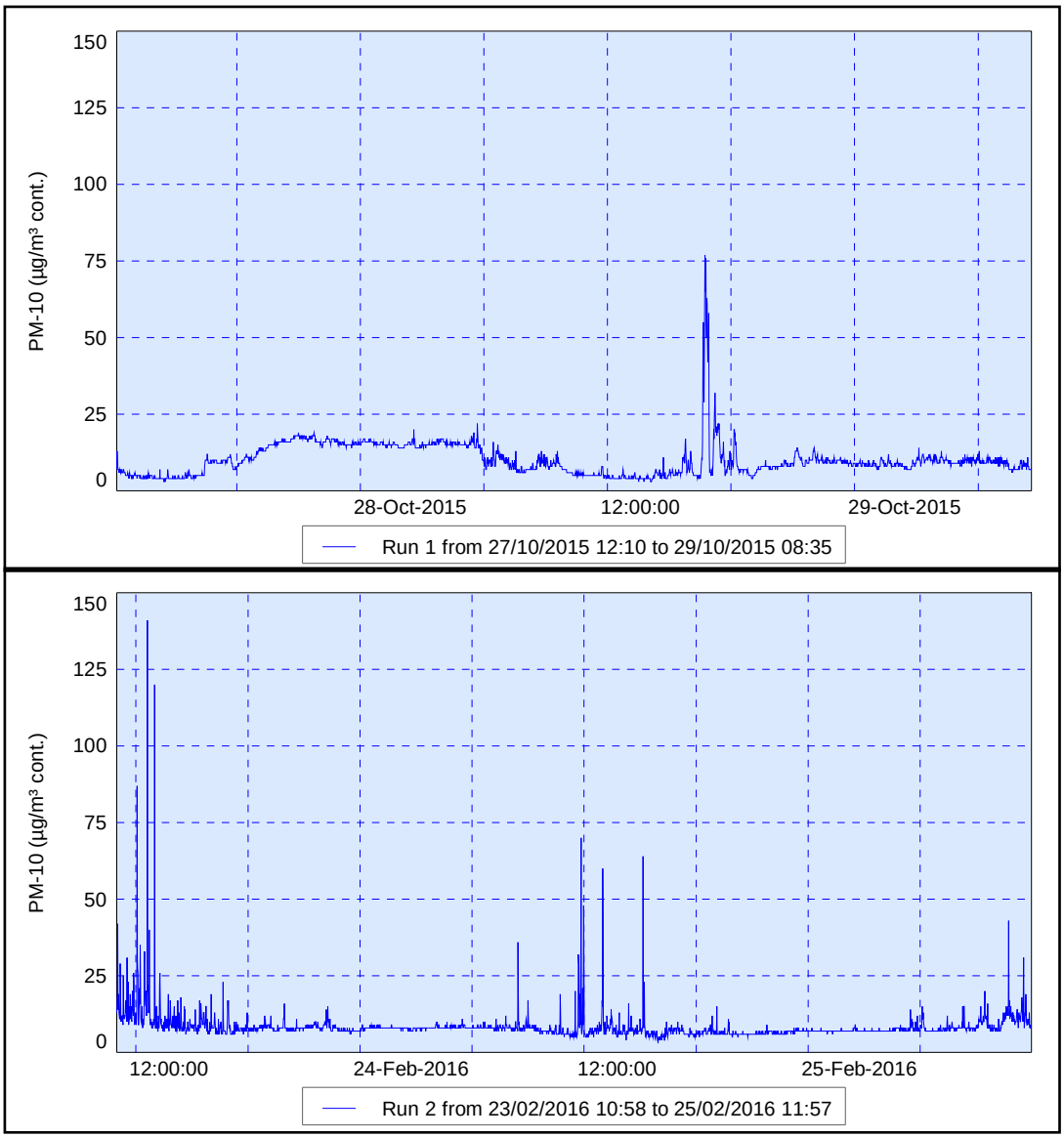
