

Fonterra Whareroa  
Monitoring Programme  
Annual Report  
2016-2017

Technical Report 2017-66

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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 holds a total of 31 resource consents related to activities undertaken at the Whareroa site to allow for the abstraction of water from the Tawhiti Stream and Tangahoe River; the discharge of river silt and sand 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 2016 to June 2017 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess Fonterra's environmental and consent compliance performance during the period under review. This report also details the results of the monitoring undertaken and assesses the environmental effects of their activities.

### **During the monitoring period, Fonterra demonstrated an overall good level of environmental performance.**

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 downstream of the stormwater pond discharge points; one freshwater biomonitoring survey; one fish survey; two intertidal surveys; 30 deposition gauging samples; 8 nitrogen oxides (NO<sub>x</sub>) samples and two periods of fine airborne particulate (PM<sub>10</sub>) monitoring in relation to air emissions, and auditing of monitoring data collected by Fonterra.

Monitoring showed that the site was well managed. Water abstraction limits were adhered to. The stormwater system performed well and no impacts were detected in the receiving environments. By comparison with previous years, consent compliance monitoring of the marine outfall discharge and stormwater discharges showed a marked improvement with no significant breach of consents. There were no adverse effects from the outfall discharge detected in the marine environment. No environmental impacts were detected beyond the site boundary during air discharge monitoring. Air discharge limits were exceeded in the Powder 3 Plant during a powder emissions trial; however, no associated adverse effects were detected offsite. In summary, three incidents were recorded during the year under review none of which resulted in detectable environmental effects or follow up enforcement action.

During the year, the Company demonstrated a good level of environmental performance and a high level of administrative performance with the resource consents.

For reference, in the 2016-2017 year, consent holders were found to achieve a high level of environmental performance and compliance for 74% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 21% of the consents, a good level of environmental performance and compliance was achieved.

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 improved in the year under review.

This report includes recommendations for the 2017-2018 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 2016 to June 2017 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 24<sup>th</sup> 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 through annual programmes;
- the resource consents held by the Fonterra relating to activities on and around the Whareroa site;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

**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 2017-2018 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 2016-2017 year, consent holders were found to achieve a high level of environmental performance and compliance for 74% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 21% of the consents, a good level of environmental performance and compliance was achieved.

## 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
<b>Total</b>	<b>428,000</b>

The Whareroa site covers approximately 25 ha and is situated on Whareroa Road, east of Hawera (Photo 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.

In the 2015-2016 season, a new water treatment plant was built (commissioned in August 2016) and a new chemical storage facility was installed at the tanker workshop.

Further plant upgrades were undertaken in the 2016-2017 season, as 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.

### 1.3.2 Water discharge permit

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

Fonterra holds coastal permit **1450** to cover the discharge of 40,000 cubic metres per day (m<sup>3</sup>/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<sup>3</sup>/day to 40,000 m<sup>3</sup>/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<sup>3</sup> 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<sup>3</sup>/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<sup>3</sup>/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<sup>3</sup>/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.

### 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.

### 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.

### 1.3.5 Air discharge permit

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

### 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<sup>3</sup>/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 5 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 locations throughout the Taranaki region.

### 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** 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.

## 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 consent reviews, renewals or new consent applications;
- 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 10 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 28 to 35 hours each time in order to monitor levels of inhalable particulates (PM<sub>10</sub>).

Monitoring of ambient nitrogen oxides (NO<sub>x</sub>) levels at the site was conducted on three occasions at four sites. This monitoring involved placing NO<sub>x</sub> 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 SQMCI<sub>s</sub> scores for each site. They were also checked for heterotrophic growths.

A fish survey was undertaken in the Tawhiti Stream in order to assess if the intake, fish pass, or discharge of sediment undertaken in relation to the Fonterra Whareroa water abstraction have had any impact on the fish communities of the Tawhiti Stream.

#### 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 between December 2016 and May 2017. 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 2016-2017 monitoring year in relation to environmental performance:

A new Water Treatment Plant was constructed. The plant enables Fonterra to produce water that meets drinking water standards while minimising the amount of water abstracted from the two rivers. The new plant uses less water for back-flushing the filters. The construction of two settling lagoons allows for the recycling of up to 10% of the back-flushing water through the treatment plant.

A Reverse Osmosis Plant was installed in the Utilities Department. This plant treats evaporator condensate water through membranes, producing up to 90,000 L/h. The purified water can then be used on site, reducing the amount of water that the site abstracts from the rivers.

Numerous improvements in the plants to reduce losses and maximum yield of product have resulted in a decrease in fat, COD and suspended solids in the wastewater as compared to previous seasons.

In 2017 the site installed particulate meters in the dryer exhaust stacks of two of the powder plants. These will be used to enable real-time monitoring of the quality of the air emissions, providing assurance that emissions control measures are working correctly.

#### 2.1.2 Inspections

Routine site inspections were conducted on a monthly basis throughout the 2016-2017 dairy season. A total of ten full site inspections were undertaken between August 2016 and May 2017, with each visit including the inspection of stormwater management, chemical storage, truck wash areas, and general site maintenance and management. The three stormwater discharges and the wastewater discharge to the Tasman Sea were also inspected during the visits.



Photo 5 Tangahoe River intake

Overall, site management was found to be good throughout the monitoring period. The wastewater discharges observed from the ocean outfall during several inspections were compliant with consent conditions. There were some minor issues relating to chemical storage in the Tawhiti catchment and leaf litter accumulating in sumps. These issues were resolved promptly by Fonterra staff.

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<sup>3</sup>/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<sup>3</sup>/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.

The maximum allowable rate of abstraction from the Tangahoe River (Photo 5) is 16,000 m<sup>3</sup>/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 2016-2017 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 2016-2017

Month	Tawhiti Stream			Tangahoe River			Total abstraction		
	Mean m <sup>3</sup> /day	Max m <sup>3</sup> /day	Breach days	Mean m <sup>3</sup> /day	Max m <sup>3</sup> /day	Breach days	Mean m <sup>3</sup> /day	Max m <sup>3</sup> /day	Breach days
July	10,490	14,869	0	682	5,934	0	11,172	18,833	0
August	5,545	13,816	0	14,063	22,814	10	19,609	22850	0
September	3,004	10,206	0	10,943	13,750	0	12,558	23,059	0
October	11,947	13,420	0	8,617	11,948	0	20,565	23,948	0
November	10,937	12,872	0	10,063	12,765	0	21,000	23,778	0
December	11,078	12,001	0	8,989	11,628	0	20,068	22,195	0
January	10,621	12,000	0	8,567	10,688	0	19,188	21,242	0
February	9,594	10,800	0	10,488	14,049	0	20,082	22,391	0
March	10,399	10,801	0	11,244	13,330	0	21,643	22,930	0
April	10,329	12,000	0	8,696	11,249	0	19,026	22,049	0
May	2,861	10,482	0	11,254	14,400	0	14,115	19,013	0
June	2,611	7,526	0	2,033	13,004	0	4,644	13,079	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<sup>3</sup>/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 2016-2017 period was 242 L/s during February 2017.

For the Tangahoe River abstraction, the maximum limit of 16,000 m<sup>3</sup>/day was exceeded on 10 occasions in August. The maximum daily abstraction rate was 22,814 m<sup>3</sup> on 13 August 2016. The maximum total abstraction rate for the Tangahoe catchment (30,000 m<sup>3</sup>/day) was complied with throughout the monitoring period.

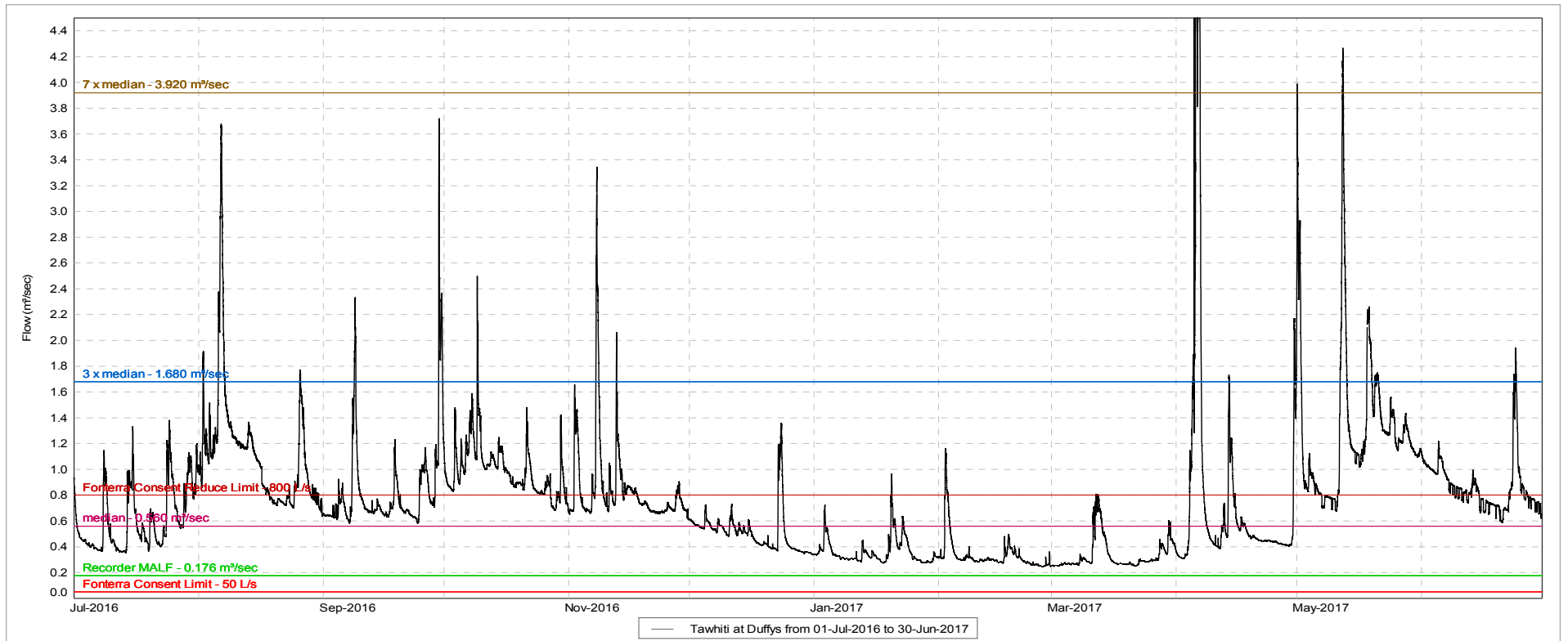


Figure 1 Tawhiti Stream flow (m<sup>3</sup>/second) at Duffy's Farm, from 1 July 2016 to 1 July 2017<sup>1</sup>

<sup>1</sup> Stream flows reached up to 8.9 m<sup>3</sup>/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 is 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 (Photo 6). The second pond was installed to ensure sufficient 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.

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 (Photo 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 repairing the stormwater isolation sump adjacent to the water treatment plant. A marked improvement in pond water quality has occurred following completion of these works (Table 9, Section 2.1.5.1).



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 (Photo 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 2016-2017 reporting period, the monitoring of stormwater discharges consisted of three components; the collection of stormwater discharge samples, a freshwater biological inspection of each of the unnamed tributaries and a macroinvertebrate survey of six 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 2016-2017 (consents 3902, 3907, 4133)

Parameter	Units	Consent limit*		
		3902	3907	4133
Temperature	°C	25	25	25
Oil and grease	g/m <sup>3</sup>	5	5	5
Total residual chlorine	g/m <sup>3</sup>	0.2	0.2	0.2
pH	pH	6.0 - 9.0	6.0 - 9.0	6.0 - 9.0
Suspended solids	g/m <sup>3</sup>	30	30	100
BOD	g/m <sup>3</sup>	10	10	10
BODCF	g/m <sup>3</sup>	2.0	2.0	2.0

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

### Tributary of Tawhiti Stream

Samples of the discharge to the Tawhiti tributary are taken at the outlet of the three-pond system. Since the construction of the three-pond system, there has been a considerable decrease in the levels of BOD and suspended solids in the discharge, while temperature, conductivity and pH have remained constant. Oil and grease (O&G) and free chlorine levels have remained low since the site upgrade.

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 in 1998, is also included for comparison.

**Table 4** Sample results for the stormwater discharge to an unnamed tributary of the Tawhiti Stream, including a summary of previous data from November 1998 to June 2016

Parameter	Alkalinity	BODCF	BOD	COD	Cond.	O&G	pH	SS	Turb.	Temp.	Total Cl <sub>2</sub>	Free Cl <sub>2</sub>
Unit	g/m <sup>3</sup> CaCO <sub>3</sub>	g/m <sup>3</sup>	g/m <sup>3</sup>	g/m <sup>3</sup>	mS/m @ 20°C	g/m <sup>3</sup>	pH	g/m <sup>3</sup>	NTU	°C	g/m <sup>3</sup>	g/m <sup>3</sup>
<b>Summary statistics previous data</b>												
Minimum	23	0.06	0.25	2.5	15	0.25	7	2	1	8	0.005	0.005
Maximum	157	19	21	210	31.9	7.3	9.9	660	350	22.5	0.3	0.3
Median	64	0.5	1	10	27.3	0.2	7.6	8	5.6	15.2	0.05	0.05
Number	119	65	126	123	125	121	125	123	86	121	123	122
<b>2016-2017 monitoring results</b>												
16 Aug 2016	79	0.7	0.7	2.5	30.6	0.25	7.3	9	22	21.1	0.05	0.05
21 Sep 2016	118	0.25	1.9	12	40.8	0.25	7.8	1	1.7	13.6	0.05	0.05
26 Oct 2016	96	0.25	1.2	15	31.8	0.25	7.5	12	22	16.7	0.05	0.05
24 Nov 2016	90	0.6	1.4	15	30.8	0.25	7.3	22	18	20.7	0.05	0.05
14 Dec 2016	82	0.6	2.0	14	28.6	0.25	7.5	14	16	20.5	0.05	0.05
18 Jan 2017	84	0.9	4.2	63	29.9	0.25	7.3	<b>200</b>	87	19.9	0.05	0.05
15 Feb 2017	95	0.25	2.2	16	32.3	0.25	7.5	<b>34</b>	21	16.9	0.05	0.05
8 Mar 2017	87	0.8	3.7	14	31.8	0.25	7.7	12	6.3	16.5	0.05	0.05
26 Apr 2017	61	0.25	1.1	5	22.1	0.25	7.2	4	6.6	14.8	0.05	0.05
17 May 2017	47	0.25	0.9	2.5	19.8	0.25	7.3	6	4.7	ND	0.05	0.05
<b>Consent limit*</b>	-	<b>2.0</b>	<b>10</b>	-	-	<b>5</b>	<b>6.0 – 9.0</b>	<b>30</b>	-	<b>25</b>	<b>0.2</b>	-

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

Suspended solids measured 200 g/m<sup>3</sup> on 18 January 2017 and 34 g/m<sup>3</sup> on 15 February 2017. The second exceedance was within the margin of error for the method used and therefore no further enforcement action was taken. Consent limits apply to eight out of ten consecutive samples over the course of the monitoring period. No other stormwater contaminants exceeded consent limits during the 2016-2017 monitoring year. Results for the contaminants not assessed against consent limits 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. The characteristics of the discharge have changed since the construction of the ponds. On average, the temperature, conductivity, alkalinity, BOD and O&G values recorded have decreased, 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 in 1996, is also included for comparison.

**Table 5** Sample results for the stormwater discharge to an unnamed tributary of the Tangahoe River, including a summary of previous data from May 1996 to June 2016

Parameter	Alkalinity	BODCF	BOD	COD	Cond.	O&G	pH	SS	Turb.	Temp.	Total Cl <sub>2</sub>	Free Cl <sub>2</sub>
Unit	g/m <sup>3</sup> CaCO <sub>3</sub>	g/m <sup>3</sup>	g/m <sup>3</sup>	g/m <sup>3</sup>	mS/m @ 20°C	g/m <sup>3</sup>	pH	g/m <sup>3</sup>	NTU	°C	g/m <sup>3</sup>	g/m <sup>3</sup>
<b>Summary statistics previous data</b>												
Minimum	28	0.25	0.6	5	4	0.25	6.8	1	0.67	8.1	0.005	0.005
Maximum	235	3.6	93	220	57.6	1.7	9.8	110	42	23.5	0.5	0.4
Median	119	1.1	5.8	23	36.4	0.25	7.9	12	6	16.4	0.1	0.05
Number	125	64	130	129	130	126	131	129	84	127	125	125
<b>2016-2017 monitoring results</b>												
16 Aug 2016	89	0.7	2.6	8	37.3	0.25	7.9	2	1.7	10.1	0.05	0.05
21 Sep 2016	79	0.6	1.9	11	29.8	0.25	7.5	7	10.0	15.3	0.05	0.05
26 Oct 2016	113	0.6	1.0	13	36.3	0.25	7.6	1	1.3	16.3	0.05	0.05
24 Nov 2016	108	0.7	1.2	9	35.7	0.25	7.6	1	1.4	19.7	0.05	0.05
14 Dec 2016	138	1.0	3.5	16	40.5	0.25	8.0	5	3.3	18.3	0.1	0.05
18 Jan 2017	126	1.1	5.0	15	35.5	0.25	9.0	6	3.8	19.9	0.05	0.05
15 Feb 2017	117	0.6	4.8	16	30.7	0.25	7.7	7	6.1	18.6	0.2	0.1
8 Mar 2017	156	0.7	4.4	20	40.2	0.25	7.7	12	6.4	16.9	0.2	0.2
26 Apr 2017	109	0.25	3.1	13	38.8	0.25	7.5	6	4.2	15.2	0.1	0.05
17 May 2017	97	0.25	2.5	2.5	34.0	0.25	7.4	6	4.8	ND	0.05	0.05
<b>Consent limit*</b>	-	<b>2.0</b>	<b>10</b>	-	-	<b>5</b>	<b>6.0 – 9.0</b>	<b>30</b>	-	<b>25</b>	<b>0.2</b>	-

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 2016-2017 monitoring year. Compared with other months, the results for pH and total chlorine were slightly elevated in January and February to March 2017 respectively; however the limits were not exceeded and therefore did not constitute a breach of consent. 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. A summary of previous results, since November 1994, is also included for comparison.

**Table 6** Sample results for the stormwater discharge to an unnamed coastal stream, including a summary of previous data from November 1994 to June 2016

Parameter	Alkalinity	BODCF	BOD	COD	Cond.	O&G	pH	SS	Turb.	Temp.	Total Cl <sub>2</sub>	Free Cl <sub>2</sub>
Unit	g/m <sup>3</sup> CaCO <sub>3</sub>	g/m <sup>3</sup>	g/m <sup>3</sup>	g/m <sup>3</sup>	mS/m @ 20°C	g/m <sup>3</sup>	pH	g/m <sup>3</sup>	NTU	°C	g/m <sup>3</sup>	g/m <sup>3</sup>
<b>Summary statistics</b>												
Minimum	16	0.25	0.8	2.5	3.6	0.25	6.6	1	1.6	7.7	0.005	0.005
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	19	10.5	15.7	0.05	0.05
Number	127	62	132	130	131	129	132	131	82	128	127	129
<b>2016-2017 monitoring results</b>												
16 Aug 2016	51	0.7	1.6	2.5	24.7	0.25	7.2	1	1.8	9.8	0.05	0.05
21 Sep 2016	53	0.6	1.5	13	25.9	0.25	7.4	1	1.3	12.8	0.05	0.05
26 Oct 2016	60	1.0	1.3	10	26.3	0.25	7.7	1	2.3	16.6	0.05	0.05
24 Nov 2016	63	0.9	1.7	11	28.1	0.25	7.6	1	1.7	19.5	0.05	0.05
14 Dec 2016	73	0.6	1.3	11	30.1	0.25	7.6	3	1.5	17.2	0.05	0.05
18 Jan 2017	94	0.9	2.2	13	35.0	0.25	7.6	6	4.0	19.9	0.05	0.05
15 Feb 2017	83	0.25	2.0	11	30.4	0.25	8.0	9	6.0	18.3	0.05	0.05
8 Mar 2017	92	0.25	2.4	8	33.7	0.25	7.7	10	4.2	15.6	0.05	0.05
26 Apr 2017	72	0.25	6.9	18	29.4	0.25	7.3	30	19	14.8	0.2	0.1
17 May 2017	68	0.25	1.0	8	29.4	0.25	7.3	7	5.2	ND	0.05	0.05
<b>Consent limit*</b>	-	<b>2.0</b>	<b>10</b>	-	-	<b>5</b>	<b>6.0 – 9.0</b>	<b>100</b>	-	<b>25</b>	<b>0.2</b>	-

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 2016-2017 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. The survey was conducted 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 adversely affected the macroinvertebrate communities of these streams during the period under review (Figure 3; Table 7). Samples were processed to provide the number of taxa (taxa richness), macroinvertebrate community index (MCI) scores and semi-quantitative MCI values (SQMCI<sub>s</sub>) at each site. They were also checked for heterotrophic growths.

The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The SQMCI<sub>s</sub> takes into account taxon abundance 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 the MCI or SQMCI<sub>s</sub> between sites indicate the extents of any adverse effects of the discharges being monitored. The presence of masses of heterotrophic organisms can also be an indicator of organic enrichment within a stream.



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

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

Stream Location	Site No.	Site code	Method
Tawhiti Stream tributary - 60 m below northern discharge	B1	TWH000478	Vegetation sweep
Tawhiti Stream tributary - 200 m below northern discharge	B2	TWH000479	Vegetation sweep
Unnamed tributary of the Tangahoe River - 10 m u/s of culvert (40 m d/s northern discharge)	1	TNH000470	Kick/ sweep sweep
Unnamed tributary of the Tangahoe River - 400 m below eastern discharge	2	TNH000473	Vegetation sweep

Stream Location	Site No.	Site code	Method
Unnamed tributary of the Tangahoe River - d/s of railway culvert	3	TNH000477	Vegetation sweep
Unnamed coastal stream - 200 m upstream from coast coastal stream	S2	UND001340	Kick/ sweep

An unauthorised discharge recorded in the unnamed tributary of the Tawhiti Stream in 2011 resulted in the proliferation of undesirable heterotrophic growths ('sewage fungus') downstream of the stormwater discharge, at sites B1 and, to a lesser extent, B2. 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 survey suggested an improvement in water quality at these sites since the stormwater upgrade was completed in April 2011. Since then, water quality has continued to improve at the monitored sites, supported by the results from the current survey. As with the previous four surveys, the SQMCI<sub>s</sub> score for site B1 was markedly higher than the historical median. In addition, the SQMCI<sub>s</sub> score recorded for site B2 was higher than the historical median for the site.

At the time of the current survey, the macroinvertebrate communities present at the three sites monitored in the unnamed tributary of the Tangahoe Stream were of 'poor' (sites 1 and 2) and 'fair' (site 3) quality. The MCI scores recorded for site 1 were typical for the site. Improvements were recorded for sites 2 and 3, with the respective MCI scores being the highest recorded at the sites to date. There were no significant differences between the MCI scores for the current and previous survey, or the historical medians, for sites 1 and 2. However, site 3 recorded an MCI score significantly higher than the historical median for the site (Stark, 1998). In addition, the SQMCI<sub>s</sub> scores recorded for the three sites were substantially higher than the historical medians.

The results of this survey continue to reflect improvements in the macroinvertebrate community that has been monitored over the past nine years at site S2, in the unnamed coastal stream. These improvements have been attributed to the fencing and planting of the stream in the vicinity of this site. There was no evidence of any adverse effects of the stormwater discharge on the macroinvertebrate community in the unnamed coastal tributary.

The results of this survey of the three small streams around the Fonterra factory indicate that the stormwater discharges from the factory have 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 discovery of undesirable heterotrophic growths in the Tawhiti Stream tributary 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* sp.

This year's inspection found no undesirable heterotrophic growths in the streambeds downstream of the three stormwater pond discharges, and the presence of 'moderately sensitive' taxa. Overall, the inspection found no evidence for any of the three dairy discharges significantly adversely affecting the respective downstream macroinvertebrate communities.

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

#### 2.1.4.4 Fish survey

On 27 and 28 March 2017, two sites were surveyed for freshwater fish in the Tawhiti Stream, in relation to the water intake weir and fish pass associated with the Fonterra dairy factory (Figure 4). Site 1 was located approximately 720 m upstream of the intake, while site 2 was located approximately 350 m downstream of the intake. The survey method involved deploying baited fine and coarse mesh fyke nets and gee-minnow traps at each site overnight. These nets and traps were recovered the following morning, with all fish identified, counted and measured.

At the time of this survey flow in the Tawhiti Stream was moderate and instream fish habitat was abundant, with undercut banks, macrophyte beds, overhanging vegetation and woody debris present at both sites. In addition the low altitude and close proximity to the coast of these sites would be expected to result in a relatively diverse and potentially abundant community.

Two species of eel were recorded, along with rainbow trout and freshwater crayfish. The downstream site had the highest abundance of fish, with 16 individuals recorded, compared with the seven fish and four crayfish recorded downstream. The downstream site recorded the highest species richness, with longfin eel, shortfin eel, rainbow trout and crayfish present. Only longfin and shortfin eel were recorded at the upstream site.

This is the first survey to record rainbow trout, although they have been observed in the stream previously. This fish appeared intact, and did not show any signs of being from the Tawhiti trout hatchery. If this is a wild fish, it indicates that rainbow trout are able to successfully reproduce in this catchment.

The abundance of fish at site 2 indicates that there has been little impact from the activities undertaken at the weir. Due to a particularly wet spring and summer, the Tawhiti Stream had carried higher than normal flows in the months preceding this survey, providing good instream conditions for the fish. It is possible that during drier period, the low flows caused by the abstraction or the discharge of sediment may result in habitat that is from time to time unsuitable, and unable to sustain a community for an extended period of time. This could result in fewer fish becoming resident in that reach of stream. Neither the current or previous survey results suggest that these effects have occurred, as flows had not dropped below MALF for a number of months prior to this survey, and no significant issues have been noted with the discharge of sediment.

It should be noted that the sampling technique can influence results, as fyke nets favour the capture of eels, especially when baited, and anecdotal evidence indicates that kokopu species may avoid nets that contain eels. In addition, other influences may exist, such as commercial fishermen targeting eels in this stream.

However, this does not explain the lack of fish captured in the gee-minnow traps. It was expected that these traps would catch bully species and possibly *inanga*, and their absence may indicate the presence of a barrier to fish passage downstream, either natural or artificial. There are two areas downstream that appear to have been the subject of modification, with the shortcutting of a loop of stream. This shortcutting appears to have created an area of very swift flow, which is likely to pose a barrier to a number of species.

In assessing whether the intake weir itself is a barrier to fish passage, it is necessary to compare the species diversity downstream with that recorded upstream. Unfortunately, this assessment is inhibited by the lack of species recorded downstream. The results of this survey, and other work undertaken further upstream which recorded shortfin eel, indicates that the intake weir and fish pass does not constitute a barrier to the

passage of those species recorded downstream of the weir. Although no rainbow trout were recorded upstream, this species is infrequently encountered with netting and trapping methods, and a visual inspection of the pass considered it to be in good condition.

Overall, this survey does not indicate that the intake, fish pass or discharge of sediment undertaken in relation to the Fonterra water abstraction have had any impact on the fish communities of the Tawhiti Stream. It is recommended that subsequent surveys use the same techniques, as the habitat does not suit electric fishing or spotlighting. However, it could be possible to electric fish immediately below the weir, and this may provide additional useful information.

A full copy of this survey is included in Appendix IV.



Figure 4 Location of the two sampling sites in relation to the intake, weir and fish pass

### 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<sup>3</sup>/day of dairy factory wastewater is provided for by consent 1450. Changes to the consent in September 2006 added specific limits on the concentrations 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: an increased level of resourcing in loss monitoring/CIP optimisation personnel, the 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 is performing according to design. The effluent field that forms above the diffuser moves parallel to the coast, and has not been observed to impinge upon the shore.

Although occasional surface films form, there has been no evidence of accumulation of material on the seabed near the outfall.

### 2.1.5.1 Discharge composite samples

Fonterra forwards monitoring results to the Council monthly. These results include daily discharge volumes, as well as the concentrations of fats and suspended solids, COD, pH 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 2016-2017

Month	Mean volume (m <sup>3</sup> /day)	Maximum volume (m <sup>3</sup> /day)	No. of non-compliance days (> 40,000 m <sup>3</sup> /day)
July	7,472	14,535	0
August	21,181	28,470	0
September	25,803	28,178	0
October	27,431	30,769	0
November	27,722	31,160	0
December	25,710	28,367	0
January	24,509	29,003	0
February	24,514	31,399	0
March	25,844	30,542	0
April	23,033	30,582	0
May	15,200	23,126	0
June	3,750	11,368	0

The highest maximum daily volume discharged was 31,399 m<sup>3</sup>, on 2 February 2017. November 2016 had the highest average daily volume discharged (27,722 m<sup>3</sup>), coinciding with the period of highest processing throughput. As with the previous six monitoring periods, the maximum allowable discharge rate of 40,000 m<sup>3</sup>/day was not exceeded.

Daily discharge volumes for the 2016-2017 monitoring period are presented in Figure 5. 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 6 to 8 and summarised in Tables 9 and 10.

