

Tawhiti Catchment  
Monitoring Programme  
Annual Report  
2014-2015

Technical Report 2015-118

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Taranaki Regional Council  
Private Bag 713  
STRATFORD

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## Executive summary

The Tawhiti Stream catchment, east of Hawera, is the location of several industries that include a meat processing plant, a meat rendering plant, and a trout hatchery. The companies that run these industries hold a number of resource consents to allow abstraction of water, discharge of stormwater to the stream, discharge of emissions into the air, disposal of paunch material to land, and placement of a structure across the stream. This report for the period July 2014-June 2015 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the companies' environmental performance during the period under review, and the results and effects of the companies' activities.

A total of 12 resource consents are held, which include a total of 101 conditions setting out the requirements that the companies must satisfy.

The Council's monitoring programme included site inspections, the collection of discharge water samples, and sampling of the receiving water body for physico-chemical analysis. A hydrometric station is maintained on the stream for the continuous measurement of flow rate and temperature.

### **Silver Fern Farms Ltd (meat processing plant) demonstrated an overall high level of environmental performance.**

The Company holds six resource consents, to allow it to maintain a dam in and to take from the Tawhiti Stream; to discharge to the stream and to land; and to discharge emissions into the air.

During the period under review, one incident was registered against the site, in relation to flooding behind the dam during an exceptional rain event. Investigation found compliance with the relevant consent.

Abstraction volumes complied with the consent limit. Telemetry of abstraction data to Council was installed in October 2012, with provision for transmission of cooling water flow and temperature data in the future, if required.

### **Graeme Lowe Protein Ltd (meat rendering plant) demonstrated an overall high level of environmental performance.**

The Company holds four resource consents, to allow it to take from and discharge to the Tawhiti Stream, and to discharge emissions into the air.

In September 2014, the plant ceased to process renderable materials, except blood. Offal from the adjacent meat processing plant was stored on site for daily transport to a rendering plant at Okaiawa.

During the period under review there were three unauthorised incidents reported in relation to activities at the site, all about odour. None of the complaints was substantiated. It is noted that the installation of a bio-filter in 2009 has resulted in much better odour control at the site, and further improvement was made in 2014-2015 through the installation of enclosed

blood tanks and ventilation of the tanks and offal storage area to the bio-filter via wet scrubbers.

Abstraction volumes complied with the consent limit. Telemetry of abstraction data to Council was installed in October 2012, with provision for transmission of cooling water flow and temperature data in future, if required.

**Taranaki Fish and Game (trout hatchery) demonstrated an overall high level of environmental performance.**

The organisation holds two resource consents, to allow it to take and use water from, and to discharge to, the Tawhiti Stream. Two inspections were conducted during the review period, which indicated that contaminants in the discharge to the Tawhiti Stream were minimal and had no significant environmental effect.

During the period under review, there were no unauthorised incidents reported in relation to activities at the site.

Physico-chemical surveys of Tawhiti Stream, carried out on three occasions in dry and wet weather conditions during the review period, showed no adverse effect on the stream as the result of activities at the sites of Silver Fern Farms Ltd, Graeme Lowe Protein Ltd and Taranaki Fish & Game.

All 12 of the consents held in relation to the Tawhiti Stream monitoring programme provide for an optional review in June 2016. Based on the results of monitoring in the period under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review of any of the consents to be pursued.

For reference, in the 2014-2015 year, 75% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 22% demonstrated a good level of environmental performance and compliance with their consents.

It is recommended that the monitoring programme for 2015-2016 continue at its present level.

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# 1. Introduction

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

### 1.1.1 Introduction

This report is the Annual Report for the period July 2014-June 2015 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by three industries<sup>1</sup> in the Tawhiti Stream catchment near Hawera.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by those industries that relate to abstractions of and discharges to water and emissions to air from these sites within the Tawhiti Stream catchment. The report combines the results for Silver Fern Farms Ltd, Graeme Lowe Protein Ltd and Taranaki Fish and Game Council trout hatchery.

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 the industries' use of water, land, and air, and is the seventh combined annual report by the Council for the Tawhiti Stream catchment. Silver Fern Farms and Graeme Lowe Protein, which are included in the Tawhiti Stream catchment report, were previously reported on individually.

### 1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the RMA and the Council's obligations and general approach to monitoring sites through annual programmes, the resource consents held by companies in the Tawhiti Stream catchment, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted in the industries within the Tawhiti Stream catchment.