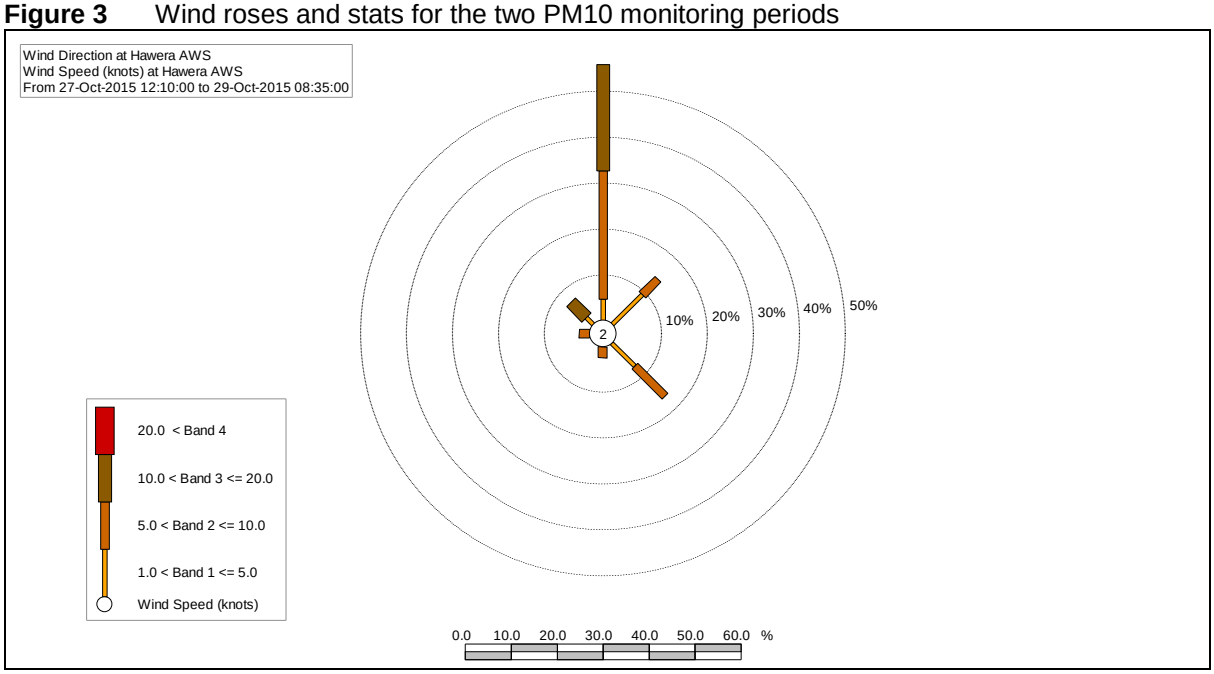