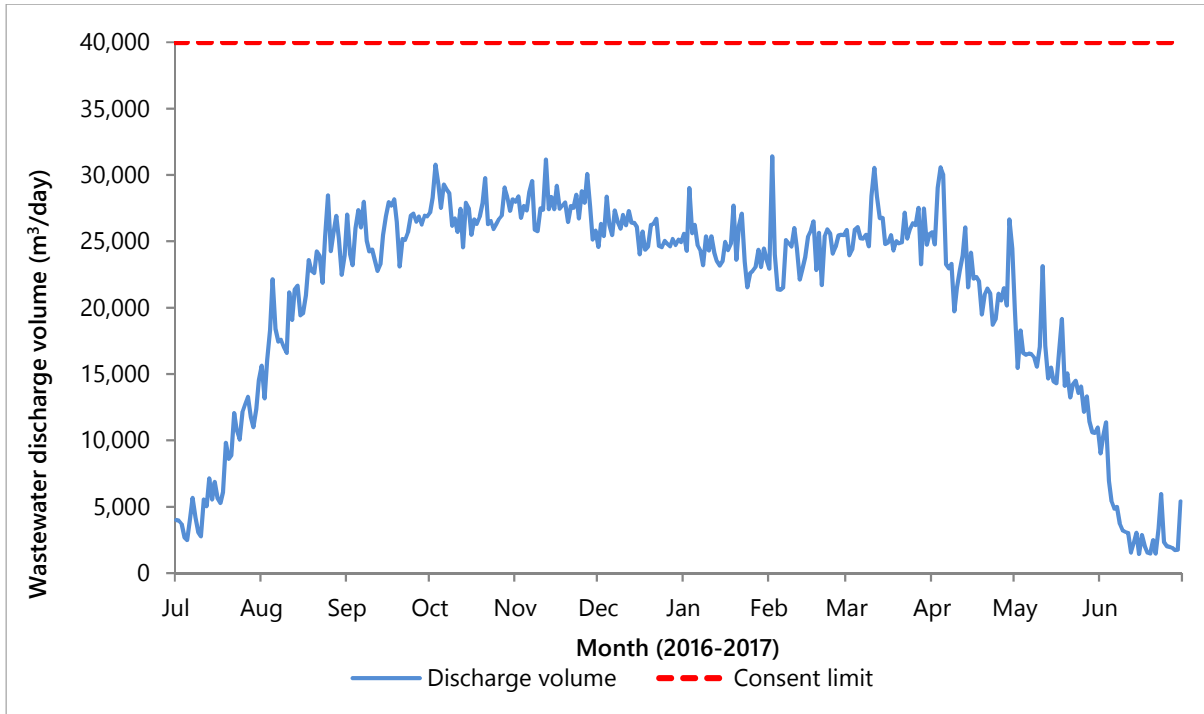


Figure 5 Daily volumes of wastewater discharged through the ocean outfall

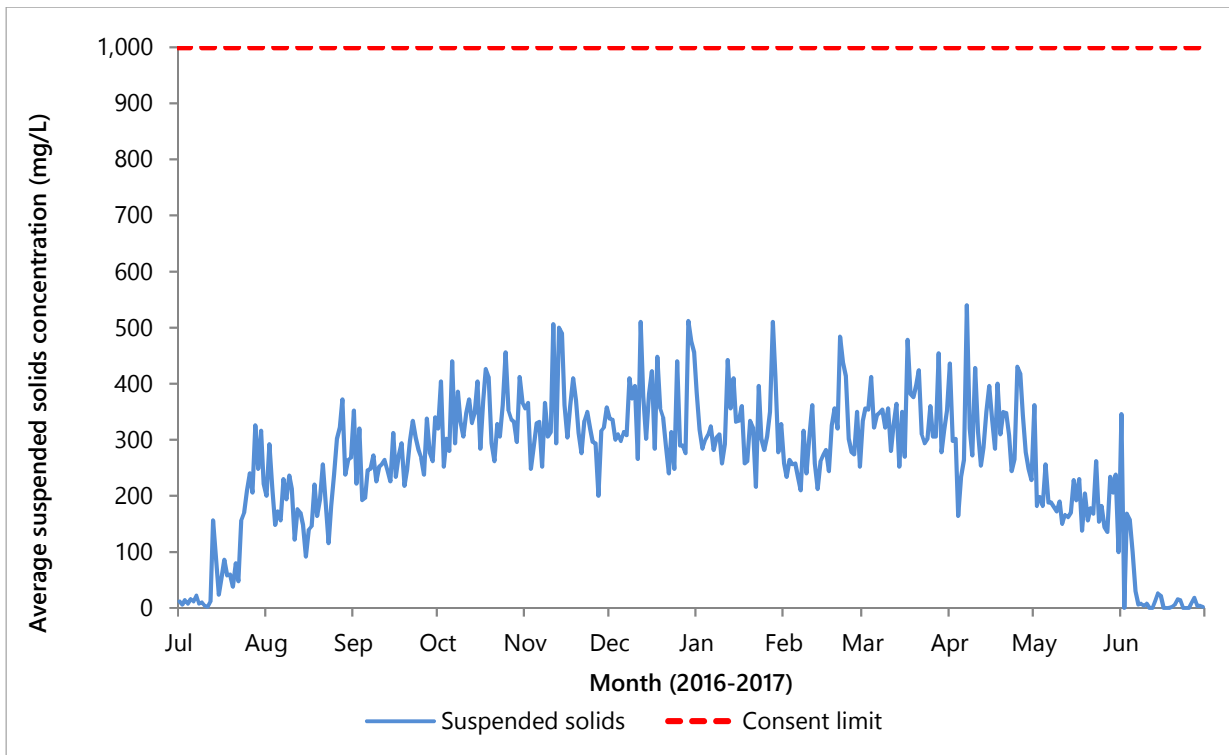


Figure 6 Daily, average concentrations of suspended solids in wastewater discharge, based on 24 hour flow-proportioned composite samples



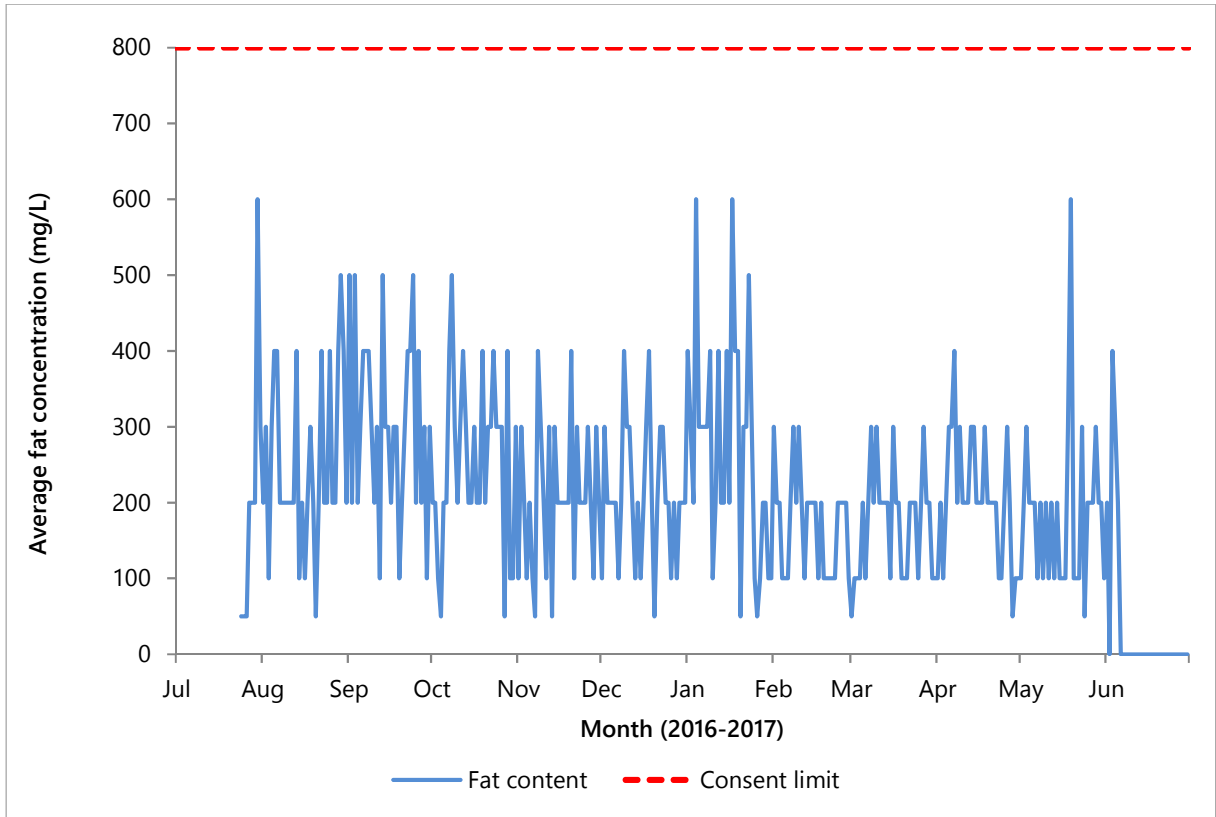


Figure 7 Daily, average concentrations of fats in wastewater discharge, based on 24 hour flow-proportioned composite samples

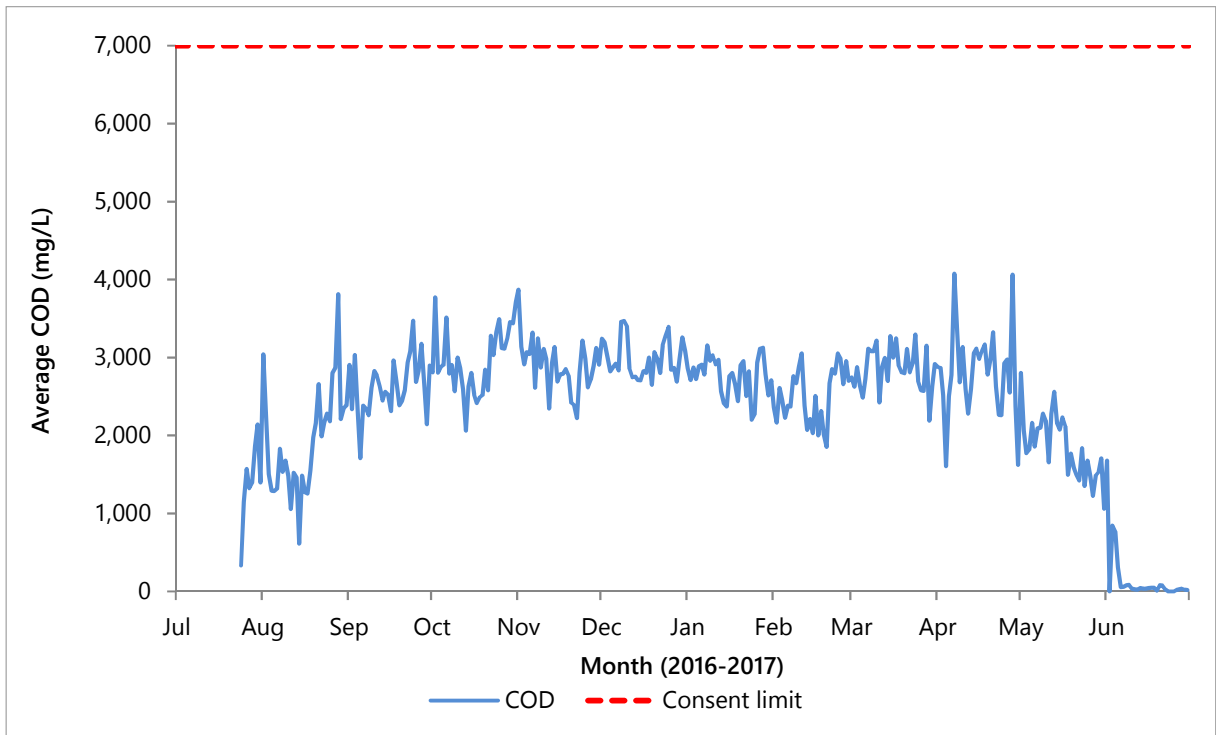


Figure 8 Daily, average COD in wastewater discharge, based on 24 hour flow-proportioned composite samples

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 2.1.5.3 (Table 12).

The daily discharge volumes and average concentrations of suspended solids, COD and fats complied with consent conditions during the entire monitoring period (Figures 5-8; Table 9).

**Table 9 Summary of daily wastewater discharge composition data (2016-2017)**

Month	Suspended solids concentration			Fat concentration			COD		
	Mean (mg/L)	Max (mg/L)	Breach days	Mean (mg/L)	Max (mg/L)	Breach days	Mean (mg/L)	Max (mg/L)	Breach days
July	63	326	0	300	600	0	392	2,142	0
August	205	372	0	257	500	0	1913	3813	0
September	274	500	0	303	500	0	1,007	3,033	0
October	345	456	0	269	500	0	2,951	3,769	0
November	338	506	0	218	400	0	2,892	3,868	0
December	352	512	0	213	400	0	2,990	3,473	0
January	328	510	0	290	600	0	2,762	3,157	0
February	295	484	0	171	300	0	2,499	3,053	0
March	345	478	0	177	300	0	2,854	3,293	0
April	322	540	0	210	400	0	2,801	4,075	0
May	190	362	0	187	600	0	1,850	2,803	0
June	7	346	0	275	400	0	174	1,676	0
<b>Consent limit</b>	<b>≤ 1,000</b>			<b>≤ 800</b>			<b>≤ 7,000</b>		
Total no. of breach days	0			0			0		

For the 2016-2017 monitoring year, 7,663,420 m<sup>3</sup> of wastewater was discharged through the outfall, a decrease from the previous monitoring period when 8,187,622 m<sup>3</sup> was discharged (Table 10). The estimated total masses of suspended solids and fats in the wastewater discharged during the year under review were lower than in the 2015-2016 monitoring period. The total COD of the wastewater also decreased, indicating a decrease in the total mass of organics discharged in wastewater. These results reflect the reduced volume of milk processed onsite in 2016-2017.

The volumes of wastewater and masses of contaminants discharged over the past five years have fluctuated in response to changing volumes of milk production. However, the average concentrations of constituents in the wastewater have remained relatively stable over this period. In the 2016-2017 monitoring period, the average concentrations of suspended solids and fats decreased and the average COD of the wastewater increased, in comparison with the previous monitoring year.

Table 10 Summary of estimated annual total masses and average concentrations of wastewater discharge constituents over the past five monitoring years, for the 11-month dairy season (July – May)

Monitoring year	Volume discharged (m <sup>3</sup> )	Suspended solids		Fat		COD	
		Estimated total mass (tonnes)	Average mg/L	Estimated total mass (tonnes)	Average mg/L	Estimated total mass (tonnes)	Average mg/L
2012-13	7,149,032	2,735	372	2,002	282	20,548	2,712
2013-14	7,996,557	3,364	408	2,327	296	22,548	2,673
2014-15	8,398,543	3,997	480	2,220	270	24,797	2,914
2015-16	8,187,622	3,677	517	2,410	297	19,829	2,422
2016-17	7,663,420	2,265	280	1,671	222	19,661	2,582

### 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 10 occasions during the 2016-2017 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 2016-2017, including summary statistics from July 2006 to June 2016.

Parameter	COD	Conductivity	<i>E. coli</i>	Enterococci	pH	SS	Temp.	TG
Unit	g/m <sup>3</sup>	mS/m @ 20°C	cfu/100ml	cfu/100ml	pH	g/m <sup>3</sup>	°C	g/m <sup>3</sup>
<b>Summary statistics</b>								
Minimum	50	11.6	<1	2	2.1	12	22.4	11
Maximum	8320	833	120,000	8,500,000	12.5	2,000	41.0	1100
Median	2300	204	76	110,000	11.1	290	30.6	110
<b>2016-2017 monitoring results</b>								
16 Aug 2016	572	149	<1	1.5	11.7	130	32.1	73
21 Sep 2016	985	275	<1	30,000	12.1	220	28.2	103
26 Oct 2016	3000	292	1	92	11.7	375	30.0	73
24 Nov 2016	5000	230	<1	600	6.6	370	30.5	440
14 Dec 2016	1760	173	17	5,000	11.4	160	30.6	38
18 Jan 2017	2300	322	<1	44,000	11.7	190	33.3	88
15 Feb 2017	1600	343	<1	2400	12.1	440	29.1	88

Parameter	COD	Conductivity	<i>E. coli</i>	Enterococci	pH	SS	Temp.	TG
Unit	g/m <sup>3</sup>	mS/m @ 20°C	cfu/100ml	cfu/100ml	pH	g/m <sup>3</sup>	°C	g/m <sup>3</sup>
8 Mar 2017	2300	227	>16000	100,000	8.5	280	30.1	170
26 Apr 2017	1800	132	1700	33,000	4.6	350	31.8	110
17 May 2017	760	38.0	11,000	5,700	9.4	210	ND	85

High concentrations of faecal indicator bacteria, in particular enterococci, were recorded in the grab samples (Table 8). 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 remained in the range of previous results. pH levels fluctuated about the historical median during the monitoring period. Wastewater conductivity and total grease concentrations were also comparable with historical median results.

### 2.1.5.3 Discharge inter-laboratory comparisons

An inter-laboratory comparison was performed on two occasions during the 2016-2017 monitoring period 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 are considered acceptable. Differences of 10-25% are considered to constitute a difference between the two laboratories and differences of greater than 25% are considered significantly different.

Table 12 Inter-laboratory comparisons performed on 24 hour composite wastewater samples (2016-2017)

Parameter	Unit	25 January 2017			8 March 2017		
		Council	Fonterra	Agree	Council	Fonterra	Agree
COD	g/m <sup>3</sup>	2,640	2,272	*	2,500	3,082	*
pH	pH	11.7	10.99	✓	9.7	9.79	✓
Suspended solids	g/m <sup>3</sup>	710	282	**	380	354	✓

Note: ✓ = acceptable agreement

\* = within 10% - 25% difference from the mean

\*\* = significantly different (i.e. > 25% difference from the mean)

Suspended solids concentrations varied significantly between the samples collected by the Council and Fonterra in January 2017. There was acceptable agreement between the samples from the subsequent collection in March 2017 for this parameter. The pH values of the samples collected in both monitoring rounds were found to be in acceptable agreement, while the COD values differed by 10-25 % on both occasions.

#### 2.1.5.4 Marine ecological surveys

In order to assess the effects of the Fonterra dairy factory and Hawera Wastewater Treatment Plant combined outfall discharge on the nearby intertidal communities, spring and summer surveys were conducted in December 2016 (peak season) and March-April 2017 (post-peak season) respectively, at four sites (Figure 9). 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 analyses of results and further discussion of the findings, are included in Appendix V. The main findings of these survey reports are summarised below, and are presented in Figures 10 to 13.



Figure 9 Map of sampling sites in relation to the outfall

The potential impact sites located 350 m NW of the outfall and at Pukeroa Reef had significantly greater species richness and diversity than Waihi Reef (the control site). The remaining potential impact site located 200 m SE of the outfall showed signs of recovery after having been buried by a slip in 2015. There is no evidence of the potential impact sites declining in species richness or diversity over time, relative to the control site.

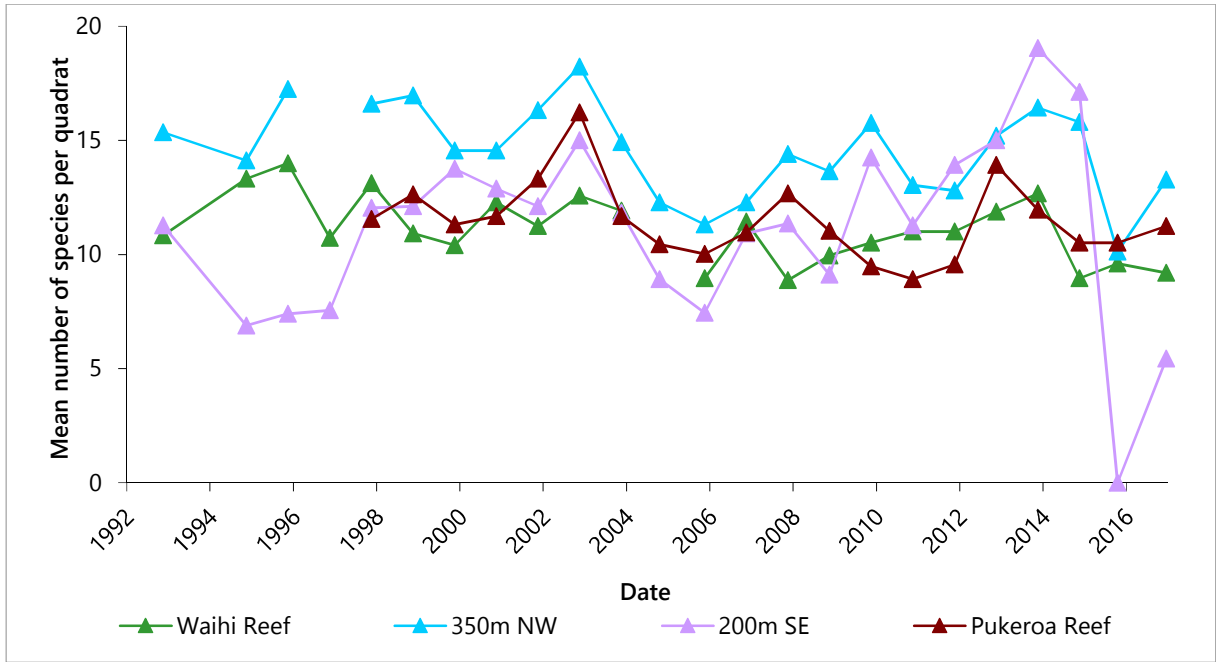


Figure 10 Mean number of species per quadrat for spring surveys (1992-2017)

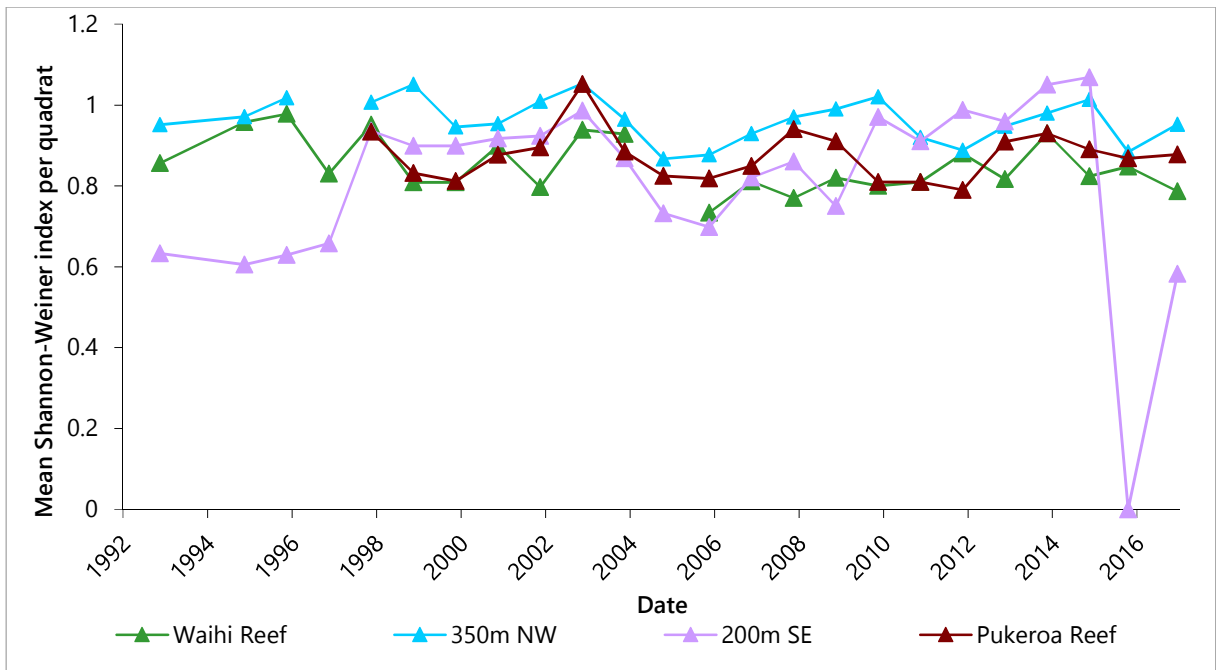


Figure 11 Mean Shannon-Weiner indices per quadrat for spring surveys (1992-2017)

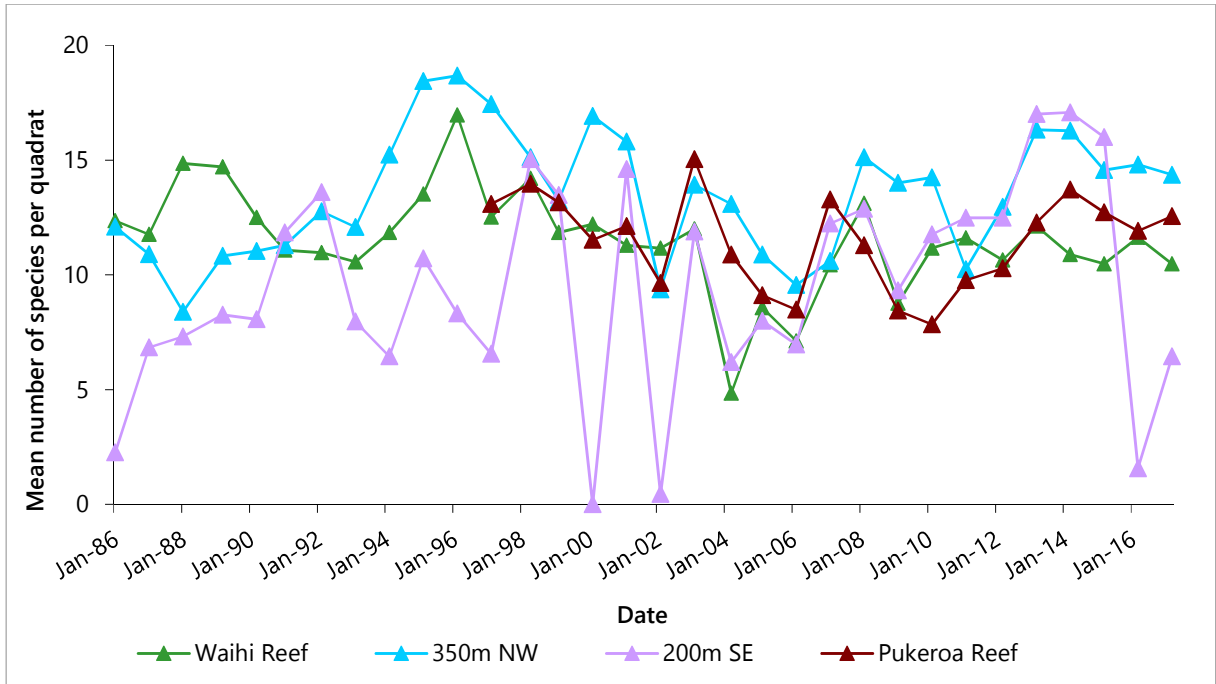


Figure 12 Mean number of species per quadrat for summer surveys (1986-2017)

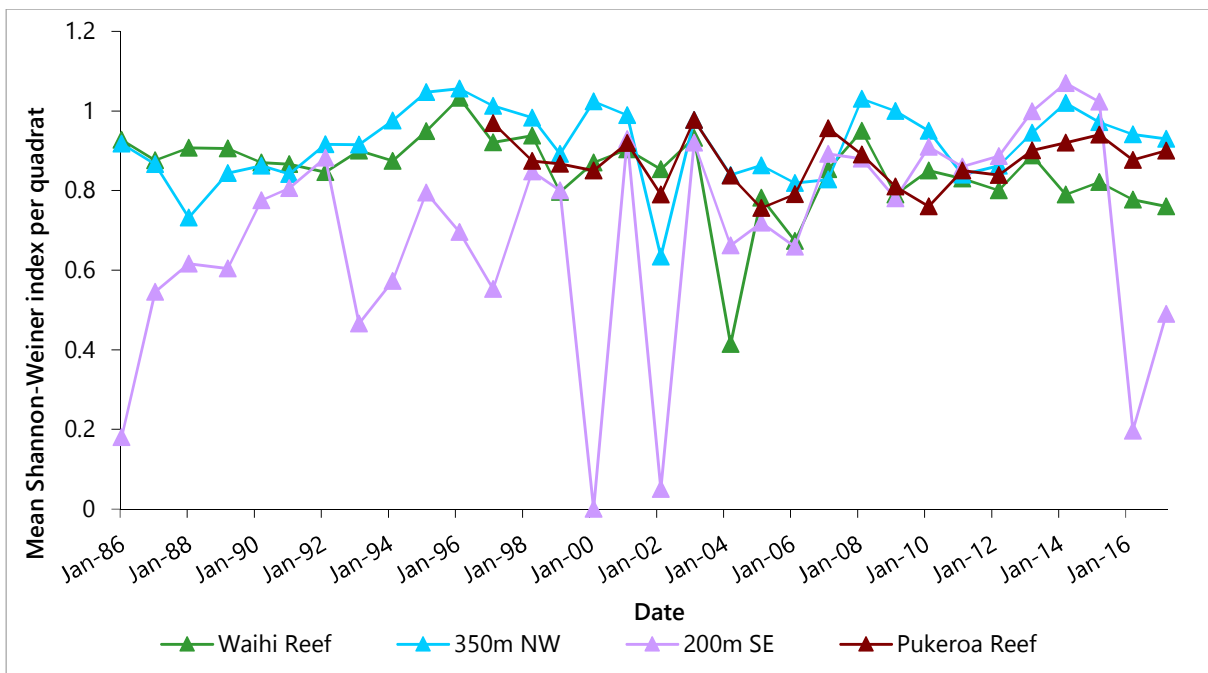


Figure 13 Mean Shannon-Weiner Indices per quadrat for summer surveys (1986-2017)

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, appear to remain the 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<sup>3</sup> 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, 4, 5, whey products, and casein) between December 2016 and May 2017. Powder 3 was monitored during whole milk powder, butter milk powder and WPC production. These results are presented in Table 13. Powder 1 was not in operation over the 2016-2017 season. The North and South stack of Powder 4 could not be monitored due to safety and access restraints at the time of this survey.

Table 13 Emission source analysis results for 2016-2017

Plant		Date	Emission concentration (mg/m <sup>3</sup> 0°C, 1 atm, dry gas)
Powder 1	North stack	-	-
	South Stack		-
Powder 2	Exhaust	14 December 2016	1
Powder 3 (whole milk powder)	East stack	7 February 2017	66
	West stack		74
	Fluid Bed exhaust		37
Powder 3 (butter milk powder)	East stack	14 December 2016	117
		6 April 2017	70
	West stack	14 December 2016	71
		6 April 2017	68
	Fluid Bed exhaust	14 December 2016	101
		6 April 2017	75
Powder 3 (WPC trial)	East stack	7 April 2017	<b>193</b>
		25 May 2017	<b>195</b>
	West stack	7 April 2017	<b>191</b>
		25 May 2017	<b>153</b>
		7 April 2017	<b>370</b>



Plant		Date	Emission concentration (mg/m <sup>3</sup> 0°C, 1 atm, dry gas)
	Fluid Bed exhaust	25 May 2017	<b>255</b>
Powder 4	North stack	-	-
	South stack	-	-
	Wet scrubber	14 December 2016	9
Powder 5	East stack	8 February 2017	48
	West stack		54
	North stack		59
	South stack		46
Whey products	Exhaust	13 December 2016	4
Casein	Drier stack 1	13 December 2016	22
	Drier stack 2		23
<b>Consent limit</b>			<b>125</b>

With the exception of the WPC trials undertaken at Powder 3, the results from all of the tested driers were below the limit of 125 mg/m<sup>3</sup> prescribed by consent 4103. The emission concentrations recorded from Powder 3 during the WPC trial in April 2017 were between 53% and 196% higher than the consent limit. A follow up trial was carried out in May 2017. The results from this testing found elevated particulate concentrations that were compliant with condition 8, consent 4103, which allowed for elevated emission concentrations (up to 400 mg/m<sup>3</sup>) for two trial periods between 18 May 2017 and 18 June 2017 (Table 13). Further details of these elevated results during the WPC trials are provided in Section 2.3.

### 2.2.2.1 Deposition gauging

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

Deposition gauges are modified buckets, elevated on a stand to approximately 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 the 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 August and December 2016. 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 14.



Figure 14 Location of air deposition sites

TDMP values for each monitoring site are presented in Table 14. The Council's guideline value for total particulate deposited to cause a nuisance is 130 mg/m<sup>2</sup>/day. The Council does not have a specific guideline value for milk powder deposited. The Fonterra deposition survey determines deposition due to milk powder only, rather than total deposition.

The results for TDMP 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 concern, provided that the stormwater management systems perform satisfactorily.

Table 14 Total deposited milk powder values (mg/m<sup>2</sup>/day) for each monitoring site during the 2016-2017 monitoring year

Site ID	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
	4 August to 25 August	25 August to 16 September	16 September to 10 October	10 October to 2 November	2 November to 25 November	25 November to 15 December
AIR002409	59	128	96	132	317	192
AIR002416	34	33	43	95	164	82
AIR002422	28	24	81	56	23	52
AIR002424	49	32	16	31	43	42
AIR002426	82	51	37	176	333	84
<b>Council guideline</b>	<b>130 mg/m<sup>2</sup>/day</b>					

As expected, the highest values of TDMP at or outside of the boundaries were recorded at sites downwind of the powder plants, in relation to the prevailing winds from the north-west quadrant (Table 15). Higher TDMP values were recorded at the staff car park entrance (AIR002409) than at the other monitored sites. Elevated results were also recorded in October and November 2016 at the site located approximately 1.3 km east of the dairy complex (AIR002426). These TDMP elevations were likely to have been caused by other local COD contributors, as lower values were found at the site (AIR002424) situated intermediate to the dairy complex and the eastern site (AIR002426). Recorded values were similar to those found in previous

years, and peaked during October to November, coinciding with the peak of maximum milk powder production.

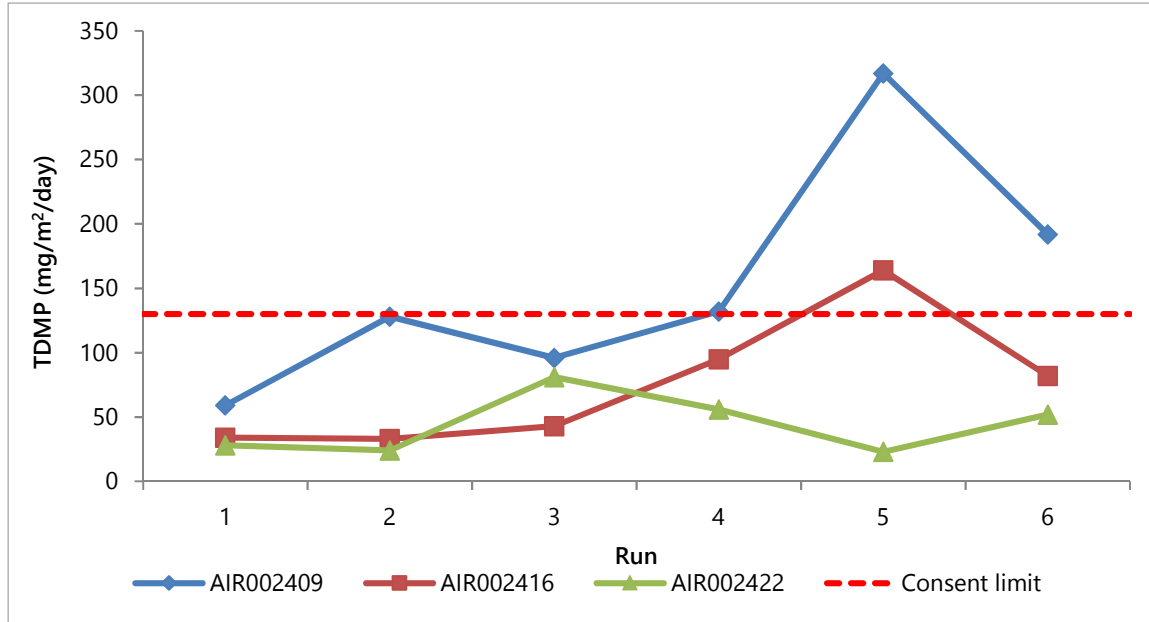


Figure 15 Milk powder fallout at three air deposition sites surrounding Whareroa during the 2016-2017 monitoring year, for each run (August to December 2016)

### 2.2.2.2 Inhalable particulate (PM<sub>10</sub>) monitoring

Special condition 9 of consent 4103 sets a limit on the emissions of PM<sub>10</sub> to the atmosphere from the site to a maximum of 50 µg/m<sup>3</sup> (24 hour average).

During the reporting period, a "DustTrak" PM<sub>10</sub> monitor was deployed on two occasions in the vicinity of the dairy complex. The deployments lasted from approximately 28 to 35 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM<sub>10</sub> concentrations. The results from the sampling runs are shown in Figure 16.

During the first 28-hour run, from 12 to 13 October 2016, the average recorded PM<sub>10</sub> concentration was 40.2 µg/m<sup>3</sup>. This daily mean equates to 80.4% of the 50 µg/m<sup>3</sup> value that is set by both the National Environmental Standard and the resource consent. It is noted that the sudden increase in PM<sub>10</sub> at 1pm on 12 October 2016 coincided with a change in wind direction from NW to SW. This change may have caused suspension of the deposited matter from the staff car park, which is located upwind of the monitor, with a consequent increase in recorded PM<sub>10</sub>.

During the second 35-hour run, from 31 March to 1 April 2017, the average recorded PM<sub>10</sub> concentrations for the first and second 24-hour periods were 6.8 µg/m<sup>3</sup> and 6.5 µg/m<sup>3</sup>, respectively. These daily means equate to 14% and 13%, respectively, of the 50 µg/m<sup>3</sup> value that is set by both the National Environmental Standard and the resource consent 4103-2.

The regional background PM<sub>10</sub> level is approximately 11 µg/m<sup>3</sup>. Onsite PM<sub>10</sub> concentrations were considerably higher than the regional background average during the first run, in October 2016, and were below the regional background concentration during the second run, in March to April 2017.