Sections 2 to 4 present and discuss the results of monitoring for the three industries during the period under review, including scientific and technical data, the interpretation of the results, and their significance for the environment.

Recommendations to be implemented in the 2015-2016 monitoring period are made for each industry, with a summary provided in Section 5.

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

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<sup>1</sup> Activities of resource consents that are not covered by the Tawhiti Stream Resource Consents Monitoring Programme, for Fonterra Whareroa Dairy Factory and South Taranaki District Council Hawera Landfill, are included in other monitoring programmes carried out by the Council.

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

The *Resource Management Act 1991* (RMA) primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

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

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Taranaki Regional 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. 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 the companies in the catchment during the period under review, this report also assigns a rating as to each company's environmental and administrative performance.

**Environmental performance** is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. **Administrative performance** is concerned with the companies' 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 these were addressed without repeated interventions from the Council staff. Alternatively adequate reason

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

- **Improvement required** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.
- **Poor** Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

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

## 1.2 Resource consents

The resource consents of the industries monitored are listed in Table 1. Details of these consents are also summarised in each section specific to the industry under discussion, and copies of the resource consents are given in Appendix I. Five of the twelve consents were replaced during the review period.

**Table 1** Resource consents for industrial activities in the Tawhiti catchment

Consent holder	Consent number	Purpose of consent	Volume	Next review date	Expiry date
Silver Fern Farms Limited	1091-4	Take water	3,500 m <sup>3</sup> /day	2015	2028
	1103-4	Discharge water from condenser cooling	2,500 m <sup>3</sup> /day	2015	2028
	4832-2	Discharge paunch waste to land	4,500 tonnes/year	2016	2028
	4995-2	Construct a dam structure		2016	2028
	5598-2	Discharge stormwater		2016	2028
	5599-2	Discharge emissions to air		2016	2028
Graeme Lowe Protein Limited	1104-4	Discharge stormwater	3,000 m <sup>3</sup> /day	2016	2028
	4033-6	Discharge emissions to air		2016	2028
	7610-2	Take water	2,500 m <sup>3</sup> /day	2015	2028
	7611-2	Discharge water from condenser cooling		2015	2028
Taranaki Fish and Game	0523-3	Take and use water	11.4 l/s	2016	2028
	7546-1	Discharge water from trout hatchery		2016	2022

### **1.2.1 Water permits**

Prior to 2010, two consents were held to take water from the Tawhiti Stream. Silver Fern Farms was allowed to take water for refrigeration condenser cooling purposes and meat processing operations, and Taranaki Fish and Game had consent to divert water for the purposes of operating a fish hatchery.

In February 2010, part of the water permit held by Silver Fern Farms was transferred to Graeme Lowe Protein, which also had been using the water, in order to facilitate the authorisation of both uses after the permit expired in June 2010. Replacement water permits were granted to Silver Fern Farms and Graeme Lowe Protein in March 2013.

### **1.2.2 Discharge permits**

Five consents provide for the discharge of stormwater and cooling water (one of each from the meat processing and rendering plants) and of wastewater (from the trout hatchery) to the Tawhiti Stream and a tributary. Two consents authorise discharges to air.

### **1.2.3 Land use consents**

Two land use consents are held; one for a dam, and one for discharge of paunch material.

## **1.3 Monitoring programme**

### **1.3.1 Introduction**

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

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

The monitoring programme for the Tawhiti Stream catchment consisted of three primary components.

### **1.3.2 Programme liaison and management**

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

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

### **1.3.3 Site inspections**

All sites were scheduled for inspection in the monitoring programme. These inspections are detailed in the relevant sections related to each industry. 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. 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 the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### **1.3.4 Chemical sampling**

The Council undertook sampling of both discharges from industrial sites and the water quality in the receiving Tawhiti Stream catchment. The locations of these sites are shown in Figure 1.

The programme specified that the discharges from the meat processing plant, rendering plant, and trout hatchery were to be monitored, together with four sites in the Tawhiti receiving waters. The samples were analysed for those parameters that are listed in Table 2.

### **1.3.5 Fish survey**

A fish community survey was undertaken in Tawhiti Stream triennially in order to assess the performance of the fish pass at the water abstraction weir. The first triennial survey took place in the previous monitoring period, in January 2014.