Figure 2 PM10 concentrations (µg/m³) at the Fonterra Whareroa dairy complex (2015-16)

Figure 3 Wind roses and stats for the two PM10 monitoring periods



~~~ Hilltop Hydro ~~~ Version 6.53 18-Nov-2016
~~~ PLWind ~~~

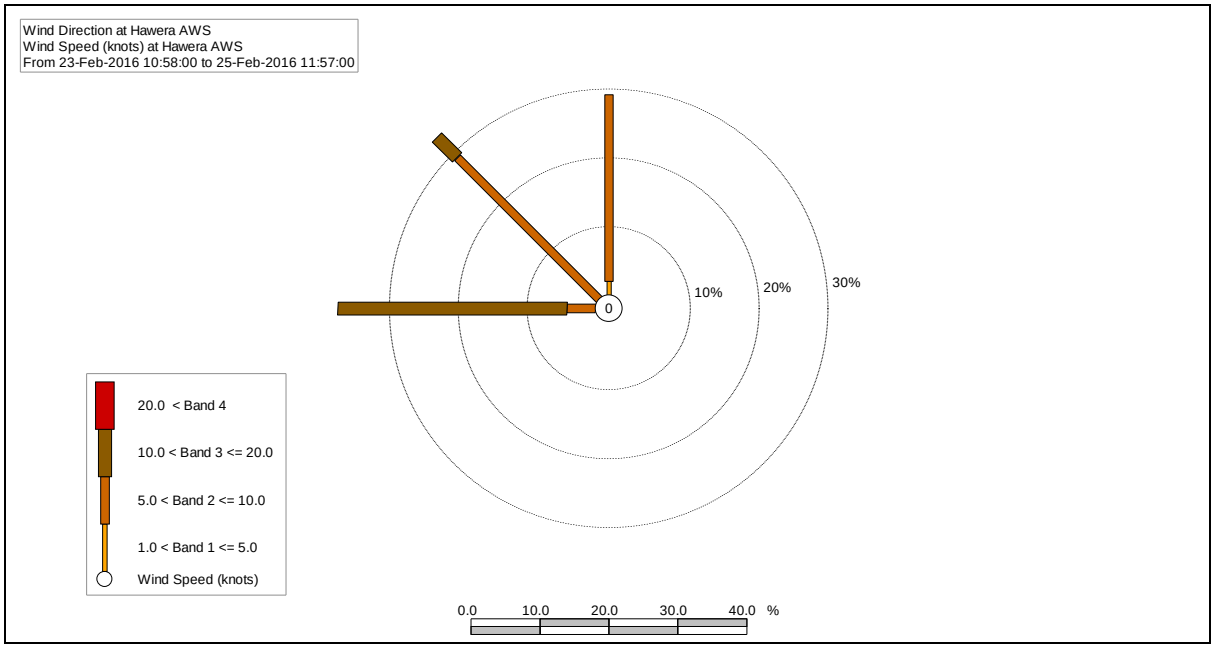
Source is R:\UNAUDITED-DATA\METEOROLOGICAL.hts
Wind Direction at Hawera AWS and Wind Speed (knots) at Hawera AWS
From 27-Oct-2015 12:10:00 to 29-Oct-2015 08:35:00

Number of data points read : 43
Number of directions <0.0 or >360.0 deg. : 0
Limits for Wind Speed (knots) are 0.0 to 50.0
Number of readings outside limits : 0
Number of data points used : 43

Percentage of time in each band

Direction	Band 1	Band 2	Band 3	Band 4	Total
337.5 - 22.4	4.7	27.9	23.3	0.0	55.8
22.5 - 67.4	9.3	4.7	0.0	0.0	14.0
67.5 - 112.4	0.0	0.0	0.0	0.0	0.0
112.5 - 157.4	7.0	9.3	0.0	0.0	16.3
157.5 - 202.4	0.0	2.3	0.0	0.0	2.3
202.5 - 247.4	0.0	0.0	0.0	0.0	0.0
247.5 - 292.4	0.0	2.3	0.0	0.0	2.3
292.5 - 337.4	2.3	0.0	4.7	0.0	7.0
Total	23.3	46.5	27.9	0.0	97.7
			Percentage <= 1.0		2.3

Wind Speed (knots) bands
1.0 < Band 1 <= 5.0 5.0 < Band 2 <= 10.0
10.0 < Band 3 <= 20.0 Band 4 > 20.0



~~~ Hilltop Hydro ~~~ Version 6.53 18-Nov-2016
~~~ PLWind ~~~

Source is R:\UNAUDITED-DATA\METEOROLOGICAL.hts
Wind Direction at Hawera AWS and Wind Speed (knots) at Hawera AWS
From 23-Feb-2016 10:58:00 to 25-Feb-2016 11:57:00

Number of data points read : 48
Number of directions <0.0 or >360.0 deg. : 0
Limits for Wind Speed (knots) are 0.0 to 50.0
Number of readings outside limits : 0
Number of data points used : 48

Percentange of time in each band

Direction	Band 1	Band 2	Band 3	Band 4	Total
337.5 - 22.4	2.1	27.1	0.0	0.0	29.2
22.5 - 67.4	0.0	0.0	0.0	0.0	0.0
67.5 - 112.4	0.0	0.0	0.0	0.0	0.0
112.5 - 157.4	0.0	0.0	0.0	0.0	0.0
157.5 - 202.4	0.0	0.0	0.0	0.0	0.0
202.5 - 247.4	0.0	0.0	0.0	0.0	0.0
247.5 - 292.4	0.0	4.2	33.3	0.0	37.5
292.5 - 337.4	0.0	29.2	4.2	0.0	33.3
Total	2.1	60.4	37.5	0.0	100.0

Percentage <= 1.0 0.0

Wind Speed (knots) bands
1.0 < Band 1 <= 5.0 5.0 < Band 2 <= 10.0
10.0 < Band 3 <= 20.0 Band 4 > 20.0