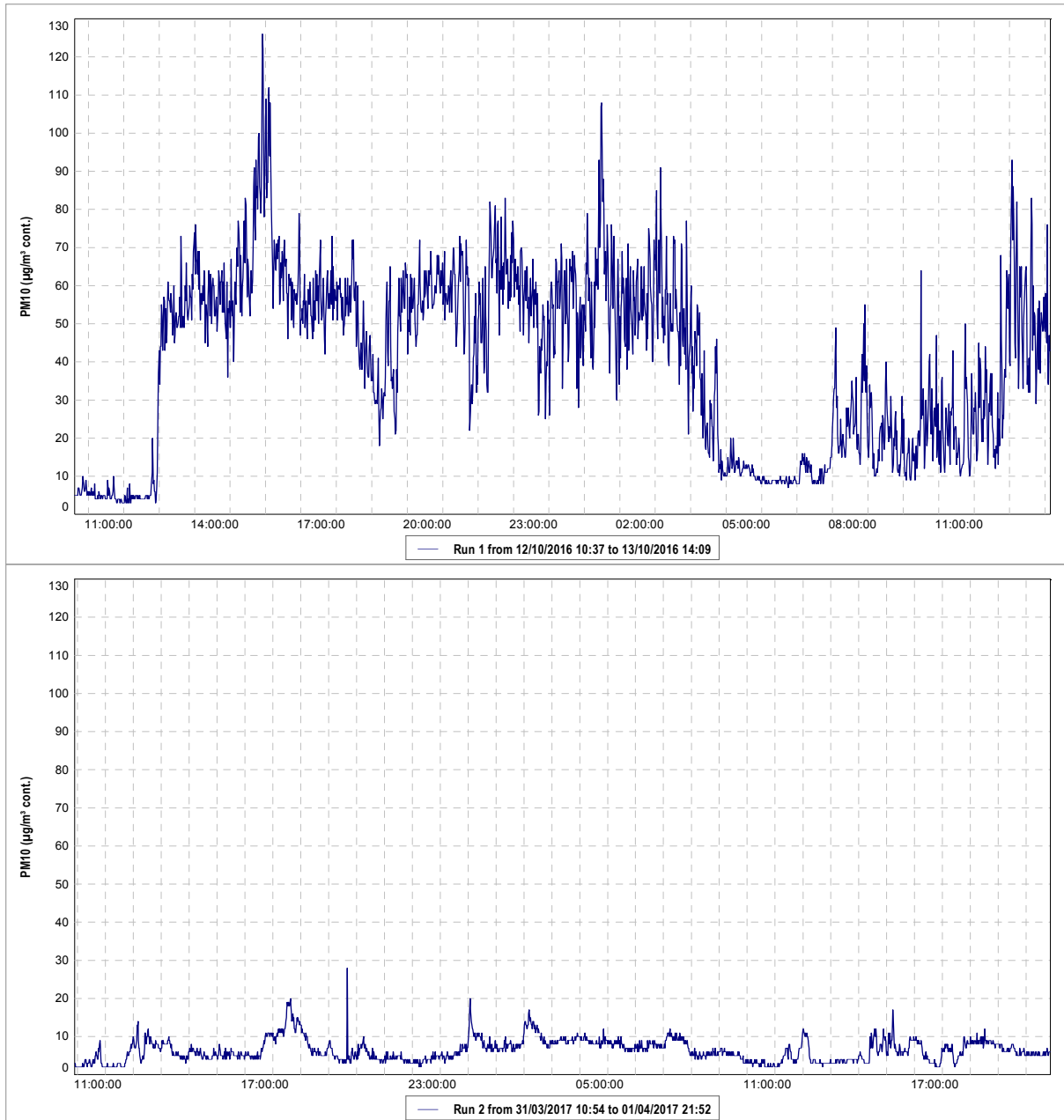


Figure 16 PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) at the Whareroa dairy complex

The full report for PM<sub>10</sub> monitoring at the Whareroa site over the 2016-2017 monitoring period is provided in Appendix VI.

### 2.2.2.3 Nitrogen oxide (NO<sub>x</sub>) monitoring

Ambient NO<sub>x</sub> 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<sub>x</sub> is the main emission of concern associated with Fonterra's co-generation 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 [µg/m<sup>3</sup>] [one-hour average], or 100 µg/m<sup>3</sup> [twenty-four hour average], at or beyond the boundary of the site."*

The Council uses passive absorption discs to monitor ambient nitrogen dioxide (NO<sub>2</sub>). The gases diffuse into the discs and any target gases are captured. These discs are deployed for periods of approximately three weeks and are then sent to an external laboratory for analysis.

Passive NO<sub>x</sub> discs were placed in four locations surrounding the Fonterra site (Figure 17) on two occasions during the 2016-2017 monitoring year.



Figure 17 NO<sub>x</sub> sample site locations around the Fonterra plant

From the average concentration measured, it is possible to calculate a theoretical maximum daily concentration that may have occurred during the exposure period. 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 factors such as local topography, micro-climates and diurnal variation. Nevertheless, they are applied conservatively and have some recognition of validity.

One formula generally used is:

$$C(t_2) = C(t_1) \times \left(\frac{t_1}{t_2}\right)^p$$

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<sub>2</sub>, given a measured concentration for time period t<sub>1</sub>). 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<sub>x</sub>, and consent 6273 limits.

Table 15 NO<sub>x</sub> levels and theoretical 1 hour and 24 hour maximums for each air monitoring site at Fonterra (2016-2017)

Monitoring period	NO <sub>x</sub> concentration µg/m <sup>3</sup>											
	AIR002410			AIR002411			AIR002412			AIR002413		
	NO <sub>x</sub> (Lab)	1 h (Cal)	24 h (Cal)	NO <sub>x</sub> (Lab)	1 h (Cal)	24 h (Cal)	NO <sub>x</sub> (Lab)	1 h (Cal)	24 h (Cal)	NO <sub>x</sub> (Lab)	1 h (Cal)	24 h (Cal)
13 January to 3 February 2017	7.10	24.65	13.05	7.00	24.30	12.87	2.20	7.64	4.04	2.10	7.29	3.86
3 February to 21 February 2017	5.40	18.18	9.63	4.80	16.16	8.56	3.00	10.10	5.35	2.50	8.41	4.46
Consent limit		200	100		200	100		200	100		200	100

**1 h** = 1 hour theoretical maximum

**24 h** = 24 hour theoretical maximum

Throughout the 2016-2017 monitoring period NO<sub>x</sub> concentrations remained well below consent condition limits (consent 6273, special condition 7 – 200 mg/m<sup>3</sup> one hour average, 100 mg/m<sup>3</sup> 24 hour average).

Variation in NO<sub>x</sub> concentration values can be explained in terms of distance from possible NO<sub>x</sub> sources, namely the plant and road traffic, as well as wind speed and direction.

Since 2014, the Council has coordinated a region-wide monitoring programme to measure NO<sub>x</sub>, not only at individual compliance monitoring sites near industries that emit NO<sub>x</sub>, 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 enables the Council to further evaluate the effects of local and regional emission sources and ambient air quality in the region.

Figure 18 presents the average NO<sub>x</sub> levels (theoretical 1 hour concentrations) from 11 industrial sites monitored around the region from January 2014 to February 2017. The full report for regional NO<sub>x</sub> monitoring is provided in Appendix VII.

The results from Figure 18 show that NO<sub>x</sub> levels at Fonterra are comparable with some of the larger production stations around Taranaki.

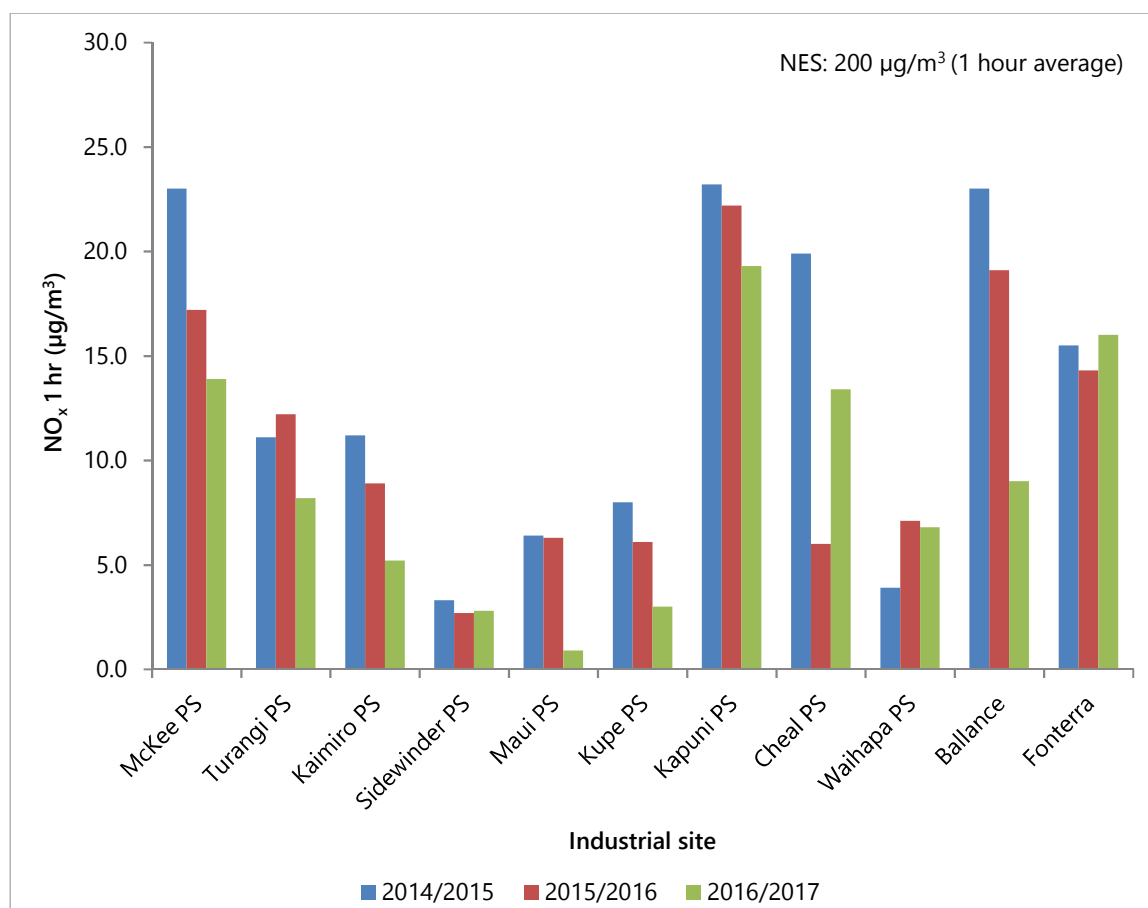


Figure 18 Average NO<sub>x</sub> levels at 11 monitored industrial sites throughout the region

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

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

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

In the 2016-2017 period there were three recorded incidents in association with the Whareroa site, none of which required follow up enforcement action.

On 29 October 2016 a complaint was received concerning an objectionable burnt milk odour on Whareroa Road in the vicinity of the Whareroa plant. An odour survey was undertaken by Council staff and no milk odour was detected beyond the boundary of the Whareroa site at the time of inspection. No further action was required.

Self-notification was received on 7 April 2017 regarding a cream spill of approximately 7,000-8,000 litres at the Whareroa plant. The cream was discharged via the ocean outfall. No breaches of consent occurred as a result of the spill (fat 400 mg/L, COD 4,075 mg/L, SS 540 mg/L). The outfall discharge was inspected by the Fonterra Environmental Manager and Council staff and was found to be visible but did not extend beyond the 200 m mixing zone. Beaches at Denby Road and Ohawe were inspected the following morning by Fonterra staff with no contamination observed. The results from analysis of the 24 h composite wastewater sample were compliant with the wastewater discharge consent limits. No further action was required.

Self-notification was received on 13 April 2017 regarding an exceedance of particulate concentration while emissions testing at Powder 3 Drier. On the 7 April 2017 a trial was undertaken where whey was dried in the Powder 3 Plant. Emission testing was carried out to monitor the effects of the trial. The results from the three drier exhaust stacks exceeded the 125 mg/m<sup>3</sup> consent limit for consent 4103, condition 7 (East Stack 193 mg/m<sup>3</sup>, West Stack 191 mg/m<sup>3</sup>, Fluid Bed Exhaust 370 mg/m<sup>3</sup>). The duration of the trial was 3.5 h during which the operating parameters of the plant were monitored continuously and the composition properties of the powder being produced were checked at regular intervals. No excessive powder depositions were observed during an inspection of the site and no complaints were received by Fonterra or the Council. Various measures were put in place to monitor and minimise emissions during the trial and the environmental effects of this incident would have been less than minor. A second trial was undertaken where cheese whey was dried in Powder 3 on 25 May 2017. The results were compliant with condition 8, consent 4103 allowing for elevated emissions during two trial periods between 18 May 2017 and 18 June 2017, however the emissions were too high to ensure ongoing compliance with condition 7, consent 4103, therefore the decision was made not to make this a routine activity at the Whareroa site. No further action was required.



## 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

The report required for consent 6274, condition 4 was received November 2014 and is next due in 2020.

This report required for consent 4103, condition 4 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 2016-2017 monitoring period. This level of compliance is consistent with that achieved during the 2015-2016 year when there were also no breaches of consent.

#### 3.2.2 Stormwater

Discharge sampling from the Tawhiti, Tangahoe and coastal stormwater ponds was undertaken on ten occasions over the 2016-2017 monitoring year. Consent limits apply to eight out of ten consecutive samples over the course of an annual monitoring period. Stormwater discharges from the Tangahoe and coastal stormwater ponds remained compliant with consent conditions during this period. There were two exceedances of the SS limit in the Tawhiti stormwater pond, however, the second exceedance was within the margin of error for the method used and therefore no further action was taken. No other stormwater contaminants exceeded consent limits during the 2016-2017 monitoring year. Whareroa's stormwater system has demonstrated a notable improvement in the past two years under review compared to the previous monitoring years where there have been multiple breaches of the consent limit for BOD, SS and pH.

Both a freshwater biomonitoring survey and a freshwater biological inspection were undertaken during the 2016-2017 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 2016-2017 season. Results of the composite monitoring by Fonterra showed that COD, fat and SS did not exceed the consent limits during the year. Composite monitoring results have shown a marked improvement from the last couple of years when there were 14 beaches of consent in 2015-2016 (12 SS, 2 fat) and 4 beaches of consent in 2014-2015 (4 SS).

Grab samples were collected by the Council on 10 occasions during the monitoring period. All of the results complied with consent limits (1450). 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.

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.

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 2016-2017 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<sub>10</sub> monitoring.

No environmental impacts were detected beyond the site boundary with visual inspections or odour surveys. Based on the milk powder deposition results, the environmental impact of milk powder deposition beyond the site boundary was negligible during the year under review.

Monitoring indicated that PM<sub>10</sub> concentrations at Fonterra Whareroa remained below the regional background concentration.

Fonterra remained compliant with consent 6273 during the 2016-2017 monitoring period. Ambient NO<sub>x</sub> concentrations at Fonterra Whareroa were comparable with those at some of Taranaki's larger hydrocarbon production stations.

On the 7 April 2017 a trial was undertaken by Fonterra where whey was dried in the Powder 3 Plant. The results from the three drier exhaust stacks exceeded the 125 mg/m<sup>3</sup> consent limit for consent 4103, condition 7. No excessive powder depositions were observed during an inspection of the site and no complaints were received by Fonterra or the Council. Various measures were put in place to monitor and minimise emissions during the trial and the environmental effects of this incident would have been less than minor. No further action was required.

### 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

<b>Purpose: To take water from Tawhiti Stream for use in manufacturing, cleaning and cooling</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High High</b>
Overall assessment of administrative performance in respect of this consent		

N/A = not applicable

Table 17 Summary of performance for Consent 1450

<b>Purpose: To discharge dairy factory wastewater into the Tasman Sea</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Discharge of lactose solids managed in accordance with application		N/A
2. Approx. 400 m3 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	Yes
6. Installation of an outfall extension	Outfall extended in 1997	Yes

<b>Purpose: To discharge dairy factory wastewater into the Tasman Sea</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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 2017	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		<b>High High</b>

N/A = not applicable

Table 18 Summary of performance for Consent 3902

<b>Purpose: To discharge stormwater into Tangahoe River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 19 Summary of performance for Consent 3907

<b>Purpose: To discharge stormwater into Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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
5. Effects on receiving waters	Site inspections, physicochemical analysis, freshwater biomonitoring surveys	Yes

<b>Purpose: To discharge stormwater into Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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	Two exceedances of SS limit, the second within the margin of error of the consent limit
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		<b>Good</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 20 Summary of performance for Consent 4103

<b>Purpose: To discharge emissions to air from the manufacture and processing of milk products</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Adopt best practicable option to prevent or minimise adverse effects	Review of contingency and management plans and air quality monitoring	Yes
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	Yes
6. Use of most appropriate process equipment and controls to minimise emissions and impacts	Report detailing emissions and technology received	Yes

<b>Purpose: To discharge emissions to air from the manufacture and processing of milk products</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
7. Powder emissions to atmosphere <125 mg/m <sup>3</sup>	Air quality monitoring	<b>No</b> Powder 3 exceeded limit during emission testing
8. Limits on depositions beyond boundary	Air quality monitoring	Yes
9. PM <sub>10</sub> not to exceed 50 µg/m <sup>3</sup>	Air quality monitoring	Yes
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		<b>Good</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 21 Summary of performance for Consent 4133

<b>Purpose: To discharge stormwater to the unnamed coastal stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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

<b>Purpose: To discharge stormwater to the unnamed coastal stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A= not applicable

Table 22 Summary of performance for Consent 4406

<b>Purpose: To discharge laboratory wastes onto and into land</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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



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

N/A = not applicable

Table 23 Summary of performance for Consent 4508

<b>Purpose: To abstract water from the Tangahoe River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 24 Summary of performance for Consent 4927

<b>Purpose: To discharge river silt and sand to the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Discharge operated on a continuous purge basis		Yes

<b>Purpose: To discharge river silt and sand to the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 25 Summary of performance for Consent 4953

<b>Purpose: To erect, place and maintain earth dams at the headwaters of an unnamed tributary of the Tangahoe River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 26 Summary of performance for Consent 4977

<b>Purpose: To erect, place and maintain a marine outfall</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 27 Summary of performance for Consent 5013

<b>Purpose: To construct and maintain a rock seawall</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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

<b>Purpose: To construct and maintain a rock seawall</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 28 Summary of performance for Consent 5015

<b>Purpose: To dam an unnamed stream between the Tangahoe River and the Waihi Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>N/A consent not in use during period under review</b>

N/A = not applicable

Table 29 Summary of performance for Consent 5016

<b>Purpose: To divert an unnamed stream between the Tangahoe River and the Waihi Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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

<b>Purpose: To divert an unnamed stream between the Tangahoe River and the Waihi Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>N/A consent not in use during period under review</b>

N/A = not applicable

Table 30 Summary of performance for Consent 5017

<b>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</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>N/A consent not in use during period under review</b>

N/A = not applicable

Table 31 Summary of performance for Consent 5036

<b>Purpose: To discharge waste material onto land</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Adoption of action likely to minimise adverse effects on the environment	Review of management plan	Yes

<b>Purpose: To discharge waste material onto land</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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 2017	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	Records of dates and volume of discharges available	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

<b>Purpose: To discharge waste material onto land</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 32 Summary of performance for Consent 5044

<b>Purpose: To discharge emissions into the air from the disposal of laboratory wastes, and stormwater and sump cleanings onto and into land</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 33 Summary of performance for Consent 5143

<b>Purpose: To erect, place, use and maintain a water intake structure in the bed of the Tangahoe River for industrial water supply purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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

<b>Purpose: To erect, place, use and maintain a water intake structure in the bed of the Tangahoe River for industrial water supply purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 34 Summary of performance for Consent 10208

<b>Purpose: To construct, place and use a water intake structure in the bed of the Tangahoe River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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



<b>Purpose: To construct, place and use a water intake structure in the bed of the Tangahoe River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 35 Summary of performance for Consent 5148

<b>Purpose: To discharge river silt and sand into the Tangahoe River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 36 Summary of performance for Consent 5337

<b>Purpose: To dam an unnamed tributary of the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. 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
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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 37 Summary of performance for Consent 5845

<b>Purpose: To remove, reconstruct, erect, place and maintain a dam structure and associated fish pass on the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 38 Summary of performance for Consent 6257

<b>Purpose: To discharge emissions to air from dual fuel boilers</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Best practicable option to prevent or minimise 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 <sup>3</sup>	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 <sup>3</sup>	Consent not yet exercised	N/A
15. Maximum ground level concentration of nitrogen dioxide not to exceed 350 mg/m <sup>3</sup>	Consent not yet exercised	N/A
16. Maximum ground level concentration of PM <sub>10</sub> not to exceed 50 mg/m <sup>3</sup>	Consent not yet exercised	N/A

<b>Purpose: To discharge emissions to air from dual fuel boilers</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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		<b>N/A Consent not yet exercised</b>

N/A = not applicable

Table 39 Summary of performance for Consent 6273

<b>Purpose: To discharge emissions into the air from 'Cogen I' and 'Cogen II' gas-fired co-generation energy generating plants</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Best practical option to minimise adverse effects on environment	Site inspections, report as required by condition 4	Yes

<b>Purpose: To discharge emissions into the air from 'Cogen I' and 'Cogen II' gas-fired co-generation energy generating plants</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
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 <sup>3</sup> (8 hour exposure) or <30 mg/m <sup>3</sup> (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 µg/m <sup>3</sup> (one-hour average) or 100 µg/m <sup>3</sup> (24-hour average)	Air quality monitoring	Yes
8. PM <sub>10</sub> not to exceed 50 µg/m <sup>3</sup> (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 <sup>th</sup> 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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 40 Summary of performance for Consent 7465

<b>Purpose: To discharge emissions into the air from the combustion of waste wood packaging</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Only untreated timber packaging to be burned	Site inspections	Yes
2. Total volume not to exceed 4m <sup>3</sup>	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		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 41 Summary of performance for Consent 9908-1

<b>Purpose: To discharge dairy liquids onto land and the associated emissions to air, in various locations throughout the Taranaki region</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Dairy liquids to be discharged limited to dairy by-products, unprocessable dairy products and surplus dairy products	Information provided by Fonterra	Yes
2. Exercise of consent in accordance with Dairy Liquids Spreading Management Plan	Information provided by Fonterra	Yes
3. Notify the Council of the intent to discharge dairy liquids to land	Email providing notification and relevant information on 30 May 2017	Yes

<b>Purpose: To discharge dairy liquids onto land and the associated emissions to air, in various locations throughout the Taranaki region</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
4. Discharge shall not result in any liquids ponding for more than 30 minutes	Inspection	Yes
5. Discharge shall not result in any liquids reaching surface water, any subsurface drainage system or any adjacent property	Inspection	Yes
6. Best practicable option to minimise environmental effects		Yes
7. No spray drift beyond the boundary of the property	Inspection	Yes
8. Sodium adsorption ratio not exceeding 15	Information provided by Fonterra	Yes
9. Nitrogen loading rate shall not exceed limits provided in consent	Information provided by Fonterra	Yes
10. Discharge shall not occur within the minimum buffer distances provided in consent	Inspection	Yes
11. No discharge within, adjacent to or directly impacting on any Statutory Acknowledgement Area	Information provided by Fonterra	Yes
12. No offensive or objectionable odour beyond property boundary	Inspection	Yes
13. Notify the Council within 48 hours of any accidental discharge		N/A
14. Maintain a complaints register		N/A
15. Notify the Council of event having significant adverse effect on water quality		N/A
16. Record of application sites	Records available	Yes
17. Farm register	Version 6 of register provided January 2015	Yes
18. Consent shall lapse 2019 if not exercised		N/A
19. Optional review of consent	Next scheduled optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High



During the year, the Company demonstrated a good level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4. Ratings are as defined in Section 1.1.4

### 3.4 Recommendations from the 2015-2016 Annual Report

In the 2015-2016 Annual Report, it was recommended:

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.

These recommendations were all implemented during the 2016-2017 period.

### 3.5 Alterations to monitoring programmes for 2017-2018

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information already made available through monitoring or other means to date;
- its relevance under the RMA;
- the Council's obligations to monitor consented activities and their effects under the RMA;
- the record of administrative and environmental performances of the consent holder; and
- reporting 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 exercising resource consents.

It is proposed that for 2017-2018 the monitoring programme remains unaltered from that of 2016-2017.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2017-2018.

A recommendation to this effect is attached to this report.

## 4 Recommendations

1. THAT in the first instance monitoring of air emissions from the Whareroa plant in the 2017-2018 year continues at the same level as in 2016-2017.
2. THAT should there be issues with environmental or administrative performance in 2017-2018, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT monitoring of water discharges (including stormwater) and abstractions for the Whareroa plant in the 2017-2018 year continues at the same level as in 2016-2017.
4. THAT freshwater and marine ecological monitoring in the 2017-2018 year continues at the same level as in 2016-2017.
5. THAT combined inspections of the Whareroa plant for monitoring of air emissions and of water abstractions and discharges in the 2017-2018 year continues at the same level as in 2016-2017.

## Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODCF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m <sup>3</sup> s <sup>-1</sup> ).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
<i>E. coli</i>	<i>Escherichia coli</i> , an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m <sup>2</sup> /day	grams/metre <sup>2</sup> /day.
g/m <sup>3</sup>	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.

L/s	Litres per second.
m <sup>2</sup>	Square metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH <sub>4</sub>	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH <sub>3</sub>	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO <sub>3</sub>	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM <sub>10</sub>	Relatively fine airborne particles (less than 10 micrometre diameter, respectively).
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	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.

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# Appendix I

## Resource consents held by Fonterra

(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

## Consent 0047-3

### 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 Limited  
20 Hakirau Street  
Motorua 4310

Decision Date: 7 December 2001

Commencement Date: 7 December 2001

**Conditions of Consent**

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

Expiry Date: 1 June 2020

Site Location: 20 Hakirau Street, New Plymouth

Legal Description: Lot 1 DP 17360 Blk IV Paritutu SD

Grid Reference (NZTM) 1690090E-5675980N

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

### Special conditions

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

pH [range]	6 - 9
Oil and grease [infrared spectroscopic technique]	15 gm <sup>-3</sup>
Suspended solids	100 gm <sup>-3</sup>

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

Consent 0671-3

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2008 and/or June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 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 424  
Hawera 4640

Decision Date: 4 February 1999

Commencement Date: 4 February 1999

**Conditions of Consent**

Consent Granted: To take up to 700 cubic metres/day of water from a bore in the Kaupokonui catchment for factory cooling water using plate heat exchangers

Expiry Date: 1 June 2017

Site Location: Manaia Road Kapuni

Legal Description: Lot 1 DP 6157 Blk XV Kaupokonui SD

Grid Reference (NZTM) 1697740E-5629660N

Catchment: Kaupokonui

*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 operate, to the satisfaction of the Chief Executive, Taranaki Regional Council, a measuring device capable of recording groundwater levels and daily and continuous rates of abstraction and shall make records available to the Chief Executive, Taranaki Regional Council.
- 2. That the consent holder shall allow the Taranaki Regional Council, its employees or agents, access to the bore at all reasonable times, for the purpose of inspecting the bore and/or taking samples of water or other material for analytical purposes.
- 3. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2005 and/or June 2011, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which either were 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 424  
Hawera 4640

Decision Date: 4 February 1999

Commencement Date: 4 February 1999

**Conditions of Consent**

Consent Granted: To discharge up to 850 cubic metres/day of cooling water from plate heat exchangers and plant cooling system into an unnamed tributary of the Motumate Stream at two different locations

Expiry Date: 1 June 2017

Site Location: Manaia Road Kapuni

Legal Description: Pt Sec 14 Blk XV Kaupokonui SD

Grid Reference (NZTM) 1697930E-5629670N

Catchment: Motumate

*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 beyond a reasonable mixing zone extending to the confluence of the unnamed tributary and the Motumate Stream, the discharges shall not give rise to all or any of the following effects in the receiving water:
  - (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 freshwater unsuitable for consumption by farm animals, and;
  - (v) any significant adverse effects on aquatic life, habitats, or ecology.
2. That the consent holder shall monitor the daily volume and temperature of the discharge, to the satisfaction of the Chief Executive, Taranaki Regional Council, and shall make such records available to the Chief Executive, Taranaki Regional Council, on a monthly basis.
3. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2005 and/or June 2011, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which either were 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**

**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: 29 June 2007 [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 and to temporarily discharge lactose solids from Fonterra Kapuni 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

## Consent 1450-2

### General conditions

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

### Special conditions

#### Conditions 1 and 2 - new

1. The discharge of lactose solids shall be managed in accordance with the documentation submitted in support of application 4679 [dated 5 June 2007]. In the case of any contradiction between the documentation submitted in support of application 4679 and the conditions of this consent, the conditions of this consent shall prevail.
2. Lactose solids from the Fonterra Kapuni site, with a volume of approximately 400 m<sup>3</sup>, may be discharged before 1 August 2007. No other discharge of lactose from the Kapuni site is authorised.

#### Conditions 3 to 16 – unchanged (previously conditions 1 to 14)

3. 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 11.
4. 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.
5. 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

## Consent 1450-2

6. 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 8, or above mean low water spring level.
7. 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.
8. 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.
9. 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
10. There shall be no direct discharge of raw or treated domestic sewage from the Whareroa site pursuant to this consent.
11. 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.
12. The consent holder shall install, to the satisfaction of the Chief Executive, Taranaki Regional Council, a system to monitor pipeline structural performance.
13. 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.

## Consent 1450-2

14. 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.
15. 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 8 or above mean low water spring level.
16. 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 29 June 2007

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](http://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.



## Consent 3902-3.0

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:

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

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](http://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.

## Consent 3907-3.0

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:

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

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  
(Change): 02 August 2017

Commencement Date  
(Change): 02 August 2017                      Granted Date: 02 August 2017

**Conditions of Consent**

Consent Granted: To discharge emissions into the air from the manufacture and processing of milk products and associated processes

Expiry Date: 01 June 2025

Review Date(s): June 2020

Site Location: Whareroa Road, Hawera

Grid Reference (NZTM) 1711450E-5614870N

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

## Consent 4103-2.2

### 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 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 18.
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.



## Consent 4103-2.2

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. Subject to condition 8, powder emissions to the atmosphere from the spray drying process cyclone exhausts shall not exceed 125 milligrams per cubic metre [mg/m<sup>3</sup>] of gas flow, adjusted to 0 degrees Celsius, 1 atmosphere pressure, and dry gas basis.
8. Powder emissions to the atmosphere from the Powder-3 cyclone exhausts shall not exceed 46 kg/hr, equivalent to an emission concentration of 400 milligrams per cubic metre [mg/m<sup>3</sup>] of gas flow, adjusted to 0 degrees Celsius, 1 atmosphere pressure, and dry gas basis during whey powder drying trials of no longer than eight hours each, to be carried out between 22 July 2017 and 21 July 2018. In addition, the Powder-5 facility shall not be operating during the trial periods.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 24 hours prior to undertaking the trials authorised by condition 8. Notification shall include the date and time of the proposed discharge, and shall be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
10. The consent holder shall monitor powder emissions to the atmosphere from the Powder-3 cyclone exhausts during the trials authorised by condition 8. The results of the monitoring shall be provided to the Chief Executive, Taranaki Regional Council within two [2] months of trial completion.
11. 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<sup>2</sup>/day]; and/or
  - b) a suspended milk powder level of 1 milligram per cubic metre [mg/m<sup>3</sup>].
12. The consent holder shall control all emissions of fine particulates [PM10] to the atmosphere from the site, in order that 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 [µg/m<sup>3</sup>] [twenty-four hour average], at or beyond the boundary of the site.
13. 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.
14. 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.

## Consent 4103-2.2

15. 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.
16. 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.
17. 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.
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 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.

Signed at Stratford on 02 August 2017

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 (Change):	12 January 2016	
Commencement Date (Change):	12 January 2016	(Granted Date: 14 February 2014)

**Conditions of Consent**

Consent Granted:	To discharge stormwater, backwash and treated process water from the Whareroa milk processing site and the Water Treatment Plant into Unnamed Stream 18	
Expiry Date:	1 June 2028	
Review Date(s):	June 2016, June 2022	
Site Location:	89 Whareroa Road, Hawera	
Legal Description:	Lot 2 DP 2777 Blk X Hawera SD (Discharge source) Lot 1 DP 18056 Blk X Hawera SD (Discharge site)	
Grid Reference (NZTM)	1711420E-5614456N	
Catchment:	Tangahoe	
Tributary:	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 storm water, backwash and treated process water discharged shall be from a catchment area not exceeding 22 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 Western 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](http://www.trc.govt.nz).
5. Prior to commissioning the Water Treatment Plant, the consent holder shall update and maintain the stormwater management plan required under condition 4 that documents how the site is to be managed to minimise the additional contaminants that became entrained in the stormwater. This plan shall be followed at all time, shall be certified by the Chief Executive, Taranaki Regional Council, and shall include but not necessarily be limited to cleaning procedures for the site catchments discharging to the Pond.
6. 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.

## Consent 4133-3.1

7. There shall be no visible bacterial and/or fungal growths downstream of the discharge.
8. 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:

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

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.

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

Signed at Stratford on 12 January 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 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<sup>3</sup>/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.



## Consent 4406-2

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**



**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

## Consent 4927-1

### 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  $30 \text{ gm}^{-3}$ , 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**

**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

## Consent 4977-1

### 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

## Consent 5013-1

### 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**



**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.

## Consent 5036-2

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.

## Consent 5036-2

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.

## Consent 5044-2

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**





**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 [ $\text{mg}/\text{m}^3$ ] [eight-hour average exposure], or 30 milligrams per cubic metre [ $\text{mg}/\text{m}^3$ ] [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 [ $\text{g}/\text{s}$ ].
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 [ $\mu\text{g}/\text{m}^3$ ] [one-hour average], or 100 micrograms per cubic metre [ $\mu\text{g}/\text{m}^3$ ] [twenty-four hour average], at or beyond the boundary of the site.
8. The consent holder shall control all emissions of fine particulates [ $\text{PM}_{10}$ ] to the atmosphere from the site, in order that the maximum ground level concentration of fine particulates [ $\text{PM}_{10}$ ] arising from the exercise of this consent measured under ambient conditions does not exceed 50 micrograms per cubic metre [ $\mu\text{g}/\text{m}^3$ ] [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<sup>th</sup> 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.