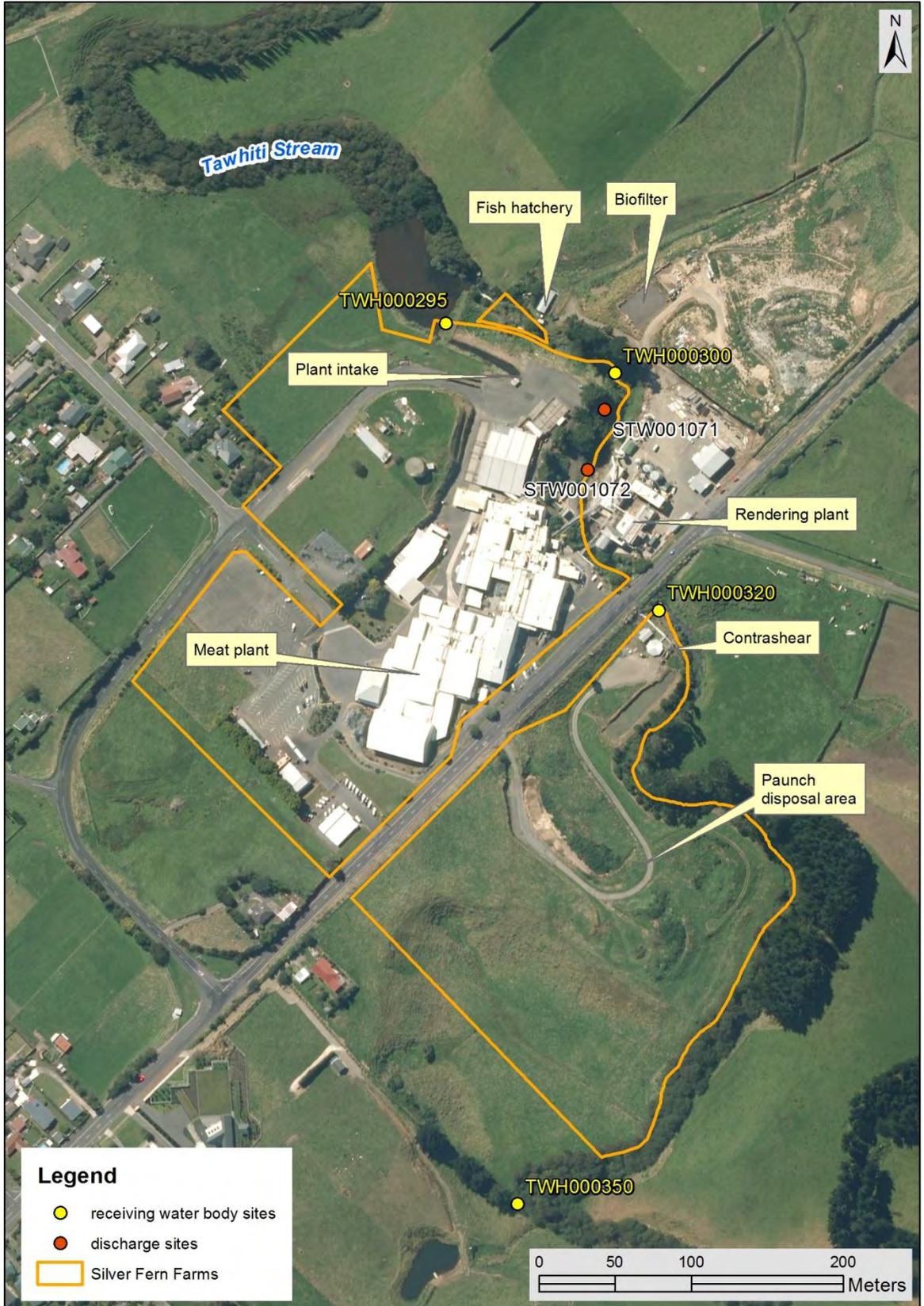


Figure 1 Chemical monitoring sites in the Tawhiti catchment

**Table 2** Schedule of chemical analyses for water quality monitoring in the Tawhiti Stream

Site Location	Number of samples	Temp	Cond	pH	NH <sub>4</sub>	SS	BOD (total)	NTU	NNN	DRP	O&G
<b><u>Tawhiti Stream</u></b>											
Upstream of industrial discharge pond outlet	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100m upstream of Tawhiti Rd.	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Culvert on Tawhiti Rd.	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	
300m downstream of Tawhiti Rd.	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<b><u>Silver Fern Farms</u></b>											
Stormwater upstream discharge	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stormwater downstream discharge	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b><u>Graeme Lowe Protein</u></b>											
Stormwater discharge	4	✓	✓	✓	✓	✓	✓	✓		✓	✓
<b><u>Taranaki Fish &amp; Game</u></b>											
Hatchery Water discharge	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Key: Temp = temperature; Cond = conductivity; NTU = turbidity; SS = suspended solids; BOD = biochemical oxygen demand; NH<sub>4</sub> = ammonia; NO<sub>3</sub> = nitrate; NNN=Total Nitrogen; DRP = dissolved reactive phosphorus; O&G = Oil and Grease

## 2. Silver Fern Farms Limited

### 2.1 Process description

Silver Fern Farms Limited (Silver Fern Farms) operates a meat processing plant at Tawhiti Road, Hawera. The plant processes beef (including slaughter, dressing, cold store operations) for export and domestic markets. Throughput of beef peaks at approximately 1,000 bodies per day.

Paunch and stockyard solids are piped under Tawhiti Road to an area of land adjacent to the plant. The solids are separated using two (2 mm) rotating milli-screens in series. Screened material containing 15-20% solids is piled on land to compost. The disposal area is bunded and leachate is drained to a clay-lined collection lagoon which is periodically pumped to trade waste via the milli-screens. The stream bank is planted to treat any groundwater seepage, and to control erosion. At six-monthly to annual intervals, the stabilised solids are spread thinly to dry.

Odours can arise due to turning of deposited material. Turning and levelling of the deposited material is only undertaken after consultation with the Council, and care is exercised with regards to appropriate weather conditions. Silver Fern Farms notes that any odorous material uncovered is immediately recovered and operations cease.

Waste from meat processing, some of it treated by dissolved air floatation (DAF), is transferred under Tawhiti Road to an effluent balance tank which also receives process waste from the Graeme Lowe Protein rendering plant, milli-screen liquids and paunch composting leachate, and domestic wastes (after screening) from both plants and from a residential subdivision on Mason Road. The combined wastes are pumped through a dedicated pipeline to Hawera wastewater treatment plant, and then discharged via an ocean outfall under consent 5079-1, held by South Taranaki District Council. Therefore, no wastewater discharges occur to the Tawhiti Stream at the Silver Fern Farms site. A contingency pond is available should the Silver Fern Farms access to the Hawera township sewage system be interrupted. It is sized to allow for the complete wash-down of the plant should a plant shut-down be required.

Stormwater from the site is discharged to the Tawhiti Stream via two outfalls. The main outlet (for all except the livestock entry area), which combines with the old cooling water outfall, has a cage trap to remove large debris. With the upgrade to the condenser system in December 2004, cooling water from condensers is no longer discharged to the Tawhiti Stream. This has had a positive effect on the water quality of the stream as there is no longer an increase in temperature downstream of the plant.

A fish pass was constructed down the true-left side of the weir in April 1999. The fish pass consists of rough concrete with cobbles and boulders fixed into place. A shallow notch was cut in the crest of the weir to ensure that there would always be a flow of water down the channel. The area around the intake structure needs frequent maintenance to control weed growth, which can result in screen blockage.

The layout of the plant can be seen in Figure 1.

## 2.2 Resource consents

A summary of the six consents held by Silver Fern Farms in relation to its Hawera meat processing plant is given in Table 3 below, and the consents are discussed in sections 2.2.1 to 2.2.5. A copy of each of the consents can be found in Appendix I.

**Table 3** Resource consents held by Silver Fern Farms Limited

Consent Number	Purpose	Volume	Next Review Date	Expiry Date
1091-4	To take surface water from the Tawhiti Stream	3,500 cubic metres/day [75.2 litres/second]	2016	2028
1103-4	To discharge condenser cooling water to Tawhiti Stream	2,500 cubic metres/day	2016	2028
4832-2	To discharge screened paunch and stockyard solids onto and into land in the paunch disposal area	4,500 tonnes per year	2016	2028
4995-2	To place and maintain a dam across the Tawhiti Stream		2016	2028
5598-2	To discharge stormwater into the Tawhiti Stream		2016	2028
5599-2	To discharge emissions into the air		2016	2028

### 2.2.1 Water abstraction permit

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.

Silver Fern Farms holds water permit **1091-4** to take water from a dam and intake structure on the Tawhiti Stream for general use in a meat processing plant and for cooling purposes. This permit was issued by the Council on 18 March 2013 under Section 87(d) of the RMA. It is due to expire on 1 June 2028.