## Consent 6273-1

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 424  
Hawera 4640

Decision Date: 13 July 2004

Commencement Date: 13 July 2004

**Conditions of Consent**

Consent Granted: To discharge stormwater from an inhalation grade lactose plant site into the Kaipokonui Stream

Expiry Date: 1 June 2017

Site Location: Manaia Road, Kapuni

Legal Description: Lot 1 DP 4509 Sec 1 SO 11967 Blk XV Kaipokonui SD

Grid Reference (NZTM) 1697810E-5629840N

Catchment: Kaipokonui

*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. Prior to the exercise of this consent, the consent holder shall prepare a contingency plan to be approved by the Chief Executive, Taranaki Regional Council, outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
2. The exercise of this consent shall be conducted in general accordance with the information submitted in support of application 3198, and to ensure that the conditions of this consent are met at all times. In the case of any contradiction between the documentation submitted in support of application 3198 and the conditions of this consent, the conditions of this consent shall prevail.
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 of the discharge on any water body.
4. The following concentrations shall not be exceeded in the discharge:

<b>Component</b>	<b>Concentration</b>
pH (range)	6.5 - 8.5
suspended solids	100 gm <sup>-3</sup>
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm <sup>-3</sup>

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

## Consent 6423-1

5. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the Kaupokonui Stream:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) the rendering of fresh water unsuitable for consumption by farm animals;
  - e) any significant adverse effects on aquatic life.
6. This consent shall lapse on the expiry of five years after the date of issue of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2005 and/or June 2011, 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: 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.

Consent 7465-1

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**



**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: 25 July 2013

Commencement Date: 25 July 2013

**Conditions of Consent**

Consent Granted: To discharge contaminants (dust) to air from earthworks associated with construction activities

Expiry Date: 1 June 2018

Site Location: 84 Whareroa Road, Hawera

Legal Description: Lot 1 DP 19882 (Discharge source & site)

Grid Reference (NZTM) 1711183E-5615361N

*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 prepare a dust control management plan that details the methodology that will be used to ensure that discharges to air comply with the conditions of this consent, in particular special conditions 3, 6 and 7. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, at least 10 working days prior to earthworks commencing.
2. The consent holder shall at all times adhere to the dust control management plan, approved under condition 1 of this consent
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.
4. The area of soil exposed on the site at any time shall not exceed 15.15 ha.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
6. The dust deposition rate beyond the property boundary arising from the discharge shall be less than 4.0 g/m<sup>2</sup>/30 days or 0.13 g/m<sup>2</sup>/day.
7. Any discharge to air from the site shall not give rise to any offensive, objectionable, noxious or toxic levels of dust at or beyond the boundary of the property, and in any case, suspended particulate matter shall not exceed 3 mg/m<sup>3</sup> (measured under ambient conditions) beyond the boundary of the site.
8. The consent holder shall maintain a permanent record of any complaints received alleging adverse effects from or related to the exercise of this consent. This record shall include the following, where practicable:
  - a) the name and address of the complainant, if supplied;
  - b) date, time and details of the alleged event;
  - c) weather conditions at the time of the alleged event (as far as practicable);
  - d) investigations undertaken by the permit holder in regards to the complaint and any measures adopted to remedy the effects of the incident/complaint; and
  - e) measures put in place to prevent occurrence of a similar incident.

Consent 9620-1

9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, or his delegate, of any complaints received, which relate to the exercise of this permit, within 24 hours of being received. At the grant date of this consent, the Council's phone number is 0800 736 222 (24 hr service).
10. The consent holder shall make the complaints record available to officers of Taranaki Regional Council, on request.

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: 25 July 2013

Commencement Date: 25 July 2013

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment from earthworks onto and into land in circumstances where it may enter water

Expiry Date: 1 June 2018

Site Location: 84 Whareroa Road, Hawera

Legal Description: Lot 1 DP 19882 (Discharge source & site)

Grid Reference (NZTM) 1711183E-5615361N

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. This consent authorises the discharge of stormwater from (no more than 15.15 hectares of land where earthworks is being undertaken for the purpose of constructing the expansion of the Whareroa Distribution Centre at the Fonterra facility, as shown in the drawings provided with the application for this consent.
2. 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](mailto:worknotification@trc.govt.nz).
3. All run off from any area of exposed soil shall pass through settlement ponds or sediment traps with a minimum total capacity of:
  - a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and
  - b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.
4. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after completion of soil disturbance activities.
5. The obligation described in condition 3 above 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 3 and 5 '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.*

Consent 9621-1

6. 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.

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: 03 June 2014

Commencement Date: 03 June 2014

**Conditions of Consent**

Consent Granted: To discharge dairy liquids onto land and the associated emissions to air, in various locations throughout the Taranaki region

Expiry Date: 01 June 2034

Review Date(s): June 2017, June 2020, June 2023,  
June 2026, June 2029, June 2032

Site Location: Various locations throughout the Taranaki region

Legal Description: Various locations throughout the Taranaki region

Grid Reference (NZTM) Various locations throughout the Taranaki region

Catchment: Various locations throughout the Taranaki region

*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 dairy liquids to be discharged shall be limited to the following:
  - (a) *Dairy by-products*, which typically include, but are not limited to biomass or biosolids (drawn off from biological treatment plants); unused intermediate product of residue streams (such as stockfood and whey) and dissolved air flotation (DAF) sludge (fat and protein skimmed off liquid streams);
  - (b) *Unprocessable dairy products*, which typically include, but are not limited to silo and tank sediments; raw milk not accepted at the manufacturing site and other dairy products either contaminated or unfit for further processing; and
  - (c) *Surplus dairy products*, such as raw milk, permeate (PM18 and PM30) and buttermilk (including secondary skim and beta serum) that the consent holder is unable to process.
2. The exercise of this consent shall be in accordance with a Dairy Liquids Spreading Management Plan (DLSMP), prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The DLSMP shall detail how the discharge activity will be managed to achieve compliance with the conditions of this consent and shall include, but not limited to, the following:
  - (a) storage of dairy liquids;
  - (b) designated application areas and buffer zones for streams and property boundaries;
  - (c) selection of appropriate irrigation methods for different types of terrain;
  - (d) application rate and duration;
  - (e) application frequency and nitrogen loading rate;
  - (f) farm management and operator training;
  - (g) soil and herbage management;
  - (h) prevention of runoff and ponding;
  - (i) minimisation and control of odour and spray drift effects off site;
  - (j) operational control and maintenance of the spray irrigation system;
  - (k) monitoring of the effluent (physicochemical);
  - (l) recording of application sites, discharge volumes, rates, frequency, duration, dates and equipment operator details;
  - (m) remediation measures;
  - (n) mitigation measures including screening of any storage facilities and riparian planting;
  - (o) reporting monitoring data;
  - (p) procedures for responding to complaints; and
  - (q) notification to the Taranaki Regional Council of non-compliance with conditions of this consent.

## Consent 9908-1.0

3. Before July 15 each year, the consent holder shall notify the Taranaki Regional Council, by sending an email to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz) of the intent to discharge dairy liquids to land, including details of the locations and Farm IDs onto which the discharges will occur (as shown in the register). If dairy liquids are subsequently intended to be discharged onto any other land in that season, the consent holder shall notify the Taranaki Regional Council of that intention at least 2 working days in advance of such discharge occurring.
4. The discharge shall not result in any liquids ponding for more than 30 minutes.
5. The discharge shall not result in any liquids reaching surface water, any subsurface drainage system or any adjacent property.
6. 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.
7. There shall be no spray drift as a result of the irrigation of dairy liquids at or beyond the boundary of the property or properties on which spray irrigation is occurring.
8. The dairy liquids for discharge shall not have a sodium adsorption ratio (SAR) exceeding 15.
9. The nitrogen loading rate on land irrigated with dairy liquids, as a consequence of:
  - (a) the exercise of this consent; and/or
  - (b) the disposal of dairy farm effluent; and/or
  - (c) the disposal of any other waste or fertilizer;shall not exceed a combined total of:
  - (d) 200 kilograms of nitrogen per hectare per year on land used for grazing; or
  - (e) 300 kilograms of nitrogen per hectare per year where a crop such as maize, silage or hay is harvested from the land in the same season that dairy liquids are applied.
10. The discharge shall not occur within the following minimum buffer distances:
  - (a) 25 metres from the banks of any watercourse;
  - (b) 20 metres from any public road;
  - (c) 20 metres from any property boundary, unless the written approval of the adjoining occupier has been obtained to allow the discharge at a lesser distance;
  - (d) 50 metres from any bore, well or spring used for water supply purposes;
  - (e) 150 metres from any dwelling house or place of public assembly unless the written approval of the occupier has been obtained to allow the discharge at a lesser distance; and
  - (f) 300 metres from any school property.
11. There shall be no discharge within, adjacent to or directly impacting on any Statutory Acknowledgment Area.

## Consent 9908-1.0

12. There shall be no offensive or objectionable odour at or beyond the boundary of the property or properties on which a discharge occurs.
13. The consent holder shall notify the Taranaki Regional Council as soon as practicable and, as a minimum, within 48 hours, of any accidental discharge, equipment breakdown or other event which is likely to result in a breach of the conditions of this consent.
14. The consent holder shall maintain a complaints register for all aspects of the dairy liquids application activity. The register shall detail the date, time and type of complaint, cause of the complaint and action taken by the consent holder in response to the complaint. The register shall be available to the Taranaki Regional Council at all reasonable times. The consent holder shall forward a copy of each complaint received regarding odour, runoff or spray drift to the Taranaki Regional Council as soon as practicable but in any event within 48 hours of the complaint being made.
15. If, as a consequence of the activities authorised by these consents, an event occurs that may have a significant adverse effect on water quality at any registered drinking-water supply abstraction point, the consent holder shall, as soon as reasonably practicable, telephone the Taranaki Regional Council and the water supply operator and notify them of the event.
16. The consent holder shall keep a record of the application sites for the discharge of dairy liquids, including , but not limited to the following information:
  - (a) Type/characteristics of dairy liquids discharged;
  - (b) Date of discharge;
  - (c) Time/ duration of discharge;
  - (d) Volume and rate of discharge;
  - (e) Method of discharge;
  - (f) Name of equipment operator; and
  - (g) Location of the nearest watercourse, bore, property boundary; dwelling house; school, community halls, marae, and public road.

This record shall be kept and made available to the Chief Executive, Taranaki Regional Council, on request.

17. The following details of all farms used for dairy liquids spreading shall be recorded in a Farm Register, which shall be submitted to the Taranaki Regional Council:
  - (a) Name of the farm/property;
  - (b) Owner of the property;
  - (c) Physical address, Legal description and NZTopo50 map reference;
  - (d) Area available for irrigation (ha);
  - (e) General soil type, if known;
  - (f) Distance to any sensitive neighbours if closer than 300 metres from the farm, e.g. schools, community halls, marae.

Any new farms that become available for dairy liquids spreading shall be added the Farm Register, and the updated Register shall be provided to the Taranaki Regional Council.



## Consent 9908-1.0

18. This consent shall lapse on 30 June 2019, unless the consent is given effect to before the end of that period, of the Taranaki Regional Council fixes a longer period pursuant to Section 125(1)(b) of the Resource Management Plan 1991.
19. 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 2017 and/or June 2020, and/or June 2023, and/or June 2026, and/or June 2029, and/or June 2032 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 03 June 2014

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: 03 June 2014

Commencement Date: 03 June 2014

**Conditions of Consent**

Consent Granted: To discharge emissions to air after treatment with a biofilter from the storage of dairy liquids in a pond

Expiry Date: 01 June 2034

Review Date(s): June 2017, June 2020, June 2023,  
June 2026, June 2029, June 2032

Site Location: Rifle Range Road, Hawera

Legal Description: Pt Lot 13 DP 2625 Blks IX & X Hawera SD  
(Discharge source & site)

Grid Reference (NZTM) 1711450E-5613270N

*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 exercise of this consent shall be in accordance with an Odour Management Plan (OMP), prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The OMP shall detail the methods adopted by the consent holder to ensure compliance with the conditions of this consent and address mitigation measures for odour control.
2. At all times 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 air from the site.
3. There shall be no offensive or objectionable odour at or beyond the boundary of the property or properties on which a discharge occurs.
4. The consent holder shall notify the Taranaki Regional Council as soon as practicable and, as a minimum, within 48 hours, of any accidental discharge, equipment breakdown or other contingency which is likely to result in a breach of the conditions of this consent.
5. The consent holder shall maintain a complaints register for all aspects of the storage of dairy liquids activity. The register shall detail the date, time and type of complaint, cause of the complaint, and action taken by the consent holder in response to the complaint. The register shall be available to the Taranaki Regional Council at all reasonable times. The consent holder shall forward a copy of each complaint received regarding odour to the Taranaki Regional Council as soon as practicable but in any event within 48 hours of the complaint being made.
6. This consent shall lapse on 30 June 2019, unless the consent is given effect to before the end of that period, of the Taranaki Regional Council fixes a longer period pursuant to Section 125(1)(b) of the Resource Management Act 1991.

## Consent 9909-1.0

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2017 and/or June 2020, and/or June 2023, and/or June 2026, and/or June 2029, and/or June 2032 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 03 June 2014

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: 03 June 2014

Commencement Date: 03 June 2014

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment from earthworks associated with the construction of a storage pond, into land in circumstances where it may enter Unnamed Stream 17

Expiry Date: 01 June 2019

Site Location: Rifle Range Road, Hawera

Legal Description: Pt Lot 13 DP 2625 Blks IX & X Hawera SD  
(Discharge source & site)

Grid Reference (NZTM) 1711450E-5613270N

Catchment: Unnamed catchment 17

*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. This consent authorises the discharge of stormwater from soil disturbance involving no more than 12,000 m<sup>3</sup>, over no more than 0.3 hectares of land.
2. 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.
3. 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](mailto:worknotification@trc.govt.nz).
4. All run off from any area of exposed soil shall pass through settlement ponds or sediment traps with a minimum total capacity of:
  - a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and
  - b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.
5. 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 2 and 4.
6. The sediment control measures necessary to comply with condition 4 above 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.

*Note: For the purpose of conditions 6 and 7, '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.*



Consent 9935-1.0

7. 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.

Signed at Stratford on 03 June 2014

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 85  
Reporoa 3060

Decision Date: 31 March 2015

Commencement Date: 31 March 2015

**Conditions of Consent**

Consent Granted: To discharge effluent from a farm dairy onto and into land

Expiry Date: 1 December 2040

Review Date(s): June 2016, June 2022, June 2028, June 2034 and in accordance with special condition 20

Site Location: 42 Whareroa Road, Hawera

Legal Description: Pt Lot 1 DP 2777 Pt Lot 3 DP 3371 Lot 1 DP 11955 Lot 3 Pt Lot 2 DP 15204 Blk X Hawera SD

Grid Reference (NZTM) 1712465E-5614732N

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

### Activity definition

1. For the purposes of this consent:
  - a) Farm dairy includes every area of the dairy cow milking process and includes covered and uncovered areas where cows reside for longer than five minutes for the purpose of milking (including a stand-off pad or yard) but does not include raceways;
  - b) Unless otherwise specified, 'effluent' includes its liquid, slurry and solid forms. It also includes sand trap cleanings.
2. The effluent discharged shall be from the milking of no more than 330 cows.
3. The consent holder shall advise the Taranaki Regional Council by sending an email to [consents@trc.govt.nz](mailto:consents@trc.govt.nz) if the number of cows to be milked exceeds the number authorised in condition 2. The email shall include the consent number or dairy supply number.

*Note: The effects of the treated wastewater discharge were assessed based on the consent holder milking a maximum of 330 cows each day. If the number of milking cows increases beyond that number the adequacy of the existing effluent disposal system will be reassessed.*

4. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects of the discharge on the environment.
5. The effluent disposal system shall include a storage facility that can contain a volume of effluent that the Chief Executive, Taranaki Regional Council has certified as being adequate to manage the discharge and achieve compliance with the conditions of this consent.

*Note. The Chief Executive, Taranaki Regional Council will accept as adequate a storage volume determined by using the 'Dairy Effluent Storage Calculator' developed by Massey University and Horizons Regional Council, or a similar method generally accepted by the industry.*

6. A sand trap system shall be installed, maintained and operated at the farm dairy.

*Note. Farm dairy includes any stand-off pad or yard (see condition 1(a)).*

7. There shall be no overflow of effluent from any part of the effluent disposal system.
8. The consent holder shall ensure that at all times, while complying with the other requirements of this consent, there is sufficient storage available in the effluent disposal system for any reasonably likely inflow so that there is no overflow of effluent.

## Consent 10101-1.0

9. The effluent disposal system shall be operated and maintained to ensure compliance with the conditions of this consent. Operation and maintenance includes, but is not limited to:

- (a) vegetation control on and around the storage facility;
- (b) cleaning, repairing and generally ensuring the integrity of the:
  - (i) irrigator;
  - (ii) stormwater diversion;
  - (iii) sand trap;
  - (iv) piping;
  - (v) pumps(s); and
  - (vi) fences.

*Advice Note: For guidance on maintaining the treatment system refer to the Council publications "Design, Construction and Maintenance Guidelines for the oxidation pond treatment of farm dairy and feedpad wastes" and "Design, Construction and Maintenance Guidelines for spray irrigation of farm dairy wastes".*

10. The consent holder shall ensure that over any June to May period, liquid effluent is discharged as evenly as is practically achievable over an area no less than the minimum area required for the number of cows being milked shown in the table below. Any non-liquid effluent shall be discharged to a separate area.

Number of cows milked	Minimum area required (ha)	Number of cows milked	Minimum area required (ha)
100	3.0	325	9.75
125	3.75	350	10.50
150	4.50	375	11.25
175	5.25	400	12.0
200	6.0	425	12.75
215	6.45	450	13.50
250	7.50	475	14.25
275	8.25	500	15.0
300	9.0	525	15.75

11. Over any 12 month period the Total Nitrogen applied to any hectare of land as a result of the discharge shall be no more than 200 kg.

*Advice Note: Any Nitrogen applied within effluent should be taken into account in the nutrient budget for that land.*

12. The depth of liquid effluent discharged to land in any single discharge event shall not exceed the maximum application shown in the table below for the soil type that corresponds with soil in the area that the effluent is applied.

Soil Type	Maximum Application
Sand	15 mm
Sandy loam	24 mm
Silt loam	24 mm
Clay loam	18 mm
Clay	18 mm
Peat	20 mm

## Consent 10101-1.0

13. The discharge shall not result in any effluent reaching surface water, any subsurface drainage system or any adjacent property.
14. Discharges to land shall not result in effluent ponding on the surface that remains for more than 30 minutes.
15. No contaminants shall be discharged within:
  - (a) 25 metres of any surface water body; or
  - (b) 25 metres of any fenced urupa (burial ground) without the written approval of the relevant Iwi; or
  - (c) 50 metres of any bore, well or spring used for water supply purposes; or
  - (d) any marae, unless the written approval of the occupier has been obtained to allow the discharge at a closer distance.
16. When requested to do so by the Taranaki Regional Council the consent holder shall measure the depth of application and/or the rate of application at representative locations over the full extent of the irrigation area. This information shall be provided to the Taranaki Regional Council upon request.
17. The consent holder shall keep accurate records of effluent discharged to land including, but not necessarily limited to the:
  - (a) effluent type (e.g. liquid, slurry, solid);
  - (b) source of any solid effluent (e.g. anaerobic pond sludge, sand trap);
  - (c) paddock and area (ha) that effluent was applied to; and
  - (d) date the paddock received effluent irrigation.

This information shall be provided to the Taranaki Regional Council upon request.

18. Where, for any cause (accidental or otherwise), effluent enters surface water or a subsurface drainage system, the consent holder shall:
  - (a) immediately notify the Taranaki Regional Council on Ph 0800 736 222 (notification must include either the consent number or farm dairy number); and
  - (b) stop the discharge and immediately take steps to control and stop the escape of untreated or partially treated effluent to surface water; and
  - (c) immediately take steps to ensure that a recurrence of the escape of untreated or partially treated effluent to surface water is prevented; and
  - (d) report in writing to the Chief Executive, Taranaki Regional Council, describing the manner and cause of the escape and the steps taken to control it and to prevent it reoccurring. The report shall be provided to the Chief Executive within seven (7) days of the occurrence.

**Review of consent conditions**

19. 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 and/or June 2028 and/or June 2034, 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.
  
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 within a period of 12-months immediately following a Regional Plan, that includes rules relating to discharges of farm dairy effluent, becoming operative. Any such review would be for the purposes of ensuring that the consent conditions have appropriate regard to that plan.

Signed at Stratford on 31 March 2015

For and on behalf of  
Taranaki Regional Council

---

B G Chamberlain  
**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: 23 July 2015

Commencement Date: 23 July 2015

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment from earthworks associated with the construction of a water treatment plant onto and into land

Expiry Date: 1 June 2020

Site Location: 84 Whareroa Road, Hawera

Legal Description: Lot 2 DP 2777 Blk X Hawera SD (Discharge source & site)

Grid Reference (NZTM) 1711669E-5614533N

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. This consent authorises the discharge of stormwater from no more than 1 hectare of land where earthworks are being undertaken for the purpose of constructing a water treatment plant, in accordance with the details provided with the application for this consent, and the subsequent information received on 7 July 2015.
2. 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](mailto:worknotification@trc.govt.nz).
3. All run off from any area of exposed soil shall pass through settlement ponds or sediment traps with a minimum total capacity of:
  - a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and
  - b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.
4. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after completion of soil disturbance activities.
5. The obligation described in condition 4 above 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 4 and 5 '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.*

Consent 10140-1.0

6. 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.

Signed at Stratford on 23 July 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.*

## Consent 10208-1.0

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](mailto: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.

## Consent 10208-1.0

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**



**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: 26 July 2017

Commencement Date: 26 July 2017

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment arising from earthworks associated with the construction of the southern stormwater containment pond onto land

Expiry Date: 1 June 2019

Site Location: Manawapou Road, Whareroa

Grid Reference (NZTM) 1711735E-5614762N

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. This consent authorises the discharge of stormwater from no more than .5 hectares of land where earthworks is being undertaken for the purpose of constructing a stormwater containment pond as shown in drawing number 15580-P1.02 provided with the application for this consent.
2. 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](mailto:worknotification@trc.govt.nz).
3. The site shall be managed and any stormwater treated in general accordance with the Soil Erosion and Sediment Control Plan provided with the application and attached.
4. 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 for the consent holder to detail the measures proposed to ensure compliance with the conditions of this consent.
5. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after completion of soil disturbance activities.
6. Any discharge from the site that reaches water shall have a suspended solids concentration no greater than 100 gm<sup>-3</sup>.
7. The obligation described in condition 3 above 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 7 '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.*

Consent 10434-1.1

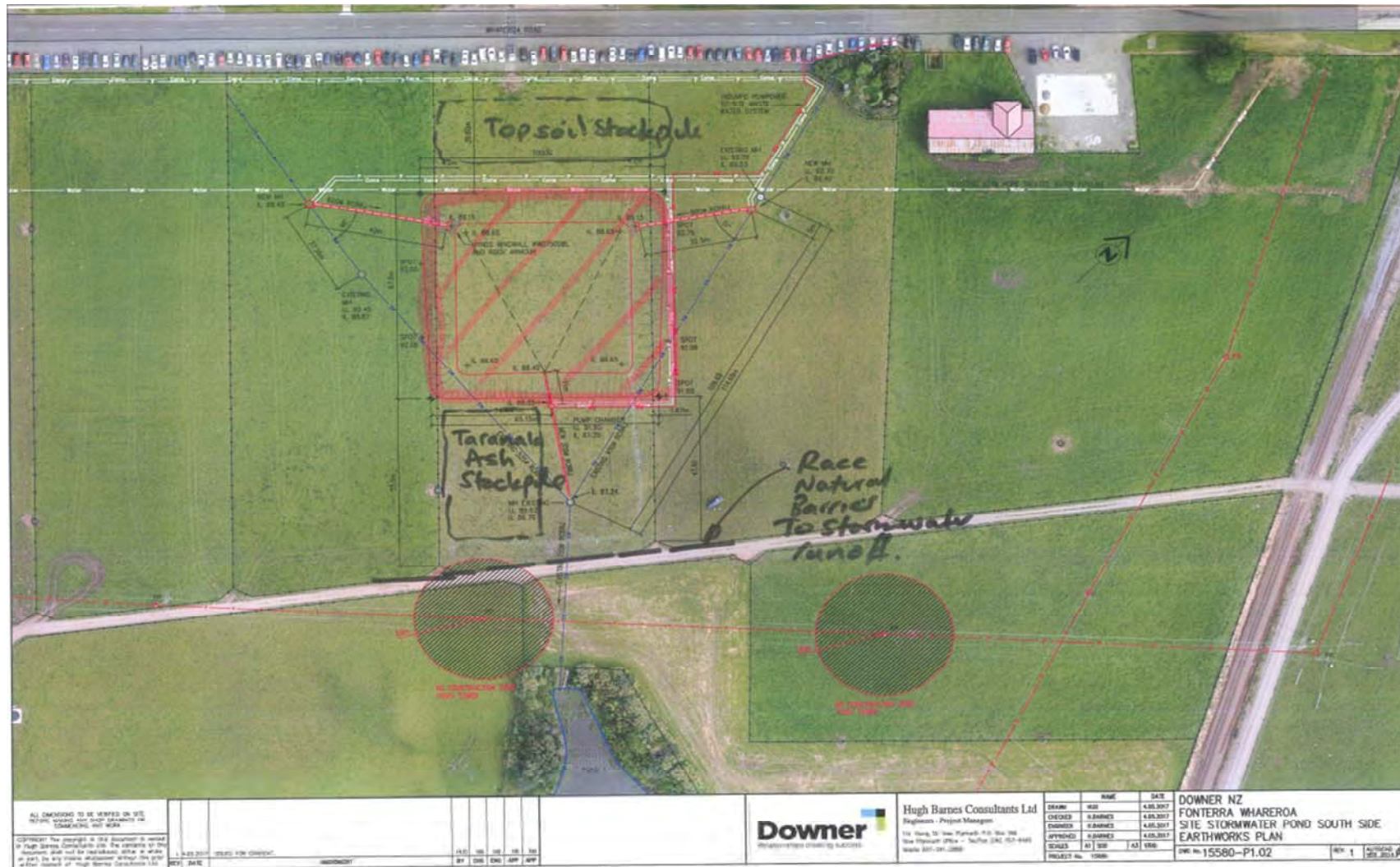
8. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

Signed at Stratford on 26 July 2017

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**



ALL DIMENSIONS TO BE VERIFIED ON SITE.  
 WITHIN TOLERANCE AND UNDER STANDBY AS  
 INDICATED ON THIS PLAN.

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DATE	BY	CHK	APP	APP
1-22-2017	DM	DM	DM	DM



**High Barnes Consultants Ltd**  
 Engineers - Project Managers  
 111 Rangitapu Street, Whareroa, Tairāhema  
 Phone: 07-357-2200

NAME	DATE
DRAWN: DM	4.28.2017
CHECKED: JBARNES	4.28.2017
DESIGNED: JBARNES	4.28.2017
APPROVED: JBARNES	4.28.2017
SCALE: A3 / A2	A3 / A2
PROJECT NO: 15580	

**DOWNER NZ**  
**FONTERRA WHAREROA**  
**SITE STORMWATER POND SOUTH SIDE**  
**EARTHWORKS PLAN**  
 DWG No: 15580-P1.02



Existing Stormwater Ponds 1&2

Silt fence around perimeter of Wetland.

Silt trap constructed with high level outlet from Silt trench.

Silt containment trenches constructed as first line of defence to the bulk fill area.

(1) Topsoil will be Stripped off the bulk fill area and stockpiled for later reuse.

(2)

Southern Pond Bulk fill area  
15580 - SK03

*[Signature]* 11/07/17



**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: 26 July 2017

Commencement Date: 26 July 2017

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment arising from earthworks associated with the construction of the western stormwater containment pond onto land

Expiry Date: 1 June 2019

Site Location: Manawapou Road, Whareroa

Grid Reference (NZTM) 1711442E-5614525N

Catchment: Unnamed catchment 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. This consent authorises the discharge of stormwater from no more than .5 hectares of land where earthworks is being undertaken for the purpose of constructing a stormwater containment pond as shown in drawing number 15580-P1.01 provided with the application for this consent.
2. 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](mailto:worknotification@trc.govt.nz).
3. The site shall be managed and any stormwater treated in general accordance with the Soil Erosion and Sediment Control Plan provided with the application and attached.
4. 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 for the consent holder to detail the measures proposed to ensure compliance with the conditions of this consent.
5. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after completion of soil disturbance activities.
6. Any discharge from the site that reaches water shall have a suspended solids concentration no greater than 100 gm<sup>-3</sup>.
7. The obligation described in condition 3 above 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 7 '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.*



Consent 10445-1.0

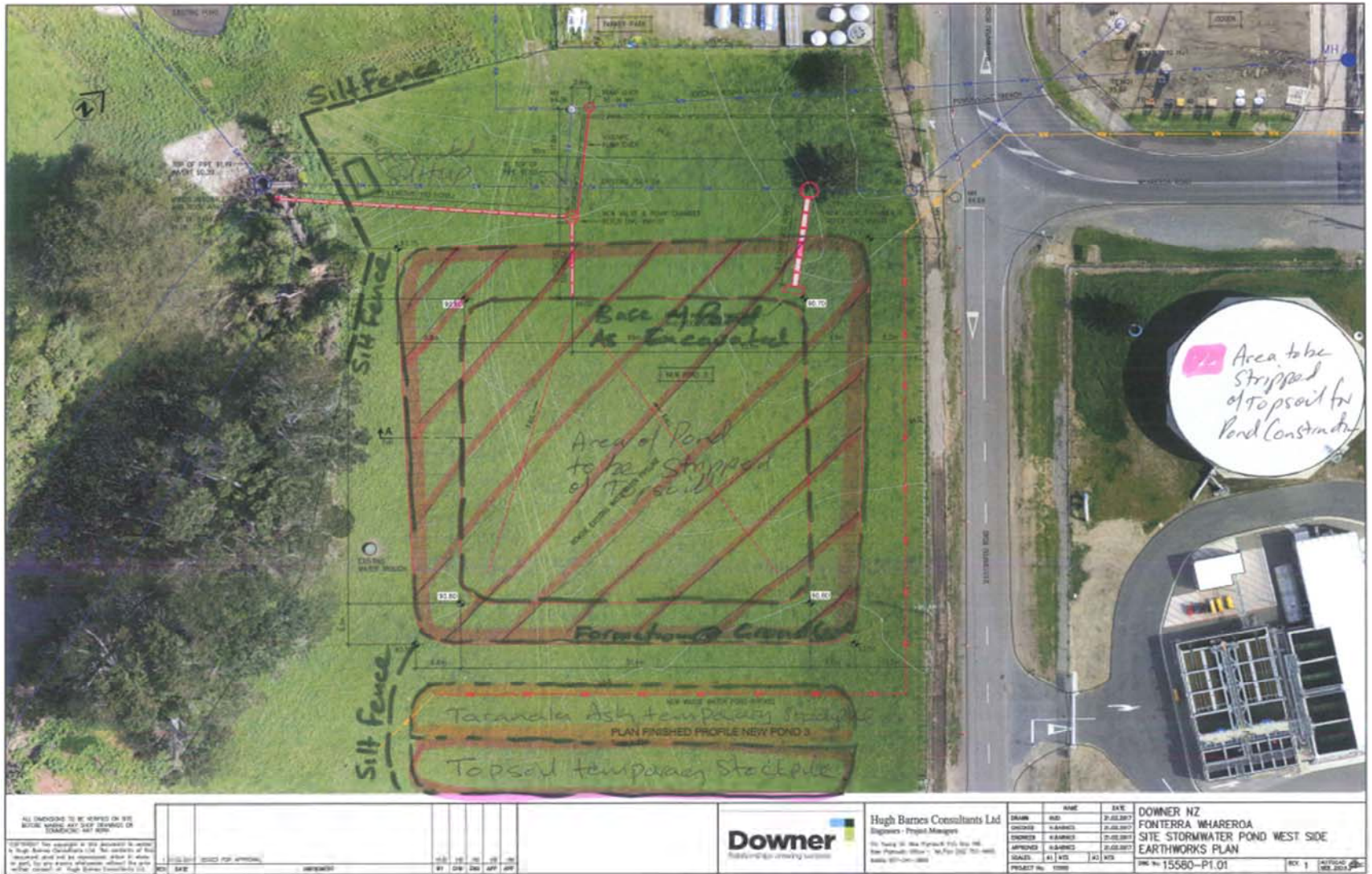
8. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

Signed at Stratford on 26 July 2017

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**



ALL IMPROVING TO BE SHOWN ON THIS  
 MUST HAVE ANY SURVEYING OR  
 TOPOGRAPHIC MAP WORK

NO.	DATE	REVISION
1	2017-08-01	ISSUED FOR APPROVAL

NO.	DATE	REVISION
1	2017-08-01	ISSUED FOR APPROVAL

NO.	DATE	REVISION
1	2017-08-01	ISSUED FOR APPROVAL



**Hugh Barnes Consultants Ltd**  
 Engineers - Project Managers  
 100 Taranaki St, New Plymouth, Taranaki, New Zealand  
 Phone: 0609 551 1000

NAME	DATE
DESIGNED	20.08.2017
CHECKED	20.08.2017
ENGINEER	20.08.2017
APPROVED	20.08.2017
ISSUED	20.08.2017

**OWNER NZ**  
**FONTERRA WHAREROA**  
**SITE STORMWATER POND WEST SIDE**  
**EARTHWORKS PLAN**  
 DRAWING No: 15550-P1.01

REV	DATE	DESCRIPTION
1	2017-08-01	ISSUED FOR APPROVAL

**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: 26 July 2017

Commencement Date: 26 July 2017

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment arising from earthworks associated with the construction of the eastern stormwater containment pond onto land