Conditions 1 to 3 limit the volumes of water taken, for general purposes and cooling, and require that cooling water be returned to Tawhiti Stream.

Conditions 4 to 8 relate to monitoring.

Condition 9 requires adoption of the best practicable option to minimise adverse environmental effects.

Condition 10 is a review provision.

### 2.2.2 Water discharge permits

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

**Cooling water**

Silver Fern Farms holds discharge permit **1103-4** to discharge cooling water from a meat processing plant into the Tawhiti Stream. This consent was issued by the Council on 18 March 2013 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Conditions 1 and 2 limit the volume discharged to and temperature increase in Tawhiti Stream.

Conditions 3 to 8 relate to monitoring of volumes and temperatures.

Condition 9 requires that a hydrological recording station be maintained downstream.

Condition 10 restricts discharge contaminants to heat, and condition 11 requires notification of discharge volume over a certain daily amount.

Condition 12 requires adoption of the best practicable option to minimise adverse environmental effects.

Conditions 13 and 14 are lapse and review provisions.

**Stormwater**

Silver Fern Farms holds discharge permit **5598-2** to discharge stormwater from a meat processing plant into the Tawhiti Stream in the Tangahoe catchment. This permit was issued by the Council on 27 July 2010 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

There are nine special conditions attached to the consent.

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

Condition 2 puts limits on the catchment area.

Condition 3 requires hazardous substances to be stored safely.

Conditions 4 and 5 deal with the discharge and its effects on the receiving waters.

Conditions 6 and 7 require the maintenance of contingency and stormwater plans.

Condition 8 states that the consent holder shall notify the Council of any significant changes to processes or operations on site.

Condition 9 is a review provision.

**2.2.3 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.

Silver Fern Farms Limited holds air discharge permit **5599-2** to cover the discharge of emissions into the air from meat processing activities at its Hawera site. This permit was issued by the Council on 31 August 2010 as a resource consent under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

There are six special conditions attached to the permit.

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

Condition 2 set out methods to minimise emissions from the site.

Condition 3 states that there should be no offensive or objectionable odours beyond the site boundary.

Condition 4 requires the preparation and maintenance of a management plan for the paunch disposal area.

Conditions 5 states that the consent holder shall notify Council of any significant changes to processes or operations at the site.

Condition 6 is a review provision.

#### **2.2.4 Discharge 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.

Silver Fern Farms holds discharge permit **4832-2** to discharge screened paunch and stockyard solids onto and into land by spreading and composting in the vicinity of the Tawhiti Stream in the Tangahoe catchment. This permit was issued by the Council on 24 August 2010 as a resource consent under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

There are eight special conditions attached to the consent.

Conditions 1 and 2 deal with the volume of paunch and stockyard solids discharged.

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

Conditions 4 to 6 deal with bunding and ensure no direct discharge of contaminants.

Condition 7 requires the preparation and maintenance of a management plan for the paunch and stockyard disposal area.

Condition 8 is a review provision.

### **2.2.5 Land use consent**

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.

Silver Fern Farms holds land use consent **4995-2** to use an existing 6-metre high concrete and earth dam and associated intake structure to dam and divert the Tawhiti Stream. This permit was issued by the Council on 18 March 2013 as a resource consent under Section 87(a) of the RMA. It is due to expire on 1 June 2028.

Conditions 1 and 2 address passageway for fish and maintenance of the structure.

Condition 3 is a review provision.

## **2.3 Monitoring programme**

The monitoring programme for the Silver Fern Farms site in Hawera consisted of four primary components in addition to programme liaison and management.

### **2.3.1 Site inspections**

The Silver Fern Farms site in Hawera was inspected five 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 the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### **2.3.2 Abstraction, flow and water temperature monitoring**

The Company provided the Council with daily abstraction rates as per condition 2 of consent 1091-3 until October 2012, when telemetry of abstraction data directly to Council was established.

A hydrological recording station with telemetry was installed in the Tawhiti Stream immediately downstream of the Silver Fern Farms site at Tawhiti Road on 3 December 2009 to assess flow volumes in preparation for replacement of consent 1091-3 (and 7610-1 held by Graeme Lowe Protein) to take water, which expired in June 2010. The hydrometric station is required to be maintained under consent 1103-4 and consent 7611-2 (held by Graeme Lowe Protein) which provide for the discharge of cooling water from the meat processing and rendering plants, respectively.

Historically, there was a cooling water discharge from the meat plant site which had the potential to cause a significant increase in the water temperature downstream. In order to monitor this, water temperature data loggers were installed in the Tawhiti Stream upstream (immediately downstream of the dam overflow) and 150 m

downstream of the condenser cooling water discharge. In 2004, the condenser, which had replaced the old shell-and-tube system in April 2002, was upgraded, this enabling the condenser discharge to cease from 16 December onwards. The small discharge from the hides cooling heat exchanger continued. Temperature monitoring ceased on 9 February 2006, having been carried out continuously since 4 December 1992. A temperature monitor was reinstalled on 18 May 2011 at Tawhiti Road, with telemetry directly to the Council, to gather information in case the discharge of cooling water recommences, from either Silver Fern Farms or Graeme Lowe Protein.

### **2.3.3 Chemical sampling**

The Council undertook sampling of the discharges from the site and the water quality upstream and downstream of the discharge points and mixing zone, and below the paunch disposal area.

The stormwater discharges were sampled on three occasions and the samples were analysed for pH, oil and grease, ammoniacal nitrogen, dissolved reactive phosphorus, biological oxygen demand (BOD), conductivity, suspended solids, temperature, turbidity, visual hydrocarbons and nitrite/nitrate nitrogen. The Tawhiti Stream was also sampled on three occasions at four sites above and below the stormwater discharge points, and the samples were analysed for pH, ammoniacal nitrogen, dissolved reactive phosphorus, biological oxygen demand (BOD), conductivity, suspended solids, temperature, turbidity and nitrite/nitrate nitrogen.

### **2.3.4 Fish survey**

Triennially, the Council carries out a survey in the Tawhiti Stream in order to assess if the intake or fish pass for Silver Fern Farms water abstraction has had any impact on the fish communities of the Tawhiti Stream. Baited fine and coarse mesh fyke nets and g-minnow traps are deployed overnight at two sites spanning the pass. The nets and traps are recovered the following morning, with all fish identified, counted and measured.

The first survey of a triennial programme was conducted in January 2014. A similar survey was conducted at the Fonterra water intake fish pass, about 6.6 km downstream, at the same time (refer TRC Technical Report 14-73).

## **2.4 Results**

### **2.4.1 Water**

#### **2.4.1.1 Inspections**

The Silver Fern Farms site in Hawera was visited on five occasions during the 2014-2015 monitoring periods. These routine inspections were conducted on 14 August and 10 November 2014, and 13 January, 26 March and 8 June 2015.

In general, the site appeared to be tidy and complying with resource consent conditions at the time of inspections.

#### **Stormwater drains**

All stormwater drains on site were satisfactory, with no evidence of oil or grease. Discharges from the drains were not observed to have visual effect on the Tawhiti Stream.

#### **Truckwash**

All effluent from the truck-wash was entering the sump and flowing to the effluent treatment system across the road during the inspections when it was observed to be in use.

#### **Condensers and cooling water**

Since the installation of a new condenser system in December 2004 there has been only a minor discharge of cooling water to the Tawhiti Stream. The upgrade has also meant that water is now mainly abstracted for wash-down purposes. The decrease in abstraction has had a positive effect on the fish pass which since has operated effectively year-round. The cessation of discharge of most cooling water also has had positive effects on physical water quality in the Tawhiti Stream as there no longer is a temperature increase downstream of the plant.

#### **Paunch management**

The management of the paunch area is checked at each inspection and an assessment of odours is made.

On all inspections the paunch area appeared to be well managed. There was local paunch/composting odour around and directly downwind of the paunch disposal area (not beyond the boundary) on most occasions. The leachate receiving pond had adequate storage capacity.

#### **Contrashear screen and contingency pond**

The contrashear screen was checked at each inspection and found to be operating correctly. The sump and drainage associated with the screen was also inspected and no overflows were found. At the time of each inspection during the review period the screening systems were found to be working well.

The contingency pond is available should the Company lose access to the Hawera township sewerage system. It is sized to allow for the complete wash down of the plant should a plant shut down be required. The pond is monitored as part of the routine compliance monitoring inspections.