Expiry Date: 1 June 2019

Site Location: Whareroa Road, Whareroa

Grid Reference (NZTM) 1711761E-5615318N

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. This consent authorises the discharge of stormwater from no more than .5 hectares of land where earthworks is being undertaken for the purpose of constructing a stormwater containment pond as shown in drawing number 15580-P1.03 provided with the application for this consent.
2. 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](mailto:worknotification@trc.govt.nz).
3. The site shall be managed and any stormwater treated in general accordance with the Soil Erosion and Sediment Control Plan provided with the application and attached.
4. 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 for the consent holder to detail the measures proposed to ensure compliance with the conditions of this consent.
5. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after completion of soil disturbance activities.
6. Any discharge from the site that reaches water shall have a suspended solids concentration no greater than 100 gm<sup>-3</sup>.
7. The obligation described in condition 3 above 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 7 '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.*

Consent 10446-1.0

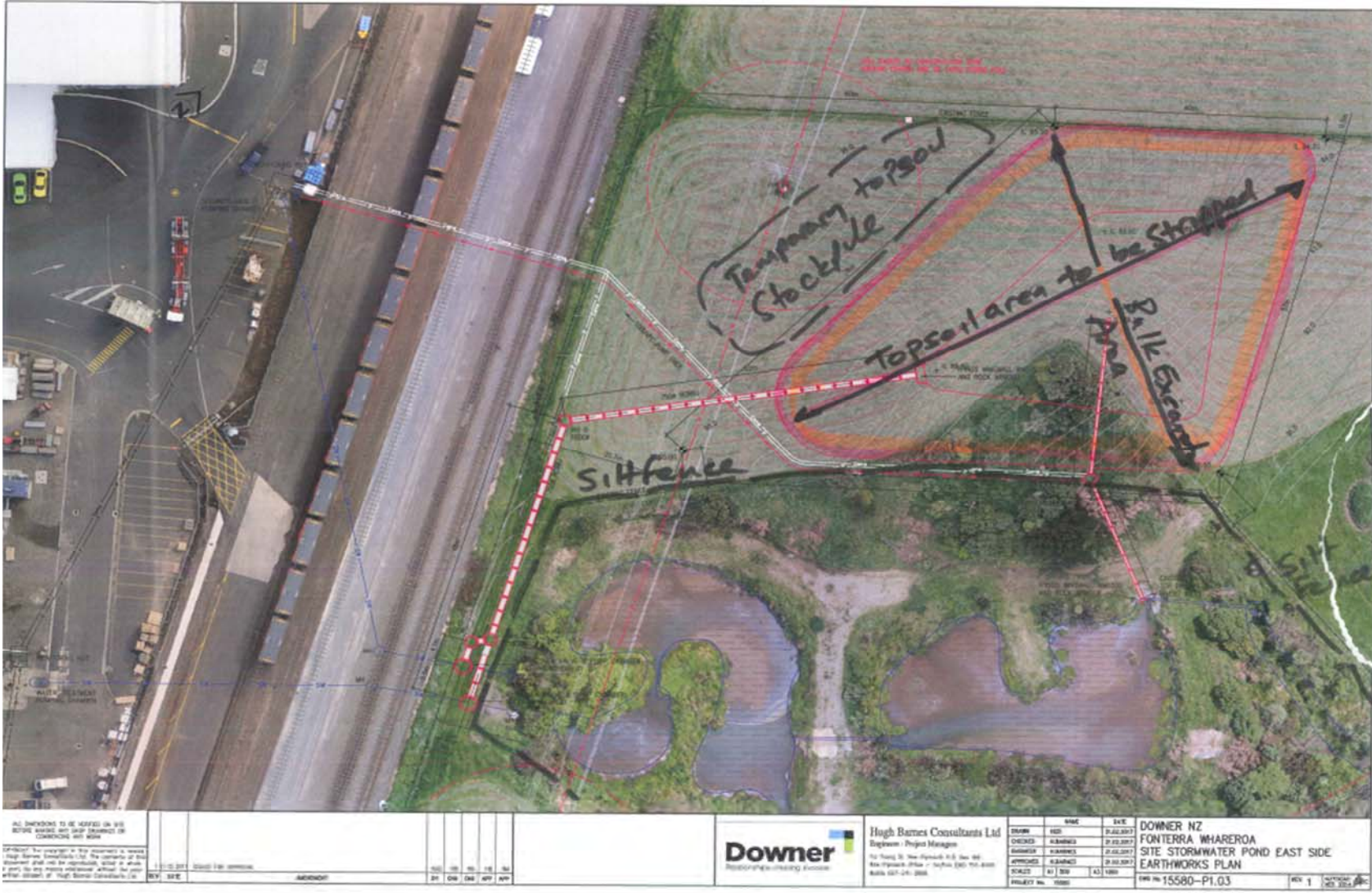
8. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

Signed at Stratford on 26 July 2017

For and on behalf of  
Taranaki Regional Council

---

A D McLay  
**Director - Resource Management**









## Appendix II

### Biomonitoring report



**To** Scientific Officer, Emily Roberts  
**From** Scientific Officer, Brooke Thomas  
**Document** BT075  
**Date** 11 July 2017

## 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 2017

### 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).

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 2016-2017 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 07 February 2017, 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 survey, 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	Time (NZST)	Water temp (°C)
Tawhiti Stream tributary	B1	TWH000478	Vegetation	1015	18.6
	B2	TWH000479	Vegetation	0955	17.3
Unnamed tributary of the Tangahoe River	1	TNH000470	Kick/ sweep	1200	17.3
	2	TNH000473	Vegetation	1140	16.9
	3	TNH000477	Vegetation	1055	16.9
Unnamed	S2	UND001340	Kick/ sweep	1445	17.0

In this survey, the standard 'vegetation sweep' sampling technique was used at sites B1, B2, 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 sites 1 and 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<sub>s</sub>) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI<sub>s</sub> is not multiplied by a scaling factor of 20, therefore SQMCI<sub>s</sub> 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.

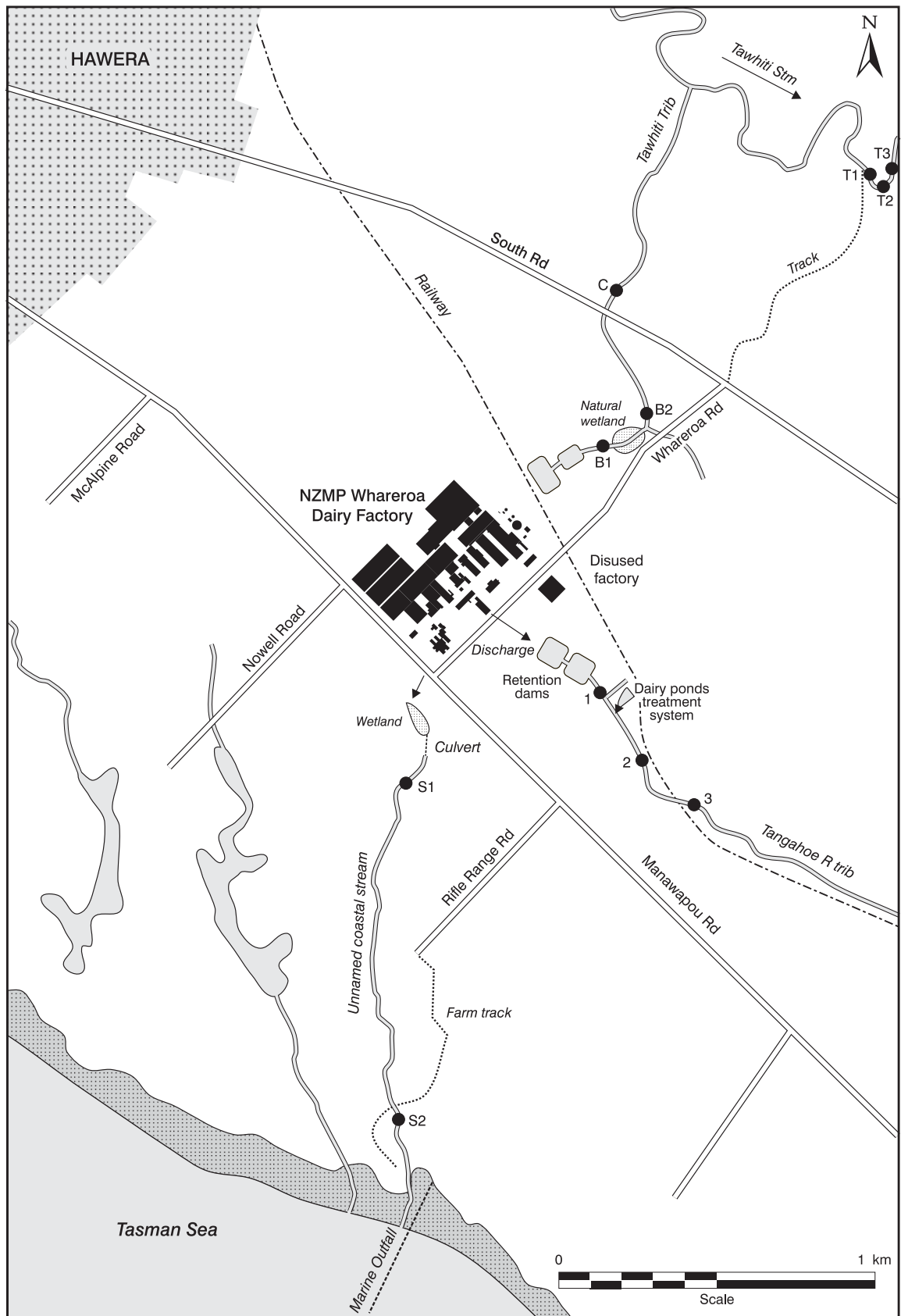


Figure 1 Biomonitors sites related to the Fonterra Whareroa dairy factory discharges.

## Results

This February 2017 survey followed a period of 87 days since a fresh in excess of three times median flow and 330 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 ranged between 17.3°C and 18.6°C. There was an uncoloured, clear, very low and very slow flow at both sites B1 and B2. Site B1 had a predominantly silt substrate with a small amount of wood/root. Site B2 had an entirely silt substrate. Macrophytes were recorded growing on both the bed and at the edges of the stream at both sites. No periphyton was recorded at either site B1 or B2. Site B1 was partially shaded while site B2 was completely unshaded.

In the Tangahoe River tributary, water temperature ranged between 16.9°C to 17.3°C. There was an uncoloured, clear, very low and very slow flow at all three sites. The substrate at site 1 comprised predominantly hard clay, with some silt and wood/root and a small amount of sand. The substrate at site 2 comprised entirely silt and the substrate at site 3 comprised predominantly silt and sand with some wood/root. No periphyton was recorded at any of the Tangahoe River tributary sites. Macrophytes were recorded growing at the edges and on the bed of the stream at all three sites. Sites 1 and 2 were shaded by overhanging grasses, whereas site 3 was completely unshaded.

The water temperature recorded at site S2 in the unnamed coastal stream was 17.0°C. A low, slow flow of clear, uncoloured water was recorded at this site. The substrate comprised predominantly bedrock and wood and root with some silt and sand. No periphyton was recorded at this site. Macrophytes were recorded growing at the edges and on the bed of the stream. The streambed 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 <sub>s</sub> scores			
		Range	Median	Current	Range	Median	Current	No. surveys	Range	Median	Current
B1	44	3-26	15	17	40-83	68	69	33	1.2-4.0	2.7	3.7
B2	43	6-26	18	15	37-83	70	69	34	2.4-4.4	4.1	4.4
1	25	11-27	18	16	65-79	71	69	25	1.7-3.9	2.8	4.1
2	56	5-29	17	14	44-74	67	77	35	1.2-4.9	2.8	4.4
3	46	6-32	19	16	50-91	71	93	34	1.1-5.2	3.2	5.4

Site	No. surveys	Numbers of taxa			MCI scores			SQMCI <sub>s</sub> scores			
		Range	Median	Current	Range	Median	Current	No. surveys	Range	Median	Current
S2	33	6-23	17	14	58-95	72	91	24	2.7-5.0	4.0	4.6

## 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 07 February 2017.

Taxa List	Site Number	MCI score	B1	B2
	Site Code		TWH000478	TWH000479
	Sample Number		FWB17021	FWB17022
COELENTERATA	Coelenterata	3	R	-
PLATYHELMINTHES (FLATWORMS)	<i>Cura</i>	3	R	-
NEMERTEA	Nemertea	3	R	-
NEMATODA	Nematoda	3	R	-
ANNELIDA (WORMS)	Oligochaeta	1	A	-
MOLLUSCA	<i>Physa</i>	3	-	C
	<i>Potamopyrgus</i>	4	XA	XA
	Sphaeriidae	3	VA	-
CRUSTACEA	Ostracoda	1	A	C
	<i>Paracalliope</i>	5	R	XA
	Paraleptamphopidae	5	R	-
	Talitridae	5	-	R
ODONATA (DRAGONFLIES)	<i>Xanthocnemis</i>	4	-	C
HEMIPTERA (BUGS)	<i>Sigara</i>	3	C	-
TRICHOPTERA (CADDISFLIES)	<i>Oxyethira</i>	2	-	R
	<i>Triplectides</i>	5	R	R
	<i>Zelandotipula</i>	6	R	-
DIPTERA (TRUE FLIES)	<i>Chironomus</i>	1	R	-
	<i>Corynoneura</i>	3	-	R
	Orthocladiinae	2	-	R
	<i>Polypedilum</i>	3	R	C
	Tanypodinae	5	C	-
	<i>Paradixa</i>	4	-	C
	Sciomyzidae	3	-	R
	<i>Austrosimulium</i>	3	-	A
ACARINA (MITES)	Acarina	5	C	R
		No of taxa	17	15
		MCI	69	69
		SQMCI <sub>s</sub>	3.7	4.4
		EPT (taxa)	1	1
		%EPT (taxa)	6	7
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa	

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



## Site B1 (TWH000478)

A moderate taxa richness of 17 taxa was recorded at site B1 which was two taxa more 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 survey (taxa richness 12; Figure 2).

The MCI score of 69 units indicated a community of 'poor' biological health which was similar to the median value recorded for the site (median MCI score 68 units; Table 3) and similar to the previous survey score (MCI score 72 units; Figure 2). The SQMCI<sub>5</sub> score of 3.7 units was substantially higher than the median value recorded at the site (median SQMCI<sub>5</sub> score 2.7 units; Table 3) and slightly higher (by 0.3 unit) than the previous survey result (SQMCI<sub>5</sub> score 3.4 units).

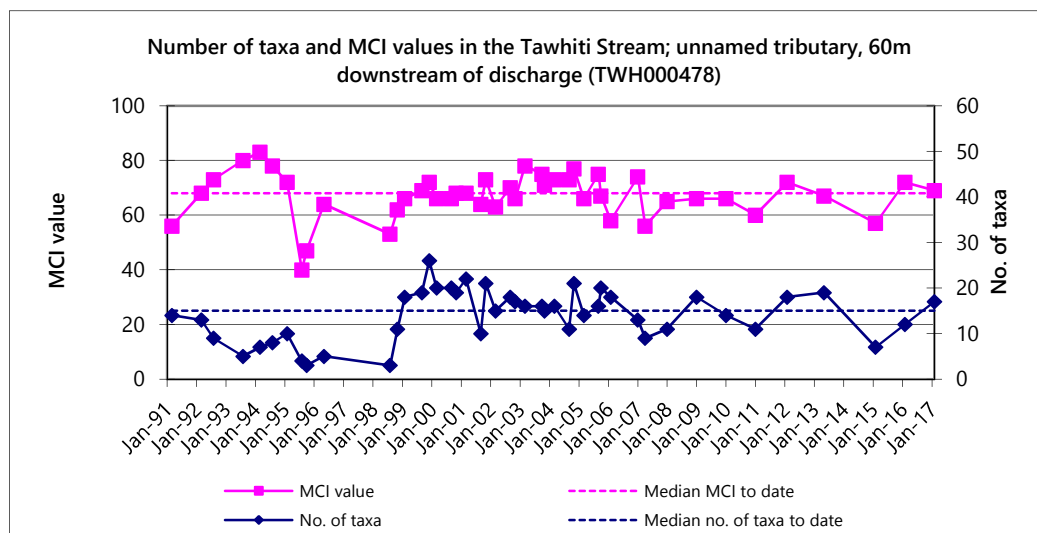


Figure 2 Number of taxa and MCI values recorded since 1991 at site B1.

The community was characterised by four 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), ostracod seed shrimp and fingernail clams (*Sphaeriidae*)] (Table 4).

## Site B2 (TWH000479)

A moderate taxa richness of 15 taxa was recorded at site B2 which was three taxa less than the median number recorded for the site (Table 3) and three taxa less than the number recorded in the previous sample (taxa richness 18; Figure 3).

The MCI score of 69 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) and similar to the previous survey score (MCI score 71 units; Figure 3). The SQMCI<sub>5</sub> score of 4.4 units was similar to the median value recorded at the site (median SQMCI<sub>5</sub> score 4.0 units; Table 3) and the same as the previous survey score.

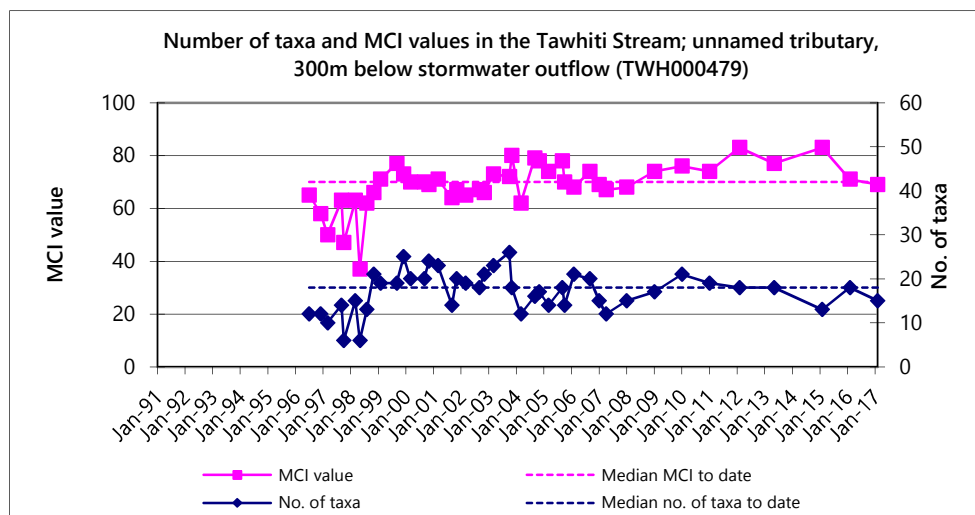


Figure 3 Number of taxa and MCI values recorded since 1996 at site B2.

The community was characterised by two 'tolerant' taxa [snail (*Potamopyrgus*) and black sandfly larvae (*Austrosimulium*)] 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 07 February 2017.

Taxa List	Site Number	MCI score	1	2	3
	Site Code		TNH000470	TNH000473	TNH000477
	Sample Number		FWB17023	FWB17024	FWB17025
PLATYHELMINTHES (FLATWORMS)	<i>Cura</i>	3	-	R	-
NEMATODA	Nematoda	3	R	-	-
ANNELIDA (WORMS)	Oligochaeta	1	VA	C	R
	Lumbricidae	5	-	-	R
MOLLUSCA	<i>Gyraulus</i>	3	C	-	-
	<i>Physa</i>	3	R	R	-
	<i>Potamopyrgus</i>	4	VA	C	A
	Sphaeriidae	3	C	-	-
CRUSTACEA	Ostracoda	1	A	VA	-
	Isopoda	5	R	-	-
	<i>Paracalliope</i>	5	XA	XA	VA
	Paraleptamphopidae	5	-	-	VA
	Talitridae	5	-	R	-
	<i>Paranephrops</i>	5	-	R	R
EPHEMEROPTERA (MAYFLIES)	<i>Zephlebia group</i>	7	-	-	VA
HEMIPTERA (BUGS)	<i>Microvelia</i>	3	R	-	-
TRICHOPTERA (CADDISFLIES)	<i>Hydrobiosis</i>	5	-	-	R
	<i>Hydropsyche (Orthopsyche)</i>	9	-	-	C
	<i>Polypsectropus</i>	6	-	A	R
	<i>Triplectides</i>	5	-	-	R
DIPTERA (TRUE FLIES)	Eriopterini	5	R	-	-
	Hexatomini	5	-	R	-
	<i>Zelandotipula</i>	6	R	-	-

Taxa List	Site Number	MCI score	1	2	3
	Site Code		TNH000470	TNH000473	TNH000477
	Sample Number		FWB17023	FWB17024	FWB17025
	Orthocladinae	2	R	-	R
	<i>Polypedilum</i>	3	A	R	A
	Tanypodinae	5	-	A	-
	<i>Paradixa</i>	4	-	-	C
	Empididae	3	-	R	-
	<i>Austrosimulium</i>	3	R	-	R
ACARINA (MITES)	Acarina	5	R	A	R
	No of taxa		16	14	16
	MCI		69	77	93
	SQMCI <sub>5</sub>		4.1	4.4	5.4
	EPT (taxa)		0	1	5
	%EPT (taxa)		0	7	31
	'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa		
	R = Rare	C = Common	A = Abundant	VA = Very Abundant	XA = Extremely Abundant

## Site 1 (TNH000470)

A moderate taxa richness of 16 taxa was recorded at site 1 which was two taxa less than the median number recorded for the site (median taxa richness 18; Table 3) but five taxa more than that recorded by the previous survey (taxa richness 11; Figure 4).

The MCI score of 69 units indicated a community of 'poor' biological health which was not significantly different (Stark, 1998) to the previous survey score (MCI score 73 units; Figure 4) or to the median value recorded for the site (median MCI score 71 units; Table 3). The SQMCI<sub>5</sub> score of 4.1 units was substantially higher than the median value recorded for the site (median SQMCI<sub>5</sub> score 2.8 units; Table 3) and substantially higher than that recorded by the previous survey (SQMCI<sub>5</sub> score 1.7 units).

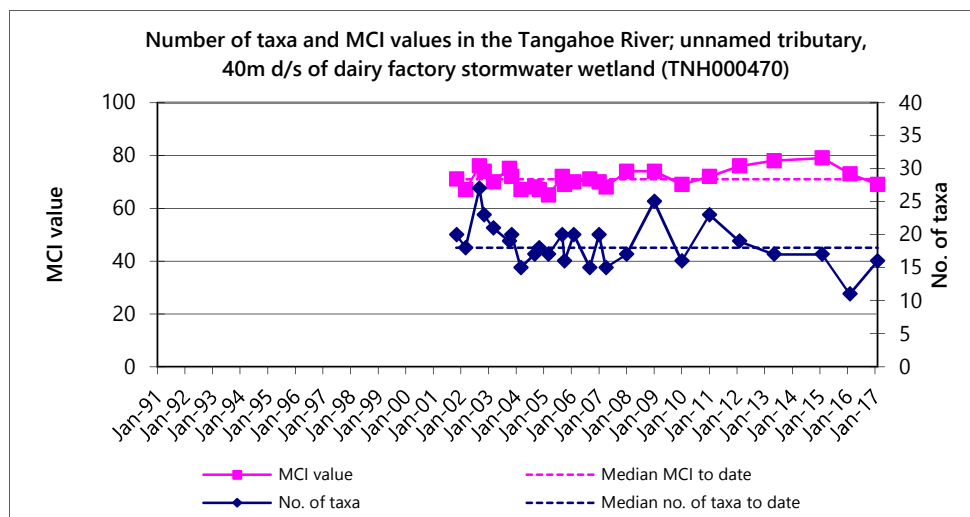


Figure 4 Number of taxa and MCI values recorded since 2001 at site 1.

The community was characterised by four 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), chironomid midge (*Polypedilum*) and ostracod seed shrimp] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] (Table 5).

## Site 2 (TNH000473)

A moderate taxa richness of 14 taxa was recorded at site 2, which was three taxa less than the median number recorded for the site (median taxa richness 17; Table 3) but the same as what was recorded during the previous (February 2016) survey (taxa richness 14; Figure 5).

The MCI score of 77 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 67 units; Table 3) or to the previous survey score (MCI score 74 units; Figure 5). This score was equivalent to the highest MCI score recorded at this site to date (Figure 5). The SQMCI<sub>5</sub> score of 4.4 units was markedly higher than the median value recorded at the site (median SQMCI<sub>5</sub> score 2.8 units; Table 3) but lower than the score recorded by the previous survey (SQMCI<sub>5</sub> score 4.9 units).

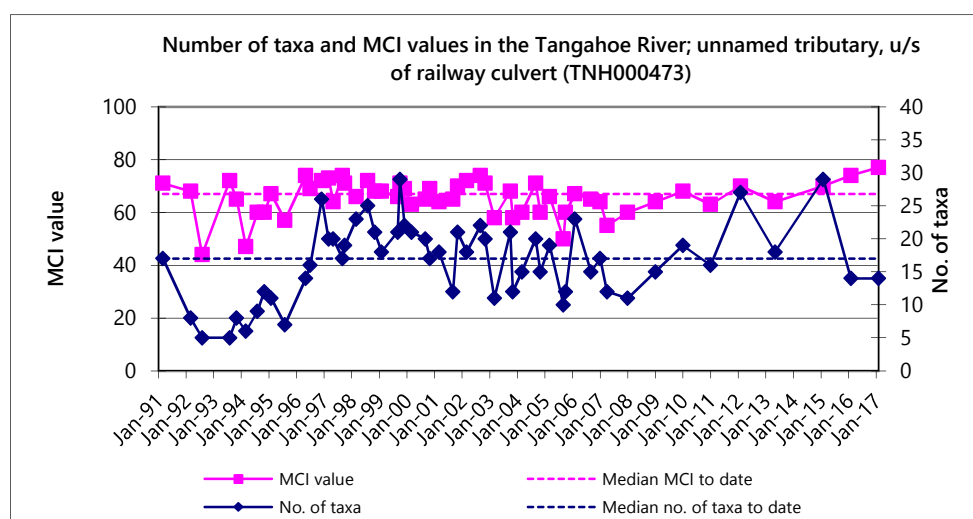


Figure 5 Number of taxa and MCI values recorded since 1991 at site 2.

The community was characterised by one 'tolerant' taxon [ostracod seed shrimp], and four 'moderately sensitive' taxa [amphipod (*Paracalliope*), free-living caddis (*Polypsectropus*), chironomid midge (Tanyptodinae) and mites (Acarina)] (Table 5).

## Site 3 (TNH000477)

A moderate taxa richness of 16 taxa was recorded 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 survey (taxa richness 17; Figure 6).

The MCI score of 93 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 slightly higher than the previous survey score (MCI score 91 units; Figure 6). This MCI score was equivalent to the highest MCI score recorded at this site to date (Figure 6). The SQMCI<sub>5</sub> score of 5.4 units was markedly higher than the median value recorded at the site (median SQMCI<sub>5</sub> score 3.2 units; Table 3) and substantially higher than the previous survey result (SQMCI<sub>5</sub> score 4.5 units).

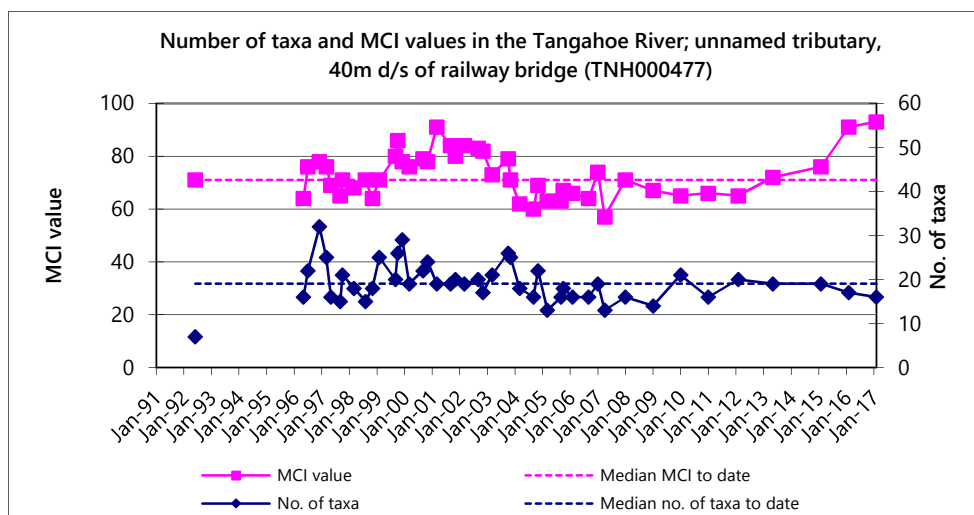


Figure 6 Number of taxa and MCI values recorded since 1992 at site 3.

The community was characterised by two 'tolerant' taxa [snail (*Potamopyrgus*) and chironomid midge (*Polypedium*)] and three 'moderately sensitive' taxa [amphipods (*Paracalliope*) and (*Paraleptamphopidae*) and mayfly (*Zephlebia group*)] (Table 5).

## Unnamed coastal stream

Table 6 Macroinvertebrate fauna of an unnamed coastal stream relation Fonterra, Whareroa sampled on 07 February 2017.

Taxa List	Site Number	MCI score	S2
	Site Code		UND001340
	Sample Number		FWB17026
PLATYHELMINTHES (FLATWORMS)	<i>Cura</i>	3	R
ANNELIDA (WORMS)	<i>Oligochaeta</i>	1	A
MOLLUSCA	<i>Potamopyrgus</i>	4	XA
CRUSTACEA	<i>Ostracoda</i>	1	R
	<i>Paracalliope</i>	5	XA
	<i>Paraleptamphopidae</i>	5	VA
	<i>Talitridae</i>	5	R
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	VA
	<i>Zephlebia group</i>	7	C
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche (Orthopsyche)</i>	9	C
DIPTERA (TRUE FLIES)	<i>Paralimnophila</i>	6	R
	<i>Polypedium</i>	3	R
	<i>Austrosimulium</i>	3	VA
ACARINA (MITES)	<i>Acarina</i>	5	A
		No of taxa	14
		MCI	91
		SQMCI	4.6
		EPT (taxa)	3
		%EPT (taxa)	21
'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 14 taxa was recorded 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 17; Table 3) and one taxon lower than the previous survey (taxa richness 15; Figure 7).

The MCI score of 91 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 72 units; Table 3) and four units below the historical maximum score this site. It was not significantly different (Stark, 1998) to the previous survey score (MCI score 95 units; Figure 7). The SQMCI<sub>5</sub> score of 4.6 units was above the median value recorded at the site (median SQMCI<sub>5</sub> score 4.0 units; Table 3) and higher than the previous survey (SQMCI<sub>5</sub> score 4.3 units).

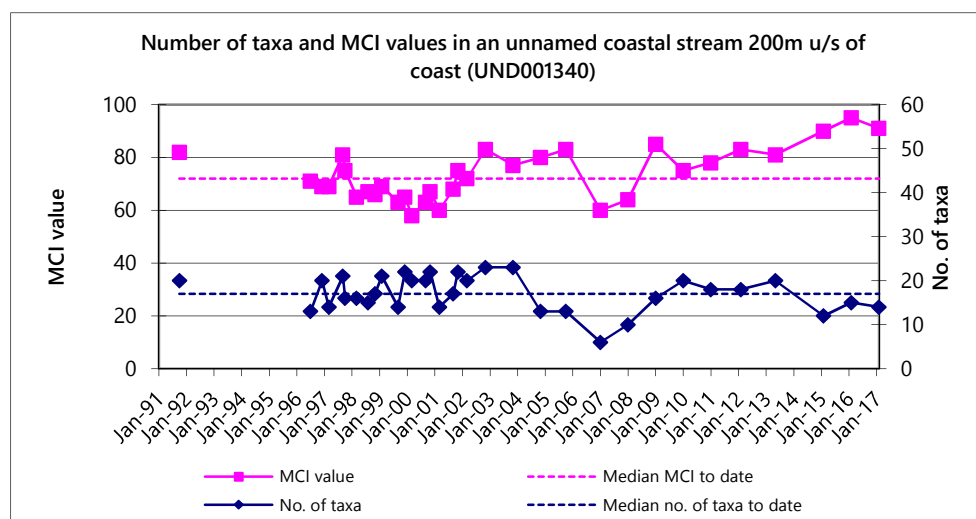


Figure 7 Number of taxa and MCI values recorded since 1996 at S2.

The community was characterised by three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*) and black fly larvae (*Austrosimulium*)], and four 'moderately sensitive' taxa [amphipods (*Paracalliope*) and (*Paraleptamphopidae*), mayfly (*Austroclima*) and mites (*Acarina*)] (Table 6).

## Discussion and conclusions

### 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 provides further evidence that current stormwater discharges did not have high levels of organic waste. In the current survey, no *Chironomus* blood worms were recorded at site B2 and they were only recorded as 'rare' at site B1.

Results from the current survey indicated that site B1 had 'poor' macroinvertebrate community health. Results indicated a slight decline in MCI score (by 3 units) at site B1 since the previous survey. The MCI score was similar to the historical median for the site. The SQMCI<sub>s</sub> score was slightly higher than that recorded by previous survey (by 0.3 unit), and substantially higher than historical median for the site (by 1.0 unit).

At site B2, there were no significant changes in MCI and SQMCI<sub>s</sub> scores between the current survey, previous survey and historic medians. The 'poor' MCI score of 69 units is a reflection of the dominance of 'tolerant' taxa in the macroinvertebrate community (73%). The MCI scores recorded at sites B1 and B2 were the same, however the SQMCI<sub>s</sub> score recorded at site B2 was higher than that recorded at site B1. The difference in the SQMCI<sub>s</sub> 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 [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 reflective of 'poor' (site 1 and 2) and 'fair' (site 3) macroinvertebrate health 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 the historical median (by 22 units). The MCI score of 93 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 24 and 16 units respectively). This is a reflection of slightly better habitat (greater flow) at this site in comparison to the two upstream sites. The MCI of 77 units recorded at site 2 was also equivalent to the highest score recorded at this to date. SQMCI<sub>s</sub> scores at all of the sites in the unnamed tributary of the Tangahoe River sites were substantially higher than historical medians and either higher or similar to the previous survey results. Overall there was no evidence for discharges significantly affecting water quality.

## Unnamed coastal stream

The macroinvertebrate community at site S2 contained a moderate number of taxa and recorded a MCI score of 91 units which was significantly (Stark, 1998) higher than the historical median for the site (by 19 units). The community was numerically dominated by two taxa in particular, including the 'extremely abundant' 'tolerant' snail (*Potamopyrgus*) and 'extremely abundant' 'moderately sensitive' amphipod (*Paracalliope*), which resulted in a moderate SQMCI<sub>s</sub> score of 4.6 units. An improvement in the health of the macroinvertebrate community over the past 5 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<sub>s</sub> 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<sub>5</sub> 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<sub>5</sub> 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, 2015 and 2016 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<sub>5</sub> score, similarly to the last four survey results, was markedly higher than the historical median at site B1. In addition, the SQMCI<sub>5</sub> score recorded at site B2 was higher than the historical median for the site.

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. The MCI scores recorded were typical for site 1 but an improvement for sites 2 and 3, which recorded MCI scores equivalent to the highest scores recorded at these two sites to date. 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 the historical median for the site. In addition, there were substantial improvements in SQMCI<sub>5</sub> scores from historical medians at all three sites.

The results of this survey continued to reflect improvements in the macroinvertebrate community that have been recorded over the past nine 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 2017 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 inspection



To Job Manager, Emily Roberts  
From Scientific Officer, Brooke Thomas  
Report No BT065  
Document No. 1797341  
Date 21 December 2016

## **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 2016**

### **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 2016-2017 monitoring year to monitor the effects of these discharges. This was conducted on 15 December 2016. This is Fifth 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 2016-2017 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 low and slow flow, which was uncoloured but slightly cloudy. The stream temperature at the time of the inspection was 16.4°C. The macroinvertebrate habitat downstream of the stormwater discharge

was comprised of macrophytes and woody debris. The substrate of the stream was predominantly silt, sand and wood 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 a combination of the 'streambed kick' and 'vegetation-sweep' methods, which was live-sorted on site. The sample contained snails (*Potamopyrgus*) (very abundant), oligochaete worms, sandfly (*Austrosimulium*), Crayfish (*Paranephrops*), chironomid midge larvae, true fly larvae, damselfly larvae, water strider (*Microvelia*), ostracod seed shrimp and amphipods. No *Chironomus* blood worms were observed in the sample. The presence of species such as oligochaete worms may be an indication of some organic enrichment. However the presence of Crayfish (*Paranephrops*), which are a moderately sensitive taxon, and the lack of undesirable heterotrophic growths on the bed, indicates that any preceding discharges from the dairy factory site had not 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 slow flow that was clear and uncoloured. The stream temperature at the time of the inspection was 15.9°C. The substrate was comprised predominantly of hard clay covered in a fine silt layer. The site was completely shaded by steep-sided banks and dense overhanging grasses. No heterotrophic growths, periphyton, or moss was noted, however there was some iron oxide visible on the streambed. 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 amphipods, ostracod seed shrimp, water strider (*Microvelia*), sandfly (*Austrosimulium*), chironomid midge larvae, snails (*Potamopyrgus*) and oligochaete worms. Amphipods were very abundant. The live-sort results indicate a mildly eutrophic stream typical of lowland farmland. Though pollution 'tolerant' oligochaete worms were present in the sample their numbers were low and combined with the lack of heterotrophic growths and chironomid blood worms suggest 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. 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 immediately below the stormwater pond, which is some way upstream of the site sampled during the full biomonitoring survey. At the time of the inspection, the stream had a steady and low flow of clear and uncoloured water. The substrate comprised predominantly fine gravel and coarse gravel with some cobble, silt and sand. Slippery algal mats and patchy filamentous algae were recorded growing on the streambed. Moss was widespread and macrophytes were recorded growing at the edges of the stream only.

The live sample collected contained an extremely abundant population of water boatman (*Sigara*). A number of other taxa were also observed, but in reduced abundance, including caddisflies, sandfly (*Austrosimulium*), chironomid midge larvae, flat worms (*Cura*), Arachnids and *Chironomus* blood worms. Although blood worms were observed in the live sample, they were rare, and not an unusual result for this type of habitat. The abundance of *Sigara* is likely to be the result of the pond



habitat upstream of the site. The presence of 'moderately sensitive' taxa, and the lack of any undesirable heterotrophic growths on the streambed, indicates that any preceding discharges from the dairy factory site had not had a significant adverse effect on the macroinvertebrate communities of the unnamed coastal stream.

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## Appendix IV

### Fish survey



**To** Emily Roberts, Scientific Officer  
**From** Bart Jansma, Scientific Officer  
**Report No** BJ295  
**Document** 1911520  
**Date** 7 August 2017

## Fish Survey of the Tawhiti Stream in relation to the abstraction of water and the intake weir, associated with the Fonterra Whareroa dairy factory, March 2017

### Introduction

This report describes the results of a fish survey of the Tawhiti Stream, which is part of the monitoring programme for the Fonterra Whareroa dairy factory. This was the only fish survey scheduled for the 2016-2017 monitoring year. Consents related to this survey are:

- 5845-1 to maintain a dam structure and associated fish pass on the Tawhiti Stream for water intake purposes
- 0047-3 to take up to 30,000 cubic metres/day of water from the Tawhiti Stream

4927-1 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

This survey is the second of this kind undertaken in the Tawhiti Stream by the Taranaki Regional Council. It was included for the first time in the 13-14 monitoring period due to a recent heightened interest in the fish communities of the Tawhiti Stream. Reports discussing previous survey results are included in the references.



Photo 1 The weir and fish pass on the Tawhiti Stream

## Methods

In this survey, two sites were surveyed in the Tawhiti Stream. Site 1 was located upstream of the intake while site 2 was located downstream of the weir. Details of the sites surveyed are given in Table 1 and the locations of the sites surveyed in relation to the site are shown in Figure 1.

Table 1 Sampling sites surveyed in the Tawhiti Stream in relation to the Fonterra Whareroa intake, weir and fish pass

Site	Site code	Location	Altitude (m)	Distance from coast (km)
1	TWH000481	Approx. 720m upstream of intake structure	40	12.9
2	TWH000420	Approx. 350m downstream of intake structure	40	13.8

The fish populations were sampled using fyke nets and gee-minnow traps. At each site, six gee-minnow traps were set, and baited with marmite. They were set overnight, among macrophytes or alongside woody debris. Three fyke nets were also set at each site, one standard mesh net (25mm) and two fine mesh nets (13mm). This represents a reduction in sampling effort from the previous survey, when two coarse mesh fyke nets were set at each site. Considering this change, sampling effort is now quantified by number of nets used, not minutes fished, as done previously. The fyke nets were baited with fish food pellets. These nets were also set overnight. All fish caught were identified, counted and measured. All nets and traps were deployed on 27 March 2017, and retrieved on 28 March 2017.



Figure 1 Location of the two sampling sites in relation to the intake, weir and fish pass.

## Results and Discussion

At the time of this survey, the Tawhiti Stream had a moderate flow which was brown and cloudy, relatively typical for this stream. Flows had remained above mean annual low flow since 21 April 2016, a period of over 11 months (Figure 2). The substrate of the stream comprised a mixture of coarse substrate, such as cobbles and gravels, but over 60% of the stream bed comprised of sand or silt at both sites.

There was good fish habitat present, with both sites having undercut banks, overhanging vegetation, macrophyte beds and some instream woody debris. In addition, thanks to the overhanging vegetation, both sites were partially shaded.

Summary results from of previous surveys are shown in Table 3 while the full results of the fish survey are shown in Table 2.

Table 2 Summary of historical data for fish surveys undertaken in the Tawhiti Stream in relation to the Fonterra Whareroa dairy factory intake and weir.

Site:		Site 1			Site 2		
Net/Trap type:		Fyke net coarse mesh	Fyke net fine mesh	G-minnow trap	Fyke net coarse mesh	Fyke net fine mesh	G-minnow trap
Number of previous surveys:		1	1	1	1	1	1
Total number of netting night*:		2	2	6	2	2	6
Longfin eel ( <i>Anguilla dieffenbachii</i> )	Total Number caught	1	4	0	2	6	1
	Average Number per net night*	0.5	2	0	1	3	0.17
	Min Length (mm)	560	353	-	587	409	307
	Max Length (mm)	560	595	-	660	542	307
	Median length	560	460	-	624	493	307
Shortfin eel ( <i>Anguilla australis</i> )	Total Number caught	0	0	0	0	2	0
	Average Number per net night*	0	0	0	0	1	0
	Min Length (mm)	-	-	-	-	640	-
	Max Length (mm)	-	-	-	-	895	-
	Median length	-	-	-	-	768	-
Koura ( <i>Paranephrops planifrons</i> )	Total Number caught	0	0	0	0	1	1
	Average Number per net night*	0	0	0	0	0.5	0.17

\* One net night equates to one net set over one night. Six nets set over one night equates to six netting nights.



Table 3 Results of the fish survey undertaken in the Tawhiti Stream in relation to the Fonterra Whareroa dairy factory intake and weir.

Site:		Site 1			Site 2		
Net/Trap type:		Fyke net coarse mesh	Fyke net fine mesh	G-minnow trap	Fyke net coarse mesh	Fyke net fine mesh	G-minnow trap
Number of minutes fished:		2560	2560	7680	2580	2580	7740
Longfin eel ( <i>Anguilla dieffenbachii</i> )	Number	1	5	-	1	5	-
	Length range (mm)	780	536-1060	-	491	96-620	-
Shortfin eel ( <i>Anguilla australis</i> )	Number	1	-	-	2	3	-
	Length range (mm)	660	-	-	490-726	94-110	-
Rainbow trout ( <i>Oncorhynchus mykiss</i> )	Number	-	-	-	-	1	-
	Length range (mm)	-	-	-	-	145	-
Koura ( <i>Paranephrops planifrons</i> )	Number	-	2	2	-	4	-
Total number of species		3			3		
Total number of fish		11			16		

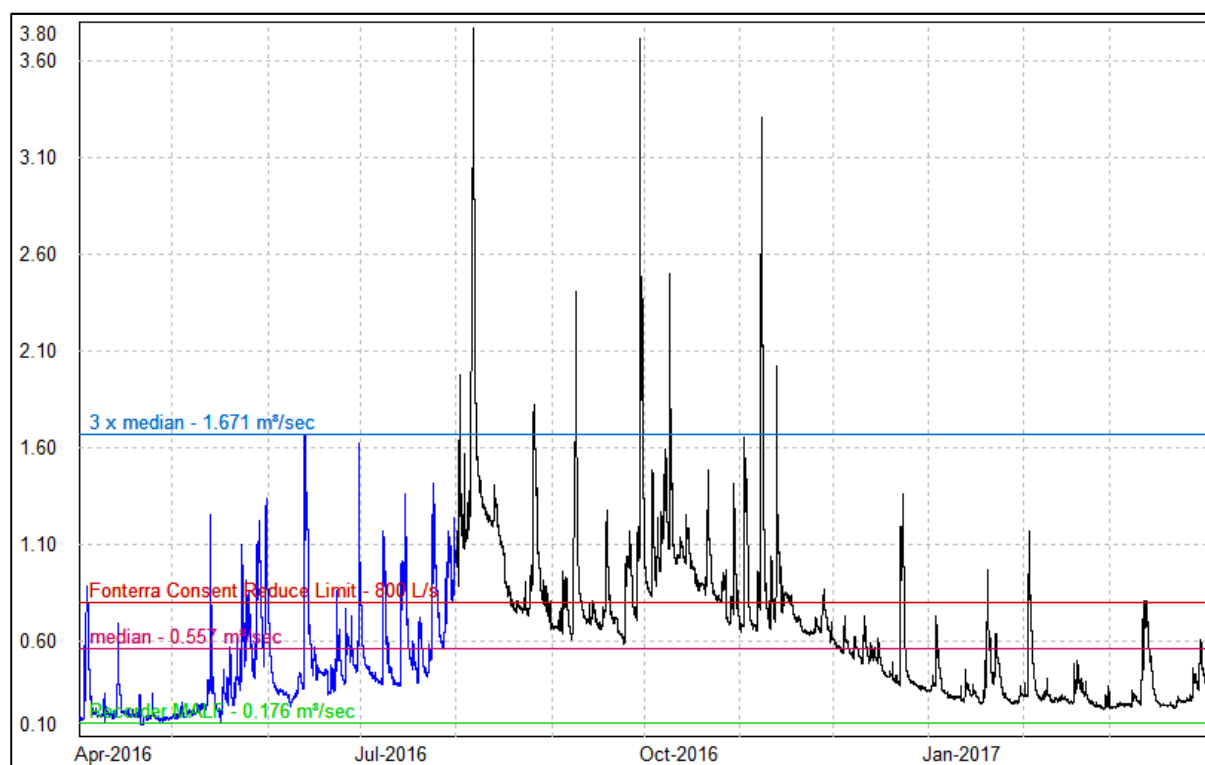


Figure 2 Flow ( $\text{m}^3/\text{sec}$ ) in the Tawhiti Stream at Duffy's farm, from 1 April 2016 to 1 April 2017. Includes audited data (blue) and unaudited data (black).

## Site 1

Three species were recorded at site 1, being longfin and shortfin eel and freshwater crayfish. In total, eleven individuals were recorded, with majority recorded in the fine mesh fyke nets, with two eels recorded in the coarse mesh net and two crayfish in the Gee-minnow traps.

There was some variation in size, with the largest fish recorded at 1060mm. This fish, the largest recorded in this survey, is likely to be more than 35 years old (Chisnall & Hicks, 1993). Assuming the eels in the Tawhiti Stream exhibit a weight to length relationship typical to the species, this means that longfin eel weight will have ranged from approximately 0.38kg to 3.6 kg, while the individual shortfin eel recorded will have weighed approximately 0.59kg (Jellyman *et al* 2013). This is the first survey to record shortfin eel and freshwater crayfish at this site.

## Site 2

This site, located downstream of the weir, contained a higher species richness (4), with sixteen individuals recorded. Longfin eel and shortfin eel were present in similar numbers with six and five recorded respectively. The largest fish recorded was a shortfin eel (726mm), which may have been as old as 25 years (Chisnall & Hicks, 1993), and would likely have weighed approximately 0.8kg. Of note was the smallest longfin eel, at 96mm. Such small eels would normally escape even a fine mesh fyke net, but its presence indicates that this species is successfully recruiting into this stream.



Of note was the first record of rainbow trout (*Oncorhynchus mykiss*) in the nets, with a small fish (145mm) captured in the fine mesh fyke net (Photo 2). This fish did not have any fin clips or fin damage, suggesting that it is a wild fish i.e. it is not an escapee from the upstream hatchery. If this is indeed the case, it indicates that rainbow trout are able to successfully reproduce in this catchment.

The previous survey observed a large rainbow trout feeding downstream of site 2, so it was already known that rainbow trout were established in the stream.

Of the four crayfish recorded at this site in the current survey, there were a number of particularly large individuals. One of which is shown in Photo 2.

Photo 2 A large freshwater crayfish (left), and a juvenile rainbow trout (below), both recorded at site 2 on 28 March 2017



## Summary and conclusions

On 27 and 28 March 2017, two sites were surveyed for freshwater fish in the Tawhiti Stream, in relation to the water intake weir and fish pass associated with the Fonterra Whareroa dairy factory. Site 1 was located approximately 720m upstream of the intake, while site 2 was located approximately 350m downstream of the intake. The survey method involved deploying baited fine and coarse mesh fyke nets and gee-minnow traps at each site overnight. These nets and traps were recovered the following morning, with all fish identified, counted and measured.

At the time of this survey, flow in the Tawhiti Stream was moderate, and instream fish habitat was abundant, with undercut banks, macrophyte beds, overhanging vegetation and woody debris present at both sites. In addition, the low altitude and close proximity to the coast of these sites would be expected to result in a relatively diverse and potentially abundant community.

Two species of eel were recorded, along with rainbow trout and freshwater crayfish. The downstream site had the highest abundance of fish, with 16 individuals recorded, compared with the seven fish and four crayfish recorded downstream. The downstream site recorded the highest species richness, with longfin eel, shortfin eel, rainbow trout and crayfish present. Only longfin and shortfin eel were recorded at the upstream site.

This is the first survey to record rainbow trout, although they have been observed in the stream previously. This fish appeared intact, and did not show any signs of being from the Tawhiti trout hatchery. If this is a wild fish, it indicates that rainbow trout are able to successfully reproduce in this catchment.

The abundance of fish at site 2 indicates that there has been little impact from the activities undertaken at the weir. Due to a particularly wet spring and summer, the Tawhiti Stream had carried higher than normal flows in the months preceding this survey, providing good instream conditions for the fish. It is possible that during drier period, the low flows caused by the abstraction or the discharge of sediment may result in habitat that is from time to time unsuitable, and unable to sustain a community for an extended period of time. This could result in fewer fish becoming resident in that reach of stream. Neither the current or previous survey results suggest that these effects have occurred, as flows had not dropped below MALF for a number of months prior to this survey, and no significant issues have been noted with the discharge of sediment.

It should be noted that the sampling technique can influence results, as fyke nets favour the capture of eels, especially when baited, and anecdotal evidence indicates that kokopu species may avoid nets that contain eels. In addition, other influences may exist, such as commercial fisherman targeting eels in this stream.

However, this does not explain the lack of fish captured in the gee-minnow traps. It was expected that these traps would catch bully species and possibly inanga, and their absence may indicate the presence of a barrier to fish passage downstream, either natural or artificial. There are two areas downstream that appear to have been the subject of modification, with the shortcutting of a loop of stream. This shortcutting appears to have created an area of very swift flow, which is likely to pose a barrier to a number of species.

In assessing whether the intake weir itself is a barrier to fish passage, it is necessary to compare the species diversity downstream with that recorded upstream. Unfortunately, this assessment is inhibited by the lack of species recorded downstream. The results of this survey, and other work undertaken further upstream which recorded shortfin eel, indicates that the intake weir and fish pass does not constitute a barrier to the passage of those species recorded downstream of the weir. Although no rainbow trout were recorded upstream, this species is infrequently encountered with netting and trapping methods, and a visual inspection of the pass considered it to be in good condition.

Overall, this survey does not indicate that the intake, fish pass or discharge of sediment undertaken in relation to the Fonterra Whareroa water abstraction have had any impact on the fish communities of the Tawhiti Stream. It is recommended that subsequent surveys use the same techniques, as the habitat does not suit electric fishing or spotlighting. However, it could be possible to electric fish immediately below the weir, and this may provide additional useful information.

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## Appendix V

### Marine ecological monitoring reports



**To** Science Manager – Hydrology/Biology, Regan Phipps  
**From** Scientific Officer, Emily Roberts and Technical Officer, Thomas McElroy  
**Document** 1915977  
**Date** 18 January 2017

## Fonterra Whareroa/Hawera Municipal Combined Outfall – Marine Ecological Survey Spring 2016/17

### 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<sup>3</sup>/day. By comparison, the Fonterra Whareroa wastewater discharge limit was 26,000 m<sup>3</sup>/day. As of 19 September 2006, the permitted volume of wastewater discharge increased to 40,000 m<sup>3</sup>/day. The oxidation pond discharge was also increased to 12,000 m<sup>3</sup>/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 2016-2017 monitoring programme for the combined marine outfall. The 2016-2017 spring survey was conducted at four sites between the 12<sup>th</sup> and the 14<sup>th</sup> of December 2016; the results are reported in this memo.

### Methods

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).



Photo 1 Surveying the potential impact site 350 m northwest of the outfall (14 December 2016)



Photo 2 Surveying the potential impact site 200 m southeast of the outfall (14 December 2016)





Photo 3 Surveying Pukeroa Reef; a potential impact site (13 December 2016)



Photo 4 Surveying the control site at Waihi Reef (12 December 2016)

**N.B.** Due to the onshore winds and large swell on 12 December, the tide took longer to retreat. Therefore the transect line needed to be positioned 3 m higher on the shore in order to start the survey on time. The method was kept consistent by orientating the random quadrats downshore of the transect, rather than upshore.

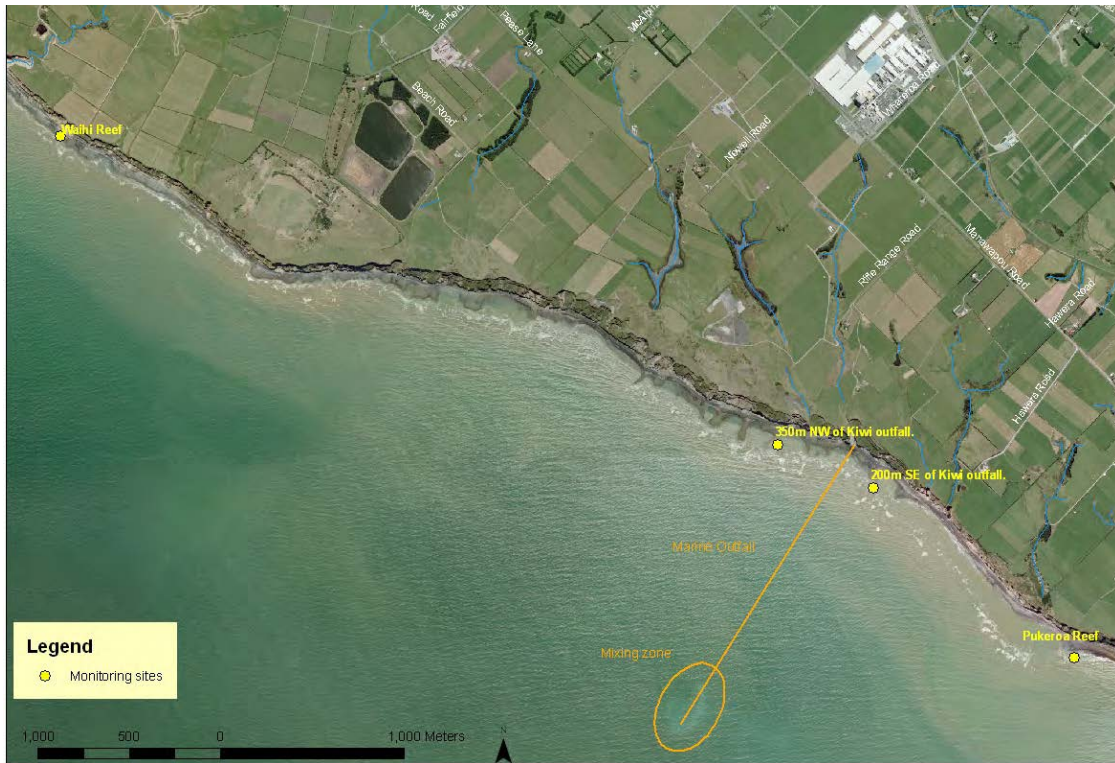


Figure 1 Map of sampling sites in relation to the outfall

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 m<sup>2</sup> 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.



Photo 5 Survey at the site located 200 m SE of the outfall, showing the transect in use

## 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 2016-2017 spring 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	2.28	6.92	9.20	0.233	0.726	0.787
350 m NW	25	5.76	7.52	13.28	0.616	0.737	0.952
200 m SE	25	1.20	4.24	5.44	0.122	0.472	0.582
Pukeroa Reef	25	2.64	8.60	11.24	0.322	0.785	0.878

### 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.

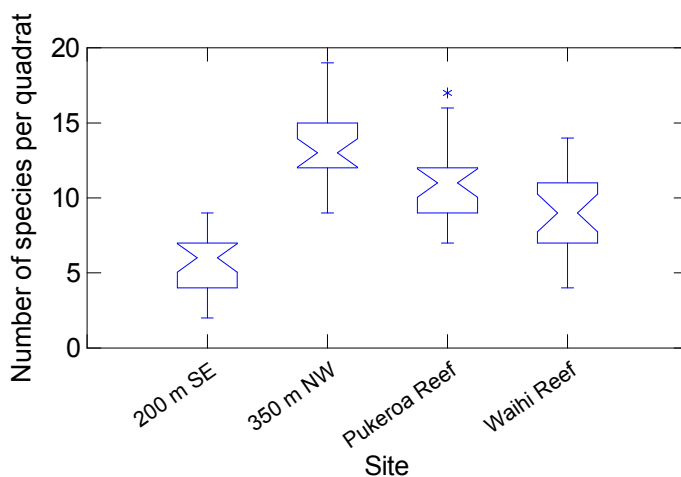


Figure 2 Box and whisker plots of the number of species per quadrat at the four sites

The data obtained from each of the four surveys was found to be normally distributed (Lilliefors test,  $P > 0.05$ ). The boxplots in Figure 2 showed homoscedasticity across the four surveys. Given that the data was normally distributed and that there was even variance across surveys, the necessary assumptions for an ANOVA test had been met.

There was a significant difference in the number of species per quadrat between sites using ANOVA ( $F_{3,96} = 45.36, P < 0.001$ ). Significant differences between sites were determined using the Tukey test (Table 2). There were significantly fewer species per quadrat at the site 200 m SE of the outfall than at any of the other sites. There were significantly more species per quadrat at the site 350 m NW of the outfall than at any of the other sites. There were significantly more species per quadrat at Pukeroa Reef than at Waihi Reef.

Table 2 Tukey test with number of species per quadrat

Site	Waihi	350 m NW	200 m SE
350 m NW	SIG		
200 m SE	SIG	SIG	
Pukeroa Reef	SIG	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.

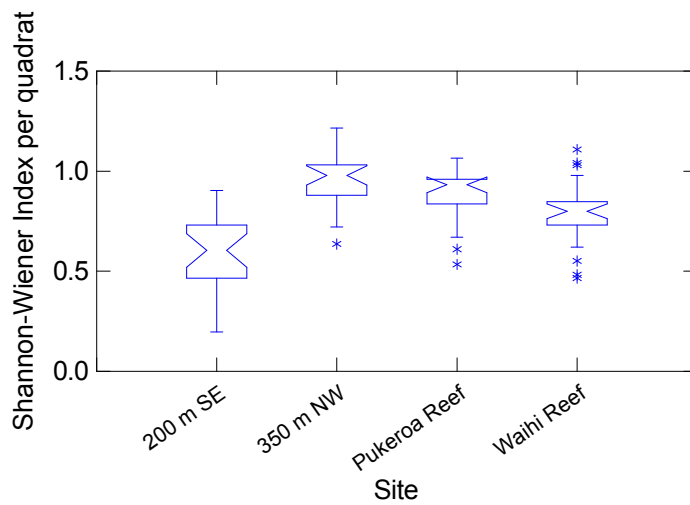


Figure 3 Box and whisker plots of Shannon-Weiner Indices at each site

The data obtained from each of the four surveys was found to be normally distributed (Lilliefors test,  $n = 25, P > 0.05$ ). The data variance at the site 200 m SE was not even with the remaining sites (Figure 3). As both

ANOVA 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,  $H = 42.32$ , degrees of freedom (df) = 3,  $P < 0.001$ )<sup>1</sup>. Significant differences between sites were determined using the Wilcoxon signed-ranks test (Table 2). The Shannon-Wiener Indices at the site 200 m SE of the outfall were significantly lower than at any other site. The Shannon-Wiener Indices at the site 350 m NW of the outfall were significantly greater than those at Waihi Reef. The Shannon-Wiener Indices at Pukeroa Reef were not significantly different from those at Waihi Reef or at the site 350 m NW of the outfall.

Table 2 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	NS	NS	SIG

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 3 Mean percentage sand cover per quadrat observed during the 2016 spring survey

Site	Mean sand coverage (%)	Mean silt coverage (%)	Total sand, silt and mud coverage (%)
Waihi Reef	1.08	0.00	1.08
350 m NW	17.24	0.00	17.24
200 m SE	6.63	0.08	6.71
Pukeroa Reef	1.10	0.00	1.10

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<sup>1</sup> 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.

## 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 spring surveys undertaken since 1992 are shown below.

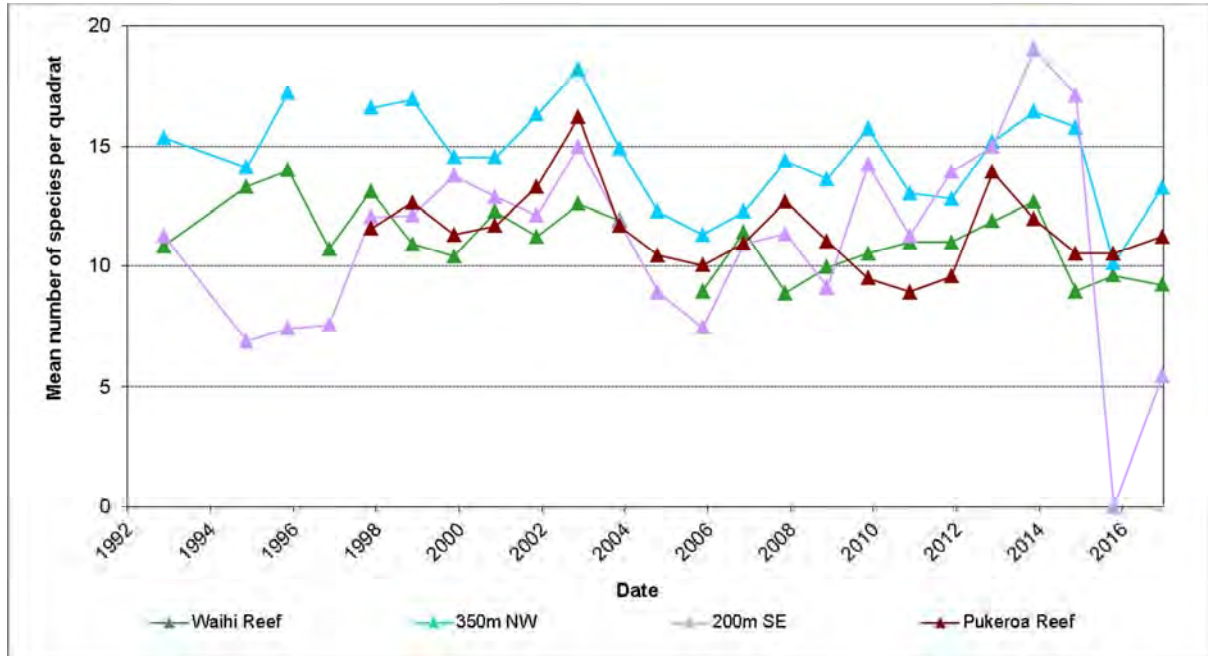


Figure 4 Mean number of species per quadrat for spring surveys 1992-2016

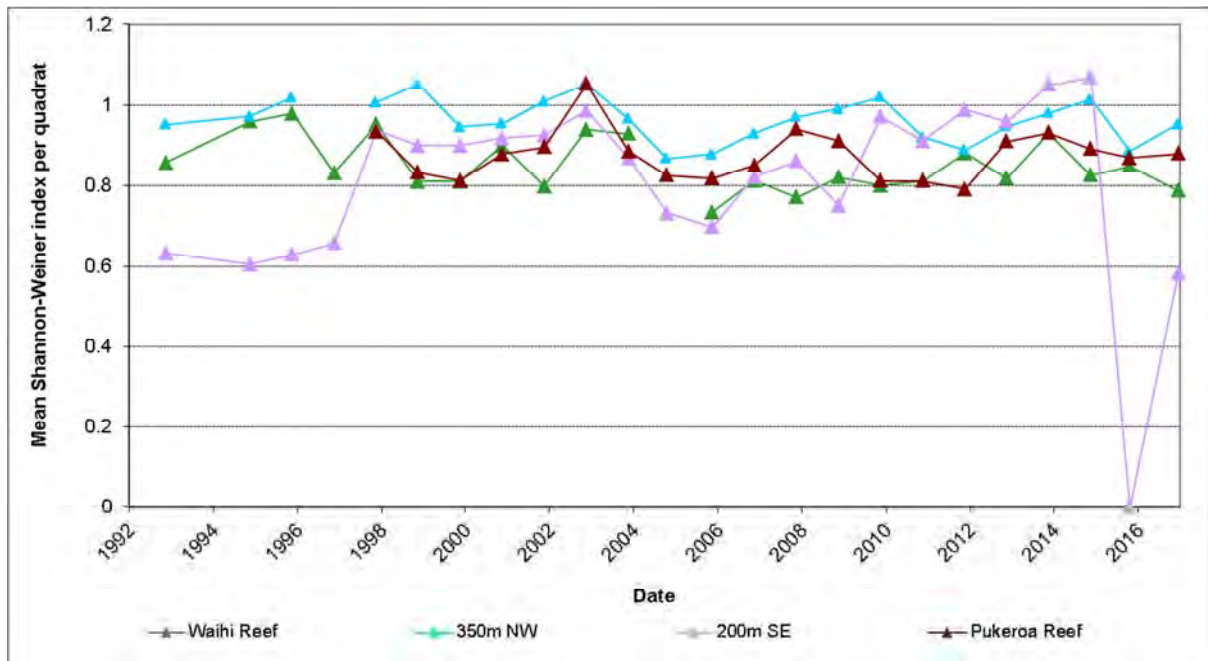


Figure 5 Mean Shannon-Weiner Indices per quadrat for spring surveys 1992-2016

The results from the 2016 spring survey show a small decrease in the mean number of species and Shannon-Wiener Index at Waihi Reef from the previous spring survey (Figures 4 and 5). These two measures

increased at all three impact sites following the previous survey. Of these three sites, the most profound increase from the results of spring 2015 was recorded at the site 200 m SE of the outfall.

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 1997, the survey sites have shown interannual variability in both number of species and Shannon-Weiner Index. However, there has been no noticeable difference in trends between the impact sites and the control site over this period, with the only exceptions being the years with heavy sand inundation (see summer survey memo's) or slips (e.g. 2016; Figures 4 and 5).