### Dam and intake structures

A fish pass was constructed down the true-left side of the weir in April 1999. The fish pass consists of rough concrete with cobbles and boulders fixed into place. A shallow notch was cut in the crest of the weir to ensure that there would always be a flow of water down the channel. The area around the intake structure needs frequent maintenance to control weed growth, which can result in screen blockage. Generally, inspections have found the intake to be clear of aquatic weeds, operating well with no blockages occurring in the monitoring year under review. However, it should be noted that continued regular maintenance of the fish pass is necessary.

#### 2.4.1.2 Water abstraction, stream flow and temperature monitoring

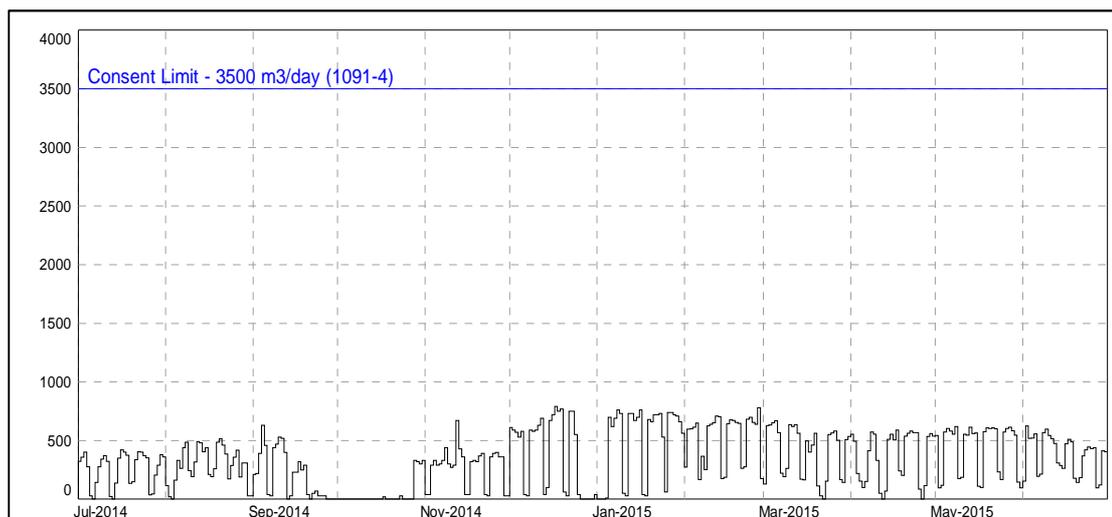
##### Abstraction volumes

Under condition 4 on consent 1091-4, Silver Fern Farms is required to install and maintain water meters and dataloggers to measure and record, to an accuracy of  $\pm 5\%$ , the rate and volume of water taken for general purposes, and for cooling. Condition 8 requires that the records of water taken be transmitted directly to the Council's computer system, in a format suitable for 'real time' record over the internet.

Also, under the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010, Silver Fern Farms was required by 10 November 2012 to take continuous measurements and keep daily records of volume taken, and thereafter supply by 31 July each year the record for the preceding 1 July to 30 June period.

Suitable flow meters were already installed, and appropriate data transmission and recording systems in place, when consent 1091-4 was issued and when the Regulations came into force. Fifteen minute average flow values are recorded.

The telemetered abstraction record, from July 2014 to June 2015 is presented in Figure 2.



**Figure 2** Daily water abstraction by Silver Fern Farms, July 2014 – June 2015, m<sup>3</sup>

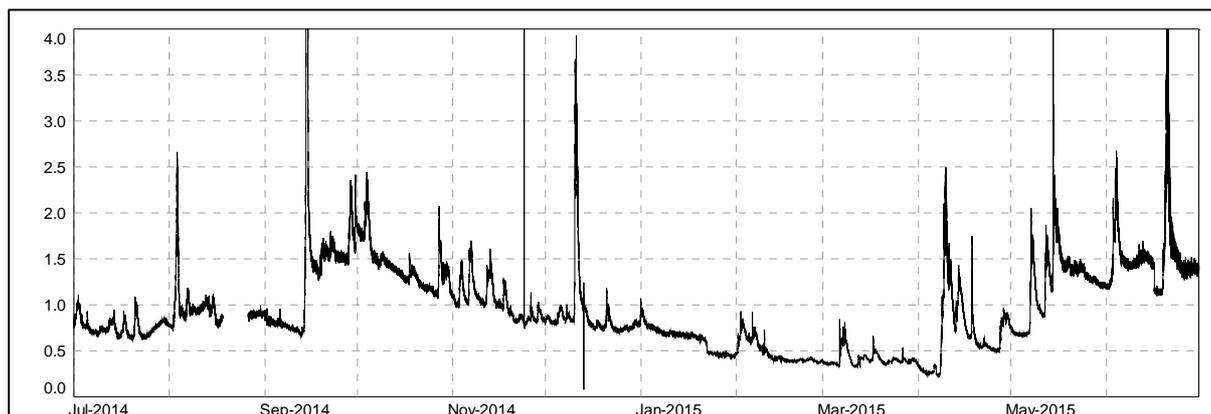
The record shows that the limit of 3,500 m<sup>3</sup>/day on maximum abstraction rate was complied with throughout the monitoring period. The recorded total volume abstracted in 2014-2015 was 123,306 m<sup>3</sup>. The maximum recorded daily volume was 790 m<sup>3</sup>, on 17