### Sand coverage

Over time, sand cover has generally remained low across the sites (Figure 6). 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.

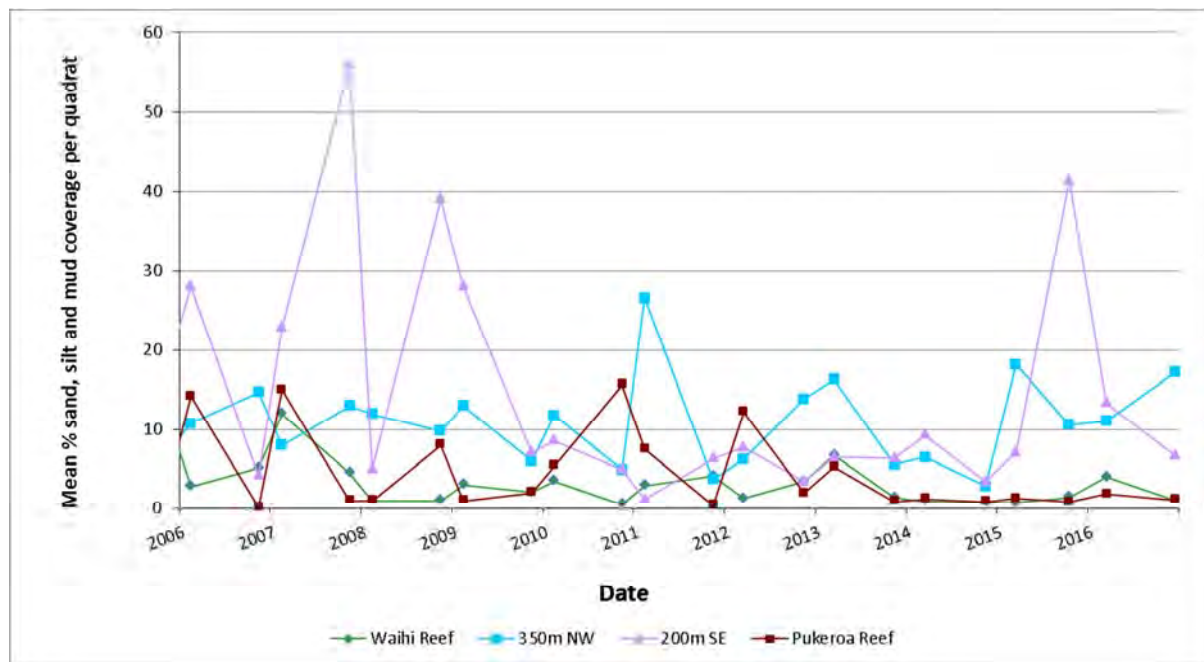


Figure 6 Mean percentage sand, silt and mud cover for summer and spring surveys (2006-2017)

## 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.



Photo 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, which was buried by a slip in the winter of 2015, had increased notably in terms of mean number of species (species richness) and Shannon-Wiener Index (diversity) compared to the previous survey; evidence of ongoing recovery. The remaining two impact sites also increased in terms of species richness and diversity compared with the previous survey. The control site, Waihi Reef, was the only site at which species richness and diversity had decreased. The impact site 350 m NW of the outfall had the greatest species richness and diversity recorded of all four sites, despite having the highest sand coverage. Long term results do not indicate any differential trends between the impact sites and control sites regarding species richness or diversity.

The cover of sand, silt and mud was low (<5%) at Pukeroa and Waihi Reefs during the 2016 spring survey. The sites 200 m SE and 350 m NW of the outfall had relatively higher levels of cover (6.71% and 17.24%, respectively). Coverage at the site 200 m SE of the outfall had decreased from that of the previous survey. During the survey it was evident that the slip material had been subjected to ongoing erosion, where the finer material was continually being washed away, leaving the larger rocks and gravels behind on the reef. The moderate cover of sand at the site 350 m NW of the outfall suggests a degree of resilience on the reef considering the high level of species richness and diversity that was recorded. 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 1 Green filaments of *Chaetomorpha*, an algal genus often associated with high nutrient concentrations (North Taranaki)

The inundation of earth, sand and silt resulting from cliff face erosion can be an important factor affecting species composition and diversity along the South Taranaki coastline. Indeed, the results presented here and in recent surveys have found land based erosion to be the single most influential factor affecting the intertidal communities at these sites, following the burial of the 200 m SE Reef site. 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 earth provides 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 increased suspended sediment in the seawater which can impact on filter feeding organisms and also algal growth through affecting light availability. In the current survey, it was noted that some species are starting to return to the 200 m SE Reef

site with much of the finer silt material having been washed away. The increased species richness and diversity recorded during this survey indicates that the gravels and rocks which remain covering the reef are accommodating the settlement and recovery of the intertidal community (Photograph 2).

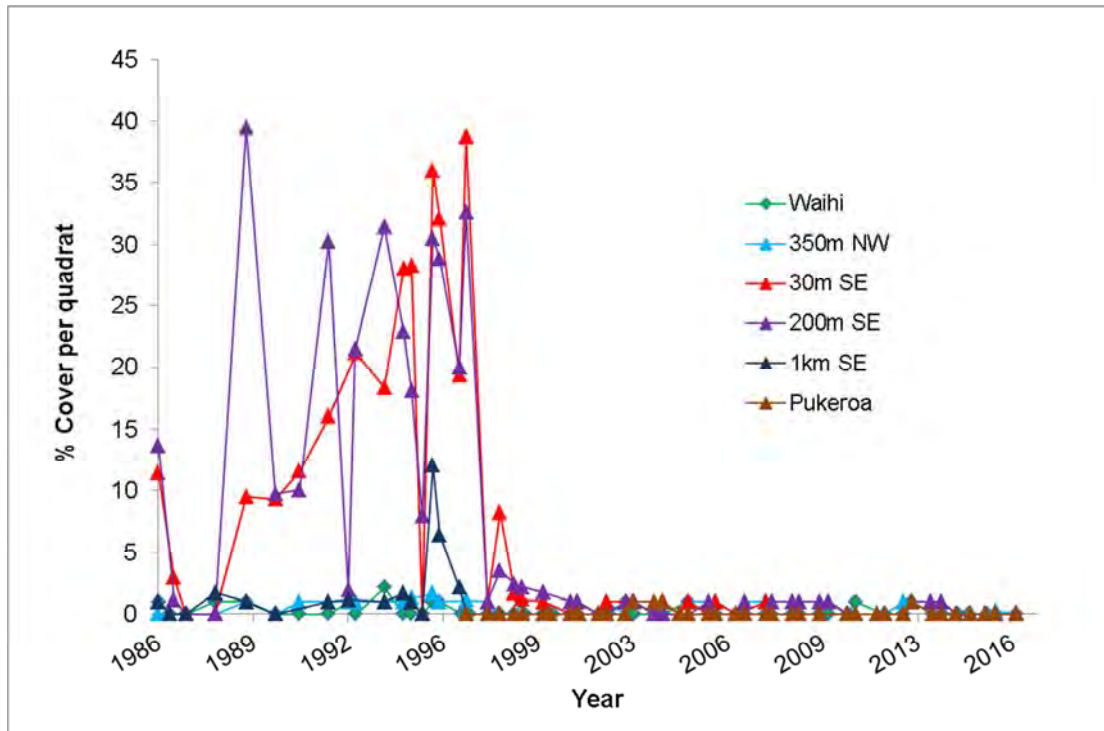


Figure 6 Percentage cover per quadrat of *Chaetomorpha*, 1986 – 2016

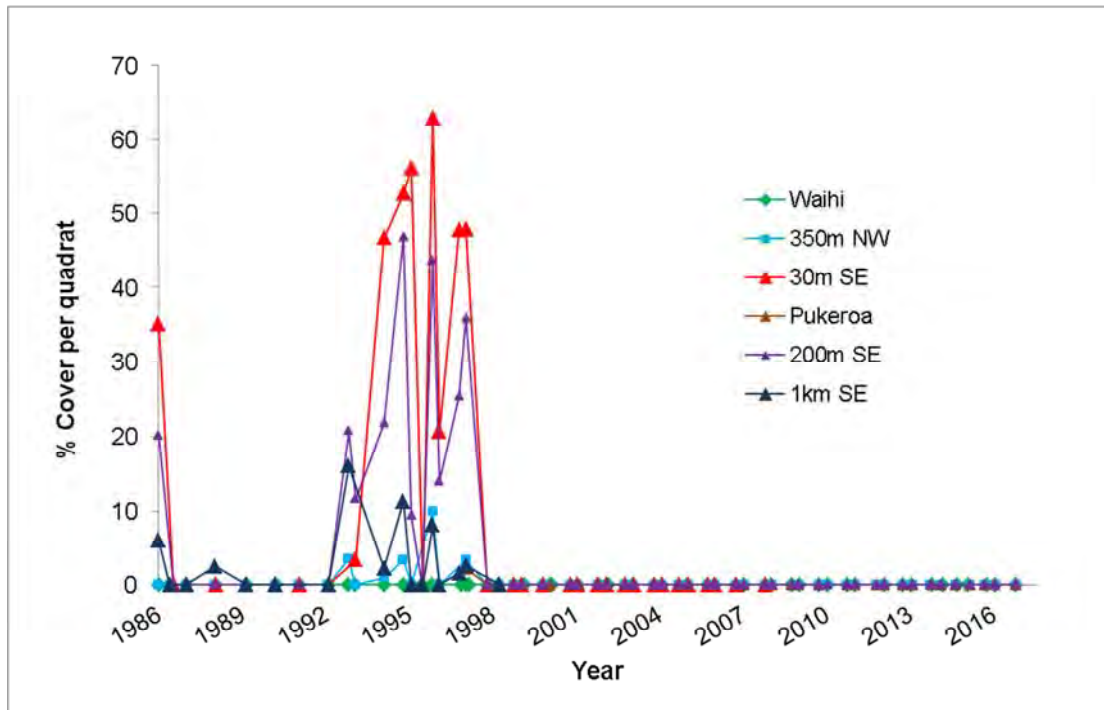


Figure 7 Percentage cover per quadrat of filamentous bacteria, 1986 - 2016

**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.

## 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 12<sup>th</sup> and 14<sup>th</sup> of December 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.

None of the potential impact sites showed significant declines in species richness or diversity in relation to the control site. Instead, the potential impact sites 350 m NW of the outfall and Pukeroa Reef had significantly greater species richness and diversity than Waihi Reef (the control site). The remaining potential impact site 200 m SE of the outfall showed signs of recovery after having been recently buried by a slip. 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**

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**To** Science Manager – Hydrology/Biology, Regan Phipps  
**From** Scientific Officer, Emily Roberts and Technical Officer, Angela Smith  
**Document** 1887304  
**Date** 23 June 2017

## Fonterra Whareroa/Hawera Municipal Combined Outfall – Marine Ecological Survey Summer 2016/17

### 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<sup>3</sup>/day. By comparison, the Fonterra Whareroa wastewater discharge limit was 26,000 m<sup>3</sup>/day. As of 19 September 2006, the permitted volume of wastewater discharge increased to 40,000 m<sup>3</sup>/day. The oxidation pond discharge was also increased to 12,000 m<sup>3</sup>/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 2016-2017 monitoring programme for the combined marine outfall. The 2016-2017 summer survey was conducted at four sites between 27 March and 24 April 2017; the results are reported in this memo.

### Methods

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) (Photos 1-3; Figure 1). The control site at Waihi Reef (Photo 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).



Photo 1 Surveying the potential impact site 350 m northwest of the outfall (28 March 2017)



Photo 2 Surveying the potential impact site 200 m southeast of the outfall (28 March 2017)



Photo 3 The survey site at Pukeroa Reef (8 June 2017)

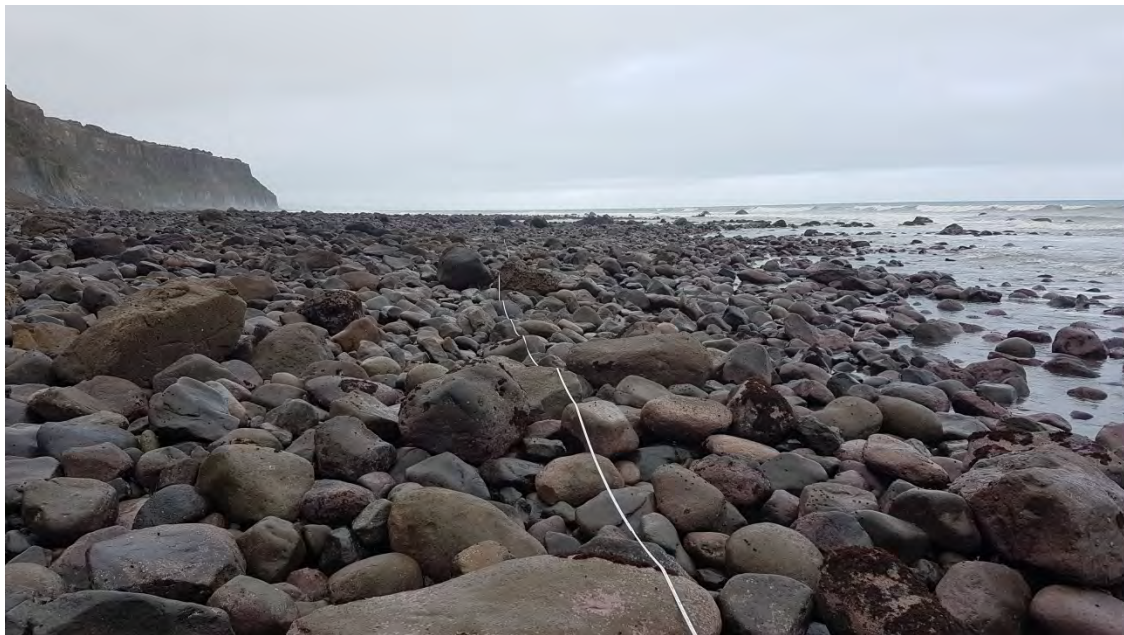


Photo 4 Surveying the site at Waihi Reef (27 March 2017)



Figure 1 Map of sampling 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 m<sup>2</sup> quadrats were laid giving a total of 25 random quadrats (Photo 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.



Photo 5 Survey at the site located 200 m SE of the outfall, showing the transect in use



## 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 2016-2017 summer survey

Site	Number 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	2.88	7.6	10.48	0.25	0.66	0.76
350 m NW	25	4.96	9.40	14.36	0.58	0.75	0.93
200 m SE	25	1.48	4.96	6.44	0.15	0.41	0.49
Pukeroa Reef	25	2.96	9.60	12.56	0.41	0.79	0.90

### 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.

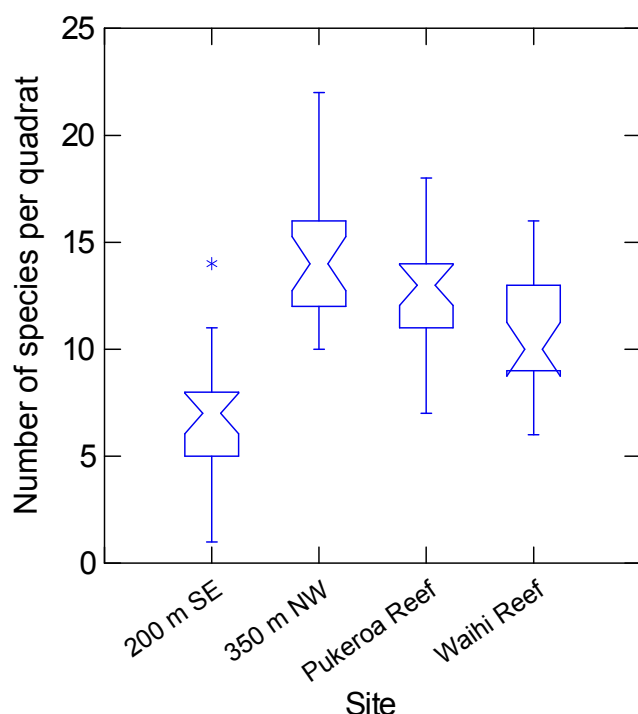


Figure 2 Box and whisker plots of the number of species per quadrat at each site

The data obtained from Waihi Reef, the site 200 m SE of the outfall and Pukeroa Reef conformed to the assumption of normal distribution. However, data from the site 350 m NW of the outfall significantly deviated from the normal distribution at the 95% confidence level (Lilliefors test,  $n = 25$ ,  $P < 0.05$ ). A natural

logarithmic transformation was applied to the data. Only the data obtained from the Waihi Reef and the site 200 m SE of the outfall conformed to the assumption of normal distribution following this transformation. The data from the remaining two 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 (Kruskal-Wallis,  $H = 52.08$ , degrees of freedom ( $df$ ) = 3,  $P < 0.001$ ). Significant differences between sites were determined using the Wilcoxon signed-ranks test, and are presented in Table 2. The total number of species found varied significantly between each site surveyed; in descending order of greatness, at the site located 350 m NW of the outfall, Pukeroa Reef, Waihi Reef and the site located 200 m SE of the outfall ( $n = 25$ ,  $P < 0.05$ ; Figure 2).

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	SIG	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.

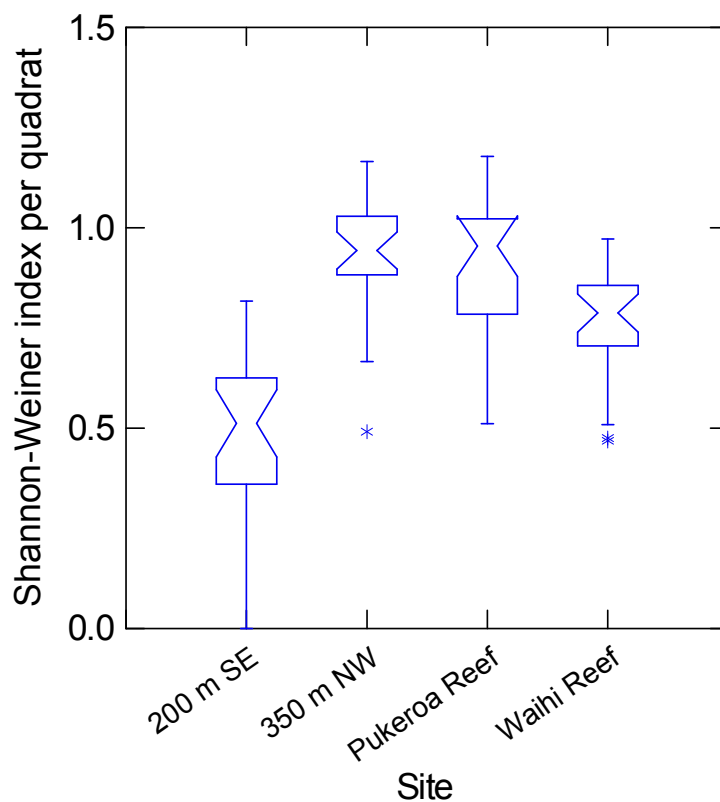


Figure 3 Box and whisker plots of Shannon-Weiner Indices at each site

The data obtained from each of the four surveys was found to be normally distributed (Lilliefors test,  $n = 25$ ,  $P > 0.05$ ). However the data variance at the site 200 m SE of the outfall was not homogeneous with the other sites (Figure 3). 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 Shannon-Weiner Indices between sites (Kruskal-Wallis,  $H = 51.08$ , degrees of freedom ( $df$ ) = 3,  $P < 0.001$ )<sup>1</sup>. Significant differences between sites were determined using the Wilcoxon signed-ranks test, and are presented in Table 3. The Shannon-Wiener Indices at Pukeroa Reef were not significantly different from those at the site 350 m NW of the outfall, and these two sites had significantly greater Shannon-Wiener Indices than the remaining two sites ( $n = 25$ ,  $P < 0.05$ ; Figure 3). The Shannon-Wiener Indices at the site 200 m SE of the outfall were significantly lower than at any other site ( $n = 25$ ,  $P < 0.05$ ; Figure 3).

Table 3 Wilcoxon signed ranks test with Shannon-Weiner index between sites

Site	Waihi	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

## 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 4 Mean sand coverage results for the 2017 summer survey

Site	Mean sand coverage (%)
Waihi Reef	0.60
350 m NW	15.84
200 m SE	4.33
Pukeroa Reef	0.64

## 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.

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<sup>1</sup> 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.

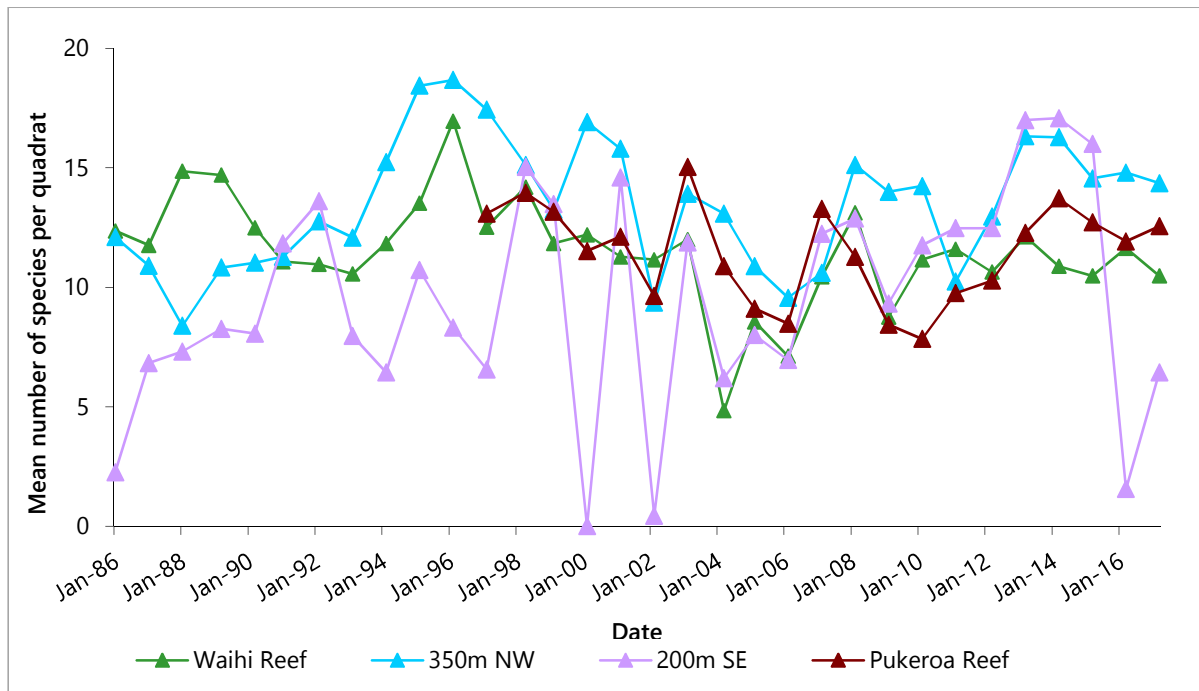


Figure 4 Mean number of species per quadrat for summer surveys (1986-2017)

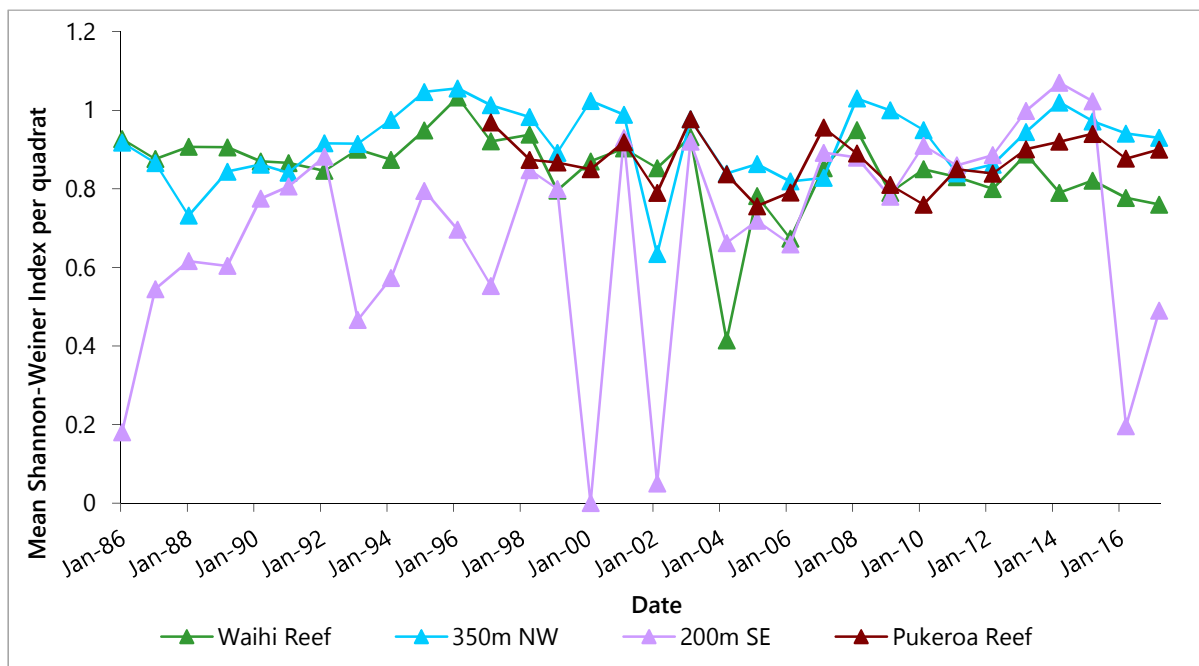


Figure 5 Mean Shannon-Weiner Indices per quadrat for summer surveys (1986-2017)

Prior to the installation of the long marine outfall in August 1997, both the number of species and the Shannon-Weiner Index per quadrat at the impact site 200 m SE were generally lower than at the control site at Waihi Reef (Figures 4 & 5). 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 4 & 5).

The results of the 2017 summer survey show a slight decrease in the mean number of species and the Shannon-Weiner index at Waihi Reef and 350 m NW when compared with the previous summer (Figures 4

& 5). The remaining two sites have shown an increase in the mean number of species and the Shannon-Weiner index from the previous summer.

### Sand coverage

Over time, sand cover has generally remained low across the sites (Figure 6). Occasionally, however, the reefs experience events of sand inundation, where coverage increases substantially. Over the past ten years, the sites worst affected by inundation events have been those 200 m SE and 350 m NW of the outfall.

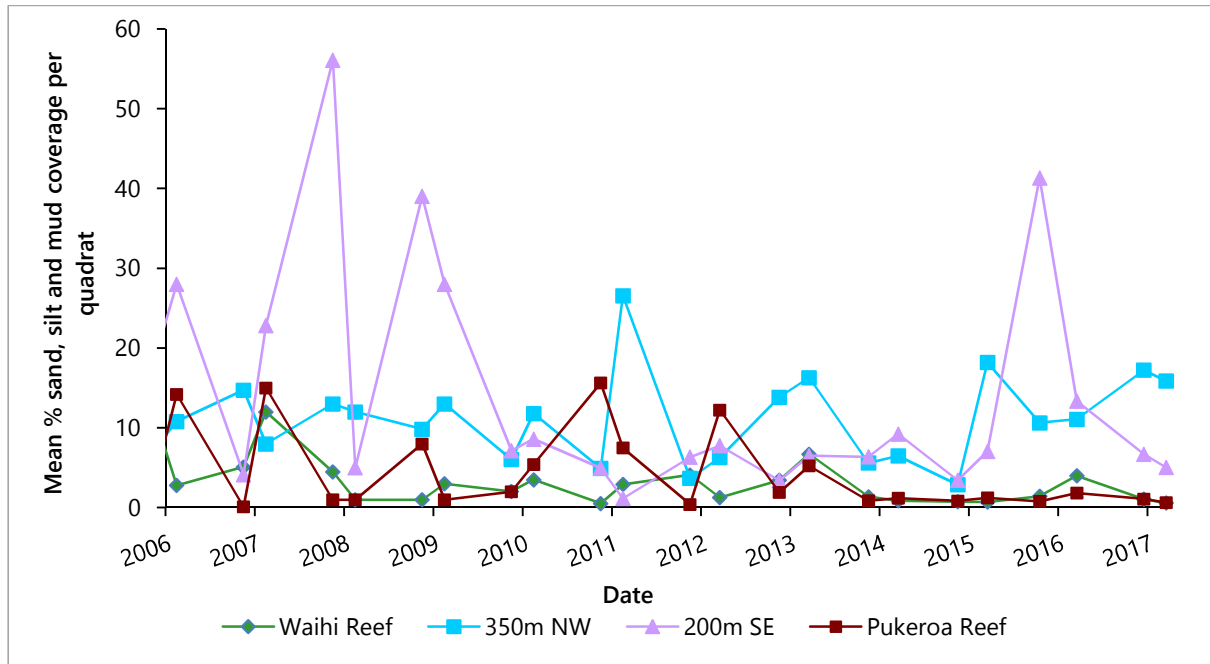


Figure 6 Mean percentage sand, silt and mud cover for summer and spring surveys (2006-2017)

## Discussion

Previous surveys have shown that the dairy factory wastewater discharged through the near-shore outfall prior to 1997 (Photo 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.



Photo 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 2017 summer survey results (Figures 4 & 5). Impact site 200 m SE, which was buried by a slip in the winter of 2015, had increased notably in terms of mean number of species (species richness) and Shannon-Wiener Index (diversity) compared to the previous survey; evidence of ongoing recovery. Compared with the previous survey, Pukeroa Reef also marginally increased in terms of species richness and diversity, while slight decreases were observed at impact site 350 m NW of the outfall and at the control site, Waihi Reef. The impact site 350 m NW of the outfall had the greatest species richness and diversity recorded of all four sites, despite having the highest sand coverage. Long-term results do not indicate any differential trends between the impact sites and control sites regarding species richness or diversity.

No coverage of silt and mud was observed at any of the sites during the 2017 spring survey. Sand coverage at the site 350 m NW of the outfall had increased from that of the previous survey, while coverage had decreased at all three of the remaining sites. The slip material deposited at site 200 m SE in 2015 had largely washed away, facilitating the recovery of impacted intertidal communities. The moderate cover of sand at the site 350 m NW of the outfall suggests a degree of resilience on the reef, considering the high level of species richness and diversity that was recorded. Long-term monitoring of intertidal rocky reefs around the Taranaki coastline has shown that the abundance and diversity of these communities can be

adversely affected when sand coverage exceeds 30%. High percentage sand cover (>30%) has previously been recorded at the site 200 m SE of the outfall (Figure 6).

The historical record of survey results (Figures 4 & 5) shows no obvious impact of the marine outfall discharge on local intertidal communities since the installation of the long outfall in 1997. Control and potential impact sites show interannual variability, and there are 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, prevents 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 4 & 5; Clark *et al.*, 2012).

The most notable change in species composition since the commissioning of the long outfall is the decline of *Chaetomorpha* sp. (Photo 7) and the absence of filamentous bacterial growths at the site 200 m SE of the outfall (Figures 7 & 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.



Photo 7 Green filaments of *Chaetomorpha*, an algal genus often associated with high nutrient concentrations (North Taranaki)

The inundation of earth, sand and silt resulting from cliff face erosion can be an important factor affecting species composition and diversity along the South Taranaki coastline. Indeed, the results presented here, and in recent surveys, have found land-based erosion to be the single most influential factor affecting the intertidal communities at these sites, following the burial of the 200 m SE reef site. 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, but observations indicate that freshly fallen earth provides 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 increased suspended sediment and restricted light availability in the seawater, which can impact on filter feeding organisms and algal growth respectively. In the current survey, it was noted that some species are starting to return to the 200 m SE Reef site, with much of the finer slip material having been washed away. The increased species richness and

diversity recorded during this survey indicates that the gravels and rocks which remain on the reef are accommodating the settlement and recovery of the intertidal community (Photo 2).

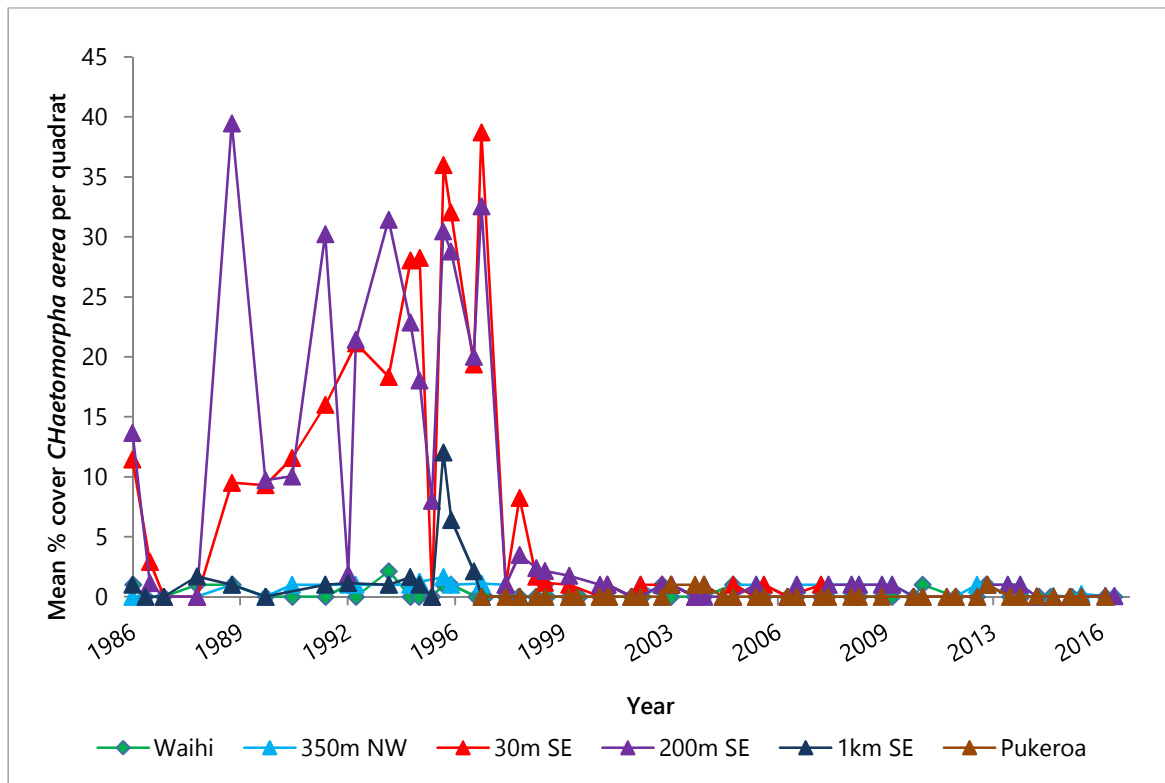


Figure 7 Mean percentage cover per quadrat of *Chaetomorpha aerea*, 1986-2017

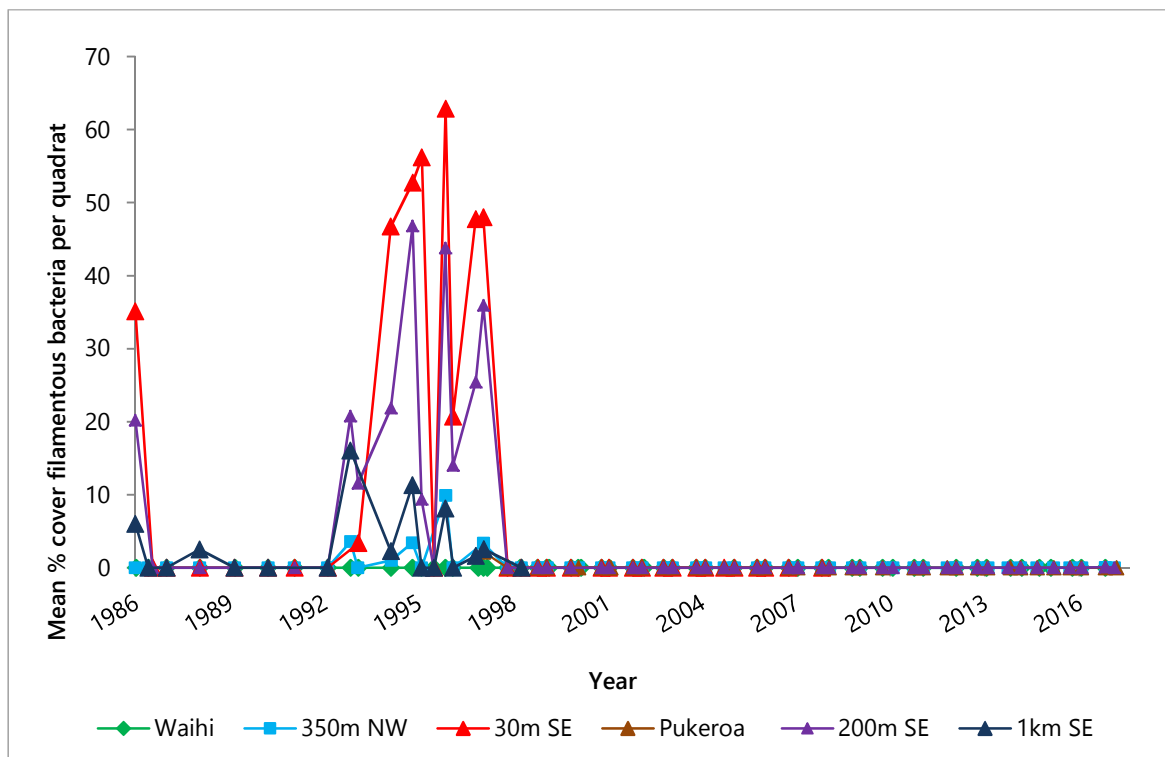


Figure 8 Mean percentage cover per quadrat of filamentous bacteria, 1986-2017

**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.



## 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 March and 24 April 2017 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 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.

None of the potential impact sites showed significant declines in species richness or diversity in relation to the control site. Instead, the potential impact sites 350 m NW of the outfall and Pukeroa Reef had significantly greater species richness and diversity than Waihi Reef (the control site). The remaining potential impact site located 200 m SE of the outfall showed signs of recovery after having been buried by a slip in 2015. 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**

Angela Smith

**Technical Officer**

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## Appendix VI

### PM<sub>10</sub> monitoring report



To Job Manager, Emily Roberts and Technical Officer, Angela Smith  
From Scientific Officer -Air Quality, Brian Cheyne  
File 1897624  
Date July 13, 2017

## PM 10 monitoring at Fonterra Whareroa Dairy Complex



Figure 1 PM10 monitoring sites in 2016-2017 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  $50 \mu\text{g}/\text{m}^3$  (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/m<sup>3</sup>] [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 28 to 35 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 and statistics for the two monitoring periods.

**Table 1 Daily mean of PM10 results during five days' monitoring at Whareroa dairy complex**

	Run 1 (28 hrs) (12-13/10/2016)		Run 2 (35 hrs) (31/03 to 01/04/2017)	
24 hr. set	Day 1	Day 2	Day 1 (Start to 24 hrs*)	Day 2 (24 hrs to end*)
Daily average	40.2 µg/m <sup>3</sup>	N/A	6.8 µg/m <sup>3</sup>	6.5 µg/m <sup>3</sup>
NES	50µg/m <sup>3</sup>			

## Findings

### First run

During the first 28-hour run, from 12 October to 13 October 2015, the average recorded PM<sub>10</sub> concentration was 40.2µg/m<sup>3</sup> for this monitoring period. These daily mean equate to 80.4% of the 50 µg/m<sup>3</sup> value that is set by both the National Environmental Standard and the resource consent. It is noted that the sudden increase in PM<sub>10</sub> at 1pm on 12 October 2016 coincided with a change in wind direction from NW to SW. This change may have caused suspension of the deposited matter from the staff car park which is located upwind of the monitor, with a consequent increase in recorded PM<sub>10</sub>.

### Second run

During the second 35-hour run, from 31 March to 1 April 2017, the average recorded PM<sub>10</sub> concentration for the first twenty-four hour period\* was 6.8µg/m<sup>3</sup> and 6.5µg/m<sup>3</sup> for the second twenty-four hour period\*. These daily means equate to 14% and 13% respectively, of the 50 µg/m<sup>3</sup> value that is set by both the National Environmental Standard and the resource consent 4103.

Background levels of PM<sub>10</sub> in the region have been found to be around 11 µg/m<sup>3</sup>.

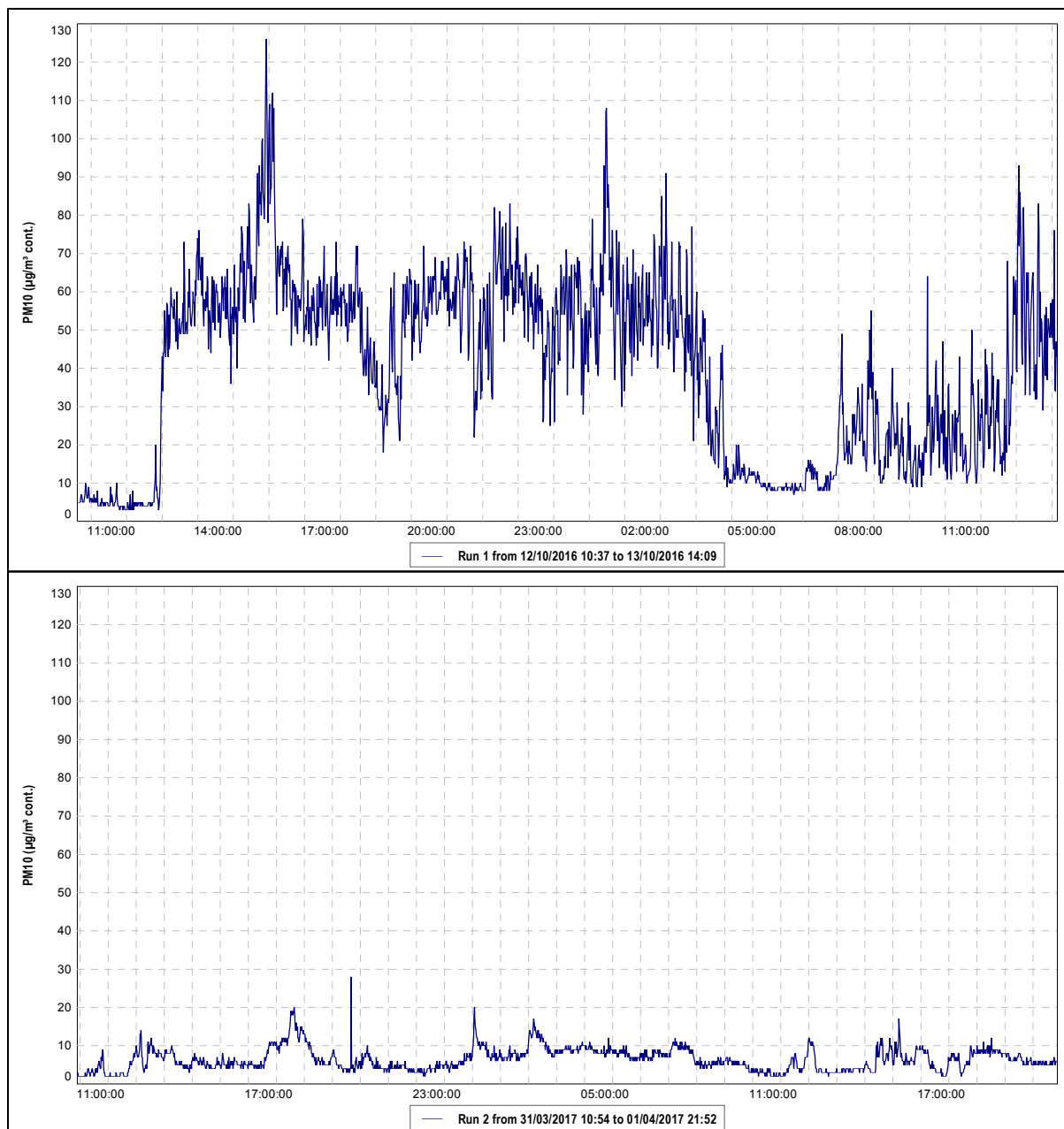
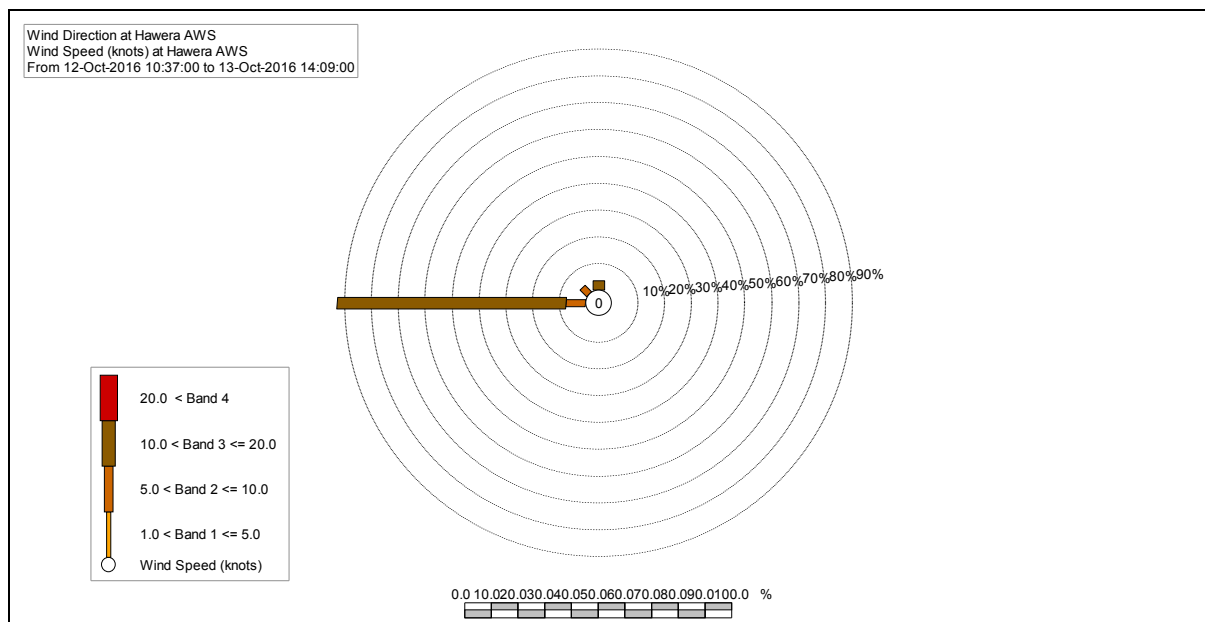


Figure 2 PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) at the Fonterra Whareroa dairy complex (2016-17)

Figure 3 Wind roses and stats for the two PM10 monitoring periods



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13-Jul-2017

~~~ PLWind ~~~

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Wind Direction at Hawera AWS and Wind Speed (knots) at Hawera AWS

From 12-Oct-2016 10:37:00 to 13-Oct-2016 14:09:00

Number of data points read : 27  
 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 : 27

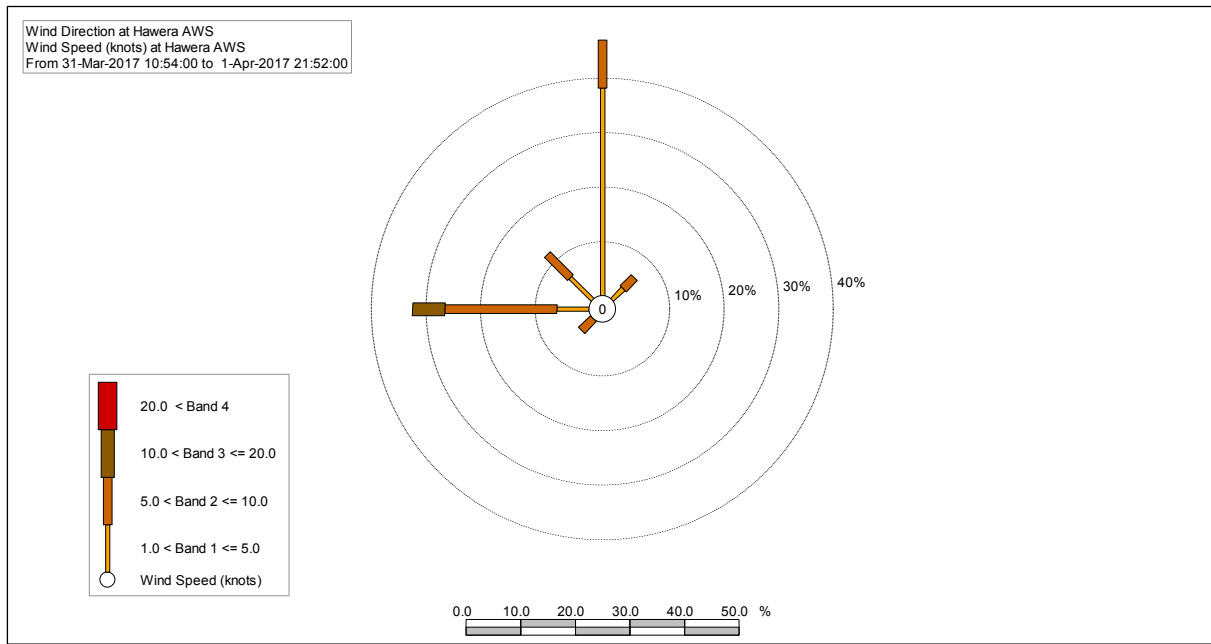
Percentage of time in each band

| Direction     | Band 1 | Band 2 | Band 3            | Band 4 | Total |
|---------------|--------|--------|-------------------|--------|-------|
| 337.5 - 22.4  | 0.0    | 0.0    | 3.7               | 0.0    | 3.7   |
| 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    | 7.4    | 85.2              | 0.0    | 92.6  |
| 292.5 - 337.4 | 0.0    | 3.7    | 0.0               | 0.0    | 3.7   |
| Total         | 0.0    | 11.1   | 88.9              | 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





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13-Jul-2017

~~~ PLWind ~~~

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Wind Direction at Hawera AWS and Wind Speed (knots) at Hawera AWS

From 31-Mar-2017 10:54:00 to 1-Apr-2017 21:52:00

Number of data points read : 34  
 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 : 34

Percentage of time in each band

| Direction     | Band 1 | Band 2 | Band 3        | Band 4 | Total |
|---------------|--------|--------|---------------|--------|-------|
| 337.5 - 22.4  | 38.2   | 8.8    | 0.0           | 0.0    | 47.1  |
| 22.5 - 67.4   | 2.9    | 2.9    | 0.0           | 0.0    | 5.9   |
| 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    | 2.9    | 0.0           | 0.0    | 2.9   |
| 247.5 - 292.4 | 5.9    | 20.6   | 5.9           | 0.0    | 32.4  |
| 292.5 - 337.4 | 5.9    | 5.9    | 0.0           | 0.0    | 11.8  |
| Total         | 52.9   | 41.2   | 5.9           | 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



## Appendix VII

### NO<sub>x</sub> monitoring report



## Memorandum

**To** Alex Connolly, Scientific Officer – State of the Environment  
Job Managers - Callum MacKenzie, Emily Roberts, Nathan Crook  
**From** Brian Cheyne, Scientific Officer – Air Quality  
**File** Frodo # 1812090  
**Date** 28 March 2017

### **Monitoring of nitrogen oxides (NO<sub>x</sub>) levels in Taranaki near the NO<sub>x</sub> emitting sites, year 2016-2017**

From 2014 onwards, the Taranaki Regional Council (TRC) has implemented a coordinated region-wide monitoring programme to measure NO<sub>x</sub>, not only at individual compliance monitoring sites near industries that emit NO<sub>x</sub>, but simultaneously at the urban sites (the Council 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.

#### **Nitrogen oxides**

Nitrogen oxides (NO<sub>x</sub>), a mixture of nitrous oxide (N<sub>2</sub>O), nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), are produced from natural sources, motor vehicles and other fuel combustion processes. Indoor domestic appliances (gas stoves, gas or wood heaters) can also be significant sources of nitrogen oxides, particularly in areas that are poorly ventilated. NO and NO<sub>2</sub> are of interest because of potential effects on human health.

Nitric oxide is colourless and odourless and is oxidised in the atmosphere to form nitrogen dioxide. Nitrogen dioxide is an odorous, brown, acidic, highly corrosive gas that can affect our health and environment. Nitrogen oxides are critical components of photochemical smog – nitrogen dioxide produces the brown colour of the smog.

#### **Environmental and health effects of nitrogen oxides**

Nitrogen dioxide is harmful to vegetation, can fade and discolour fabrics, reduce visibility, and react with surfaces and furnishings. Vegetation exposure to high levels of nitrogen dioxide can be identified by damage to foliage, decreased growth or reduced crop yield.

Nitric oxide does not significantly affect human health. On the other hand, elevated levels of nitrogen dioxide cause damage to the mechanisms that protect the human respiratory tract and can increase a person's susceptibility to, and the severity of, respiratory infections and asthma. Long-term exposure to high levels of nitrogen dioxide can cause chronic lung disease. It may also affect sensory perception, for example, by reducing a person's ability to smell an odour.

#### **National environmental standards and guidelines**

In 2004, national environmental standards (NES) for ambient (outdoor) air quality were introduced in New Zealand to provide a guaranteed level of protection for the health of New Zealanders. The national standard for nitrogen dioxide (NO<sub>2</sub>) is set out below.

*In any 1-hour period, the average concentration of nitrogen dioxide in the air should not be more than 200 µg/m<sup>3</sup>.*

Before the introduction of the national environmental standards, air quality was measured against the national air quality guidelines. The national guidelines were developed in 1994 and revised in 2002 following a comprehensive review of international and national research and remain relevant. The national guideline for nitrogen dioxide (NO<sub>2</sub>) is set out below.

*In any 24-hour period, the average concentration of nitrogen dioxide in the air should not be more than 100 µg/m<sup>3</sup>.*

Nitrogen dioxide limits are also set in the special conditions of the resource consents. The consents limits are the same as those imposed under the NES and MfE's guideline.

### **Measurement of nitrogen oxides**

The Taranaki Regional Council has been monitoring nitrogen oxides (NO<sub>x</sub>) in the Taranaki region since 1993 using passive absorption discs. Research to date indicates that this is an accurate method, with benefits of simplicity of use and relatively low cost. To date more than 690 samplers of nitrogen oxides have been collected in Taranaki region. Discs are sent to EUROFINs ELS Ltd. Lower Hutt for analysis. Passive absorption discs are placed at the nominated sites. The gases diffuse into the discs and any target gases (nitrogen dioxide or others) are captured.

In the 2016-17 year, passive absorption discs were placed on one occasion at twenty four sites, staked about two metres off the ground for a period of 21 days, for the purpose of Compliance Monitoring.

### **Conversion of exposure result to standardised exposure time period**

From the average concentration measured, it is possible to calculate a theoretical maximum daily or one hour concentrations that may have occurred during the exposure period. Council data on NO<sub>x</sub> is gathered over a time period other than exactly 24 hours or one hour. 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 in general use is of the form:

$$C(t_2) = C(t_1) \times \left(\frac{t_1}{t_2}\right)^p$$

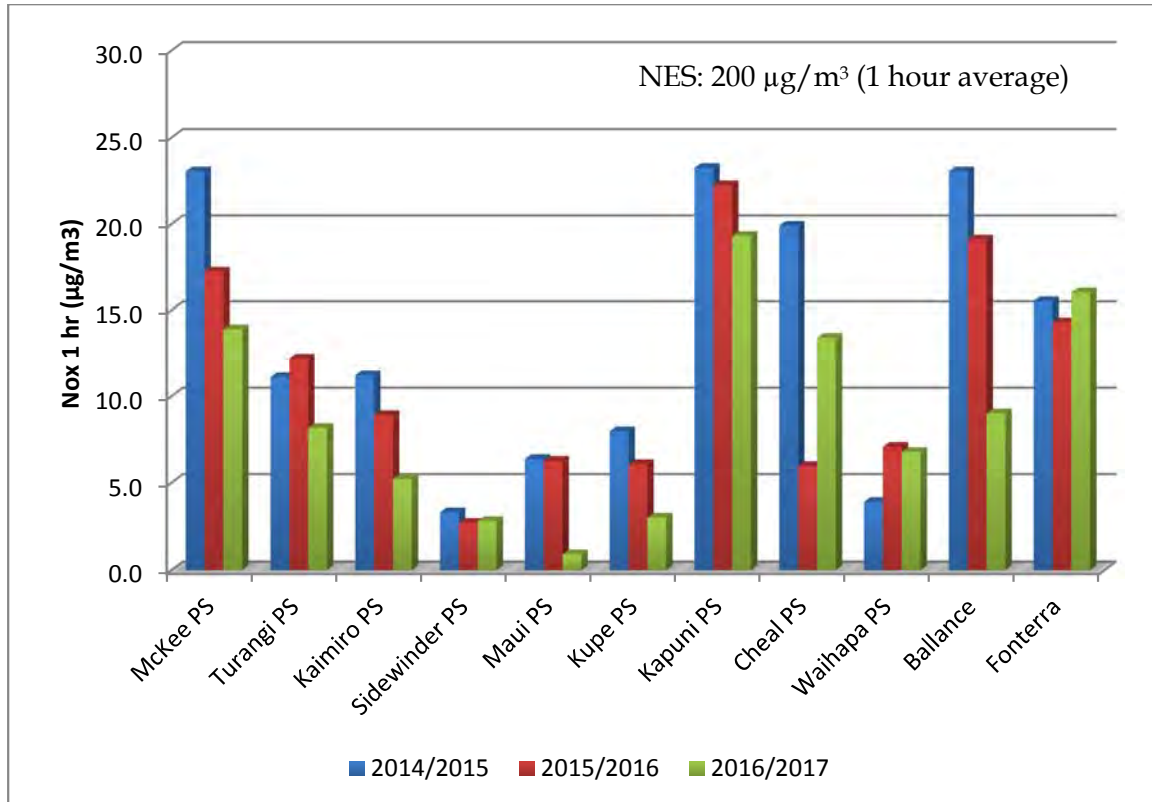
where C(t) = the average concentration during the time interval t, and p = a factor lying between 0.17 and 0.20. When converting from longer time periods to shorter time periods, using p = 0.20 gives the most conservative estimate (i.e. the highest calculated result for time period t<sub>2</sub> given a measured concentration for time period t<sub>1</sub>). Using the 'worst case' factor of p = 0.20, the monitoring data reported above has been converted to equivalent 'maximum' 1-hour and 'maximum' 24-hour exposure levels.

## Results

The location of the NO<sub>x</sub> monitoring sites are shown in Figure 1 and the details of the NO<sub>x</sub> results are presented in Table 1 and Figure 2.

**Table 1** Actual (laboratory) and recalculated ambient NO<sub>x</sub> results, NES and MfE guideline.

|  | Survey at     | Site code | NO <sub>x</sub> (µg/m <sup>3</sup> )<br>Lab. results | NO <sub>x</sub> 1/hr (µg/m <sup>3</sup> )<br>Theoretical max. | NO <sub>x</sub> 24/hr (µg/m <sup>3</sup> )<br>Theoretical max. |
|--|---------------|-----------|--|---|--|
| Petrochemical  | McKee PS      | AIR007901 | 1.2  | 4.2   | 2.2  |
|  |               | AIR007902 | 6.8  | 23.6  | 12.5   |
|  | Turangi PS    | AIR007822 | 3.2  | 11.1  | 5.9  |
|  |               | AIR007824 | 1.5  | 5.2   | 2.8  |
|  | Kaimiro PS    | AIR007817 | 0.6  | 2.1   | 1.1  |
|  |               | AIR007818 | 2.4  | 8.3   | 4.4  |
|  | Sidewinder PS | AIR007831 | 0.5  | 1.7   | 0.9  |
|  |               | AIR007832 | 1.1  | 3.8   | 2.0  |
|  | Maui PS       | AIR008201 | 0.4  | 1.4   | 0.7  |
|  |               | AIR008214 | 0.1  | 0.4   | 0.2  |
|  | Kupe PS       | AIR007827 | 0.4  | 1.4   | 0.7  |
|  |               | AIR007830 | 1.3  | 4.5   | 2.4  |
|  | Kapuni PS     | AIR003410 | 2.7  | 9.7   | 4.5  |
|  |               | AIR003411 | 8.4  | 29.2  | 15.4   |
|  | Cheal PS      | AIR007841 | 0.5  | 1.7   | 0.9  |
|  |               | AIR007842 | 7.2  | 25.0  | 13.2   |
| Waihapa PS   | AIR007815     | 1.5       | 3.1  | 1.6   |  |
|  | AIR007816     | 3.0       | 10.4   | 5.5   |  |
| Ballance AUP   | AIR003401     | 0.5       | 1.7  | 0.9   |  |
|  | AIR003404     | 4.7       | 16.3   | 8.6   |  |
| Dairy<br>factory   | Fonterra      | AIR002410 | 7.1  | 24.6  | 13.0   |
|  |               | AIR002711 | 7.0  | 24.3  | 12.9   |
|  |               | AIR002412 | 2.2  | 7.6   | 4.0  |
|  |               | AIR002413 | 2.1  | 7.3   | 3.9  |
| <b>National Environmental Standard (NES) and MfE guideline</b> |               |           |  | <b>200 (NES)</b>  | <b>100 (guideline)</b>   |



**Figure 2** Average NOx levels at 11 surveyed locations throughout the region (year 2016-2017).

## Discussion

The calculated 1-hour and 24-hour theoretical maximum concentrations (using a power law exponent of 0.2) ranged from 0.4 µg/m<sup>3</sup> to 29.2 µg/m<sup>3</sup> and 0.2 µg/m<sup>3</sup> to 15.4 µg/m<sup>3</sup> respectively. The highest results in 2016-17 monitoring year were obtained from the NOx emitting sites at four different locations:

1. In Kapuni heavy industrial area around the STOS production station.
2. Around the Fonterra's Whareroa co-generation plant.
3. From the sites at McKee production station.
4. And around the Cheal production station.

All values were within the National Environmental Standards, Ministry for the Environment Ambient Air Quality Guidelines and the respective resource consents limits. This continues the pattern found in previous years.



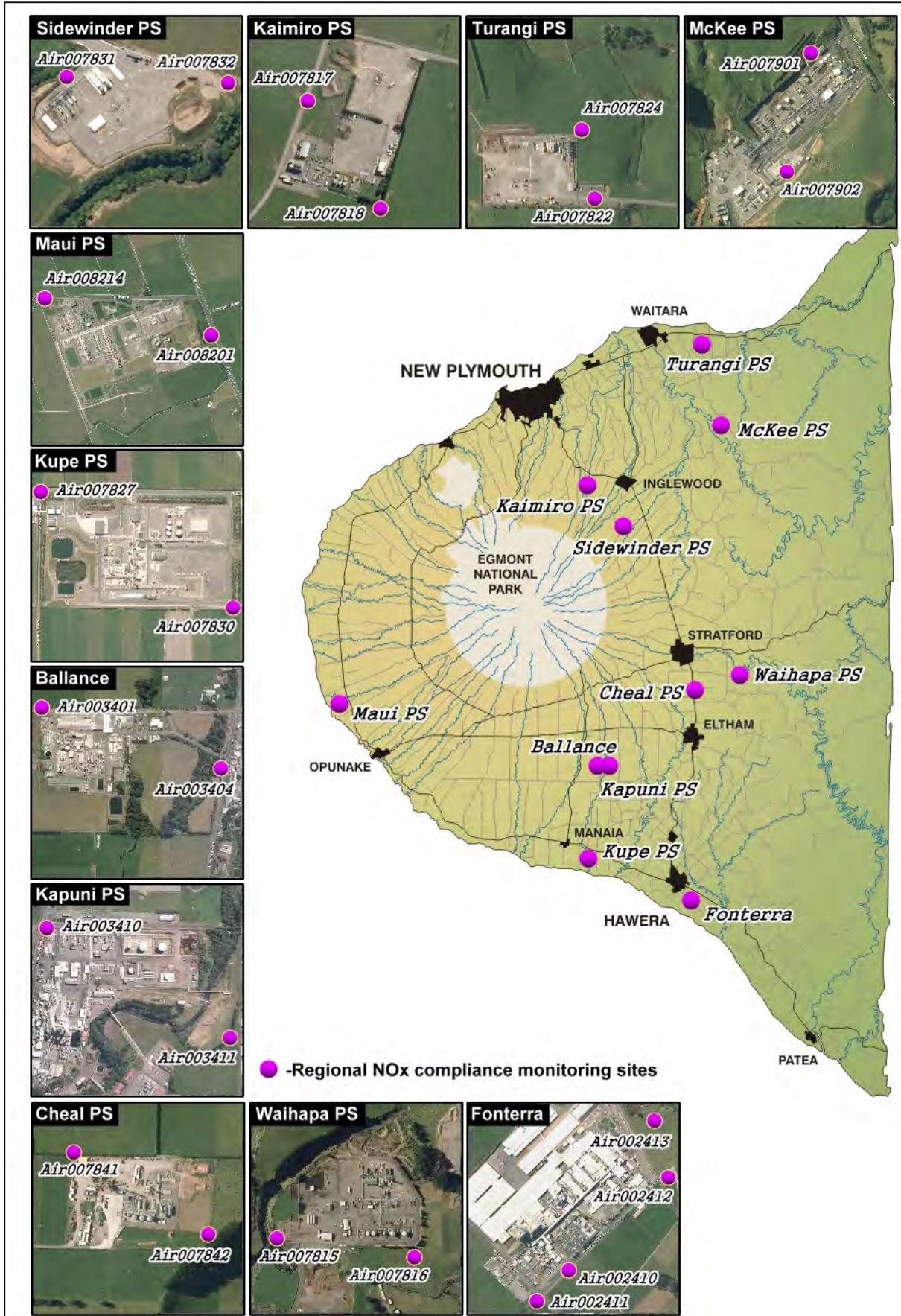


Figure 1 NOx monitoring sites in Taranaki Region, 2016-2017

## Ministry for the Environment environmental performance indicator

Ministry for the Environment uses an environmental performance indicator to categorise air quality. These categories are set out in Table 2 and further details of the entire NO<sub>x</sub> results are set out in Table 3.

**Table 2** Environmental Performance Indicator air quality categories

| Measured value | Less than 10% of NES | 10-33% of NES | 33-66% of NES     | 66-100% of NES | More than 100% of NES |
|----------------|----------------------|---------------|-------------------|----------------|-----------------------|
| Category       | <i>excellent</i>     | <i>good</i>   | <i>acceptable</i> | <i>alert</i>   | <i>action</i>         |

**Table 3** Categorisation of results (2016-17 monitoring year)

| National Environmental Standard for NO <sub>2</sub> = 200 µg/m <sup>3</sup> - 1 hour average. |  |                  |
|---|--|------------------|
| Category  | Measured values                                  |                  |
| Excellent   | <10% of the NES, (0-20µg/m <sup>3</sup> )        | <b>19</b> (79%)  |
| Good  | 10-33% of the NES, (20-66µg/m <sup>3</sup> )     | <b>5</b> (21 %)  |
| Acceptable  | 33-66% of the NES, (66-132 µg/m <sup>3</sup> )   | <b>0</b> (0%)    |
| Alert   | 66-100% of the NES, (132-200 µg/m <sup>3</sup> ) | <b>0</b> (0%)    |
| <b>Total number of samples</b>  |  | <b>24</b> (100%) |

## Conclusion

The monitoring showed that 79% of the 1-hour average results fell into Ministry's 'excellent' categories and 21% of the results lay within Ministry's 'good' category. No results ever entered the 'acceptable' or 'alert' categories, i.e., no results ever exceeded the National Environmental Standard of 200µg/m<sup>3</sup>.

These results, and all regional monitoring to date, have shown that Taranaki has very clean air, and on a regional basis there are no significant pressures upon the quality of the air resource.