December 2014, which is in compliance with the daily limit of 1,000 m<sup>3</sup> on maximum volume that is allowed to be taken for general use purposes, other than cooling.

### Stream flow

Under condition 9 on consent 1103-4, Silver Fern Farms, in conjunction with Graeme Lowe Protein Limited, is required to install and maintain a hydrological recording station immediately downstream of the Company's site to measure and record the flow of Tawhiti Stream. An appropriate station was installed before the consent was granted.

The hydrograph for 2014-2015 is given in Figure 3.



**Figure 3** Flow (m<sup>3</sup>/s) in the Tawhiti Stream measured below the abstraction point of Silver Fern Farms from 1 July 2014 to 30 June 2015

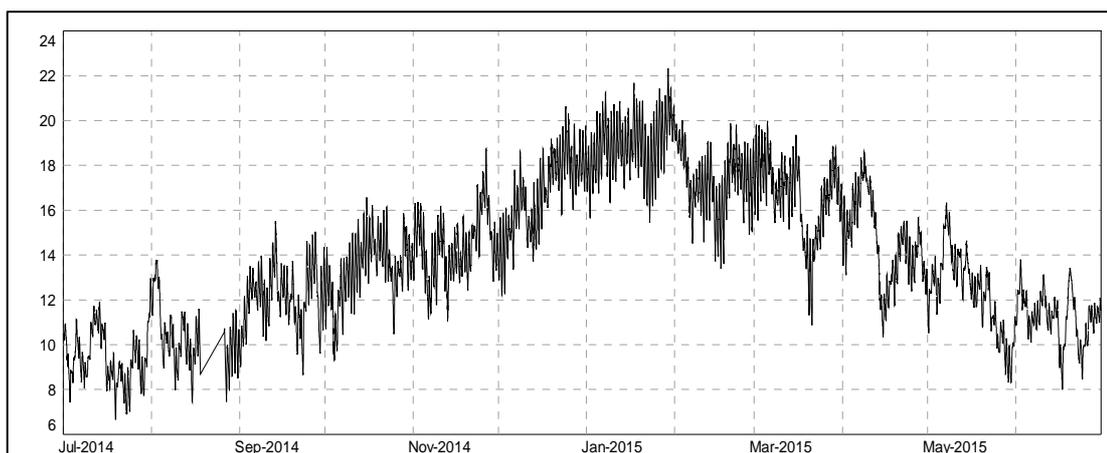
The median recorded flow was 829 litres/second. The minimum recorded flow was 213 litres/second, on 7 April 2015 at 1115 NZST.

### Stream temperature

Under condition 3 on consent 1103-4, Silver Fern Farms is required to measure and record the temperature of its cooling water discharge and of Tawhiti Stream above and below the discharge point. These requirements may be suspended under condition 5 if the rate of discharge of cooling water is less than 100 m<sup>3</sup>/day for an extended period of time. The records must be transmitted directly to Council under condition 6. The same conditions apply to Graeme Lowe Protein in respect of its cooling water discharge under consent 7611-2.

As Silver Fern Farms had been discharging less than 100 m<sup>3</sup>/day of (hide) cooling water since the condenser cooling water system was decommissioned in December 2004, Council has not required the temperature of cooling water or of Tawhiti Stream above the discharge point to be monitored, but has required the continuation of temperature monitoring below the discharge point, at Tawhiti Road hydrometric Station.

The telemetered temperature record, from July 2014 to June 2015 is presented in Figure 4. There is a eight day gap in the record, from 18 August 2014, after the datalogger failed.



**Figure 4** Temperature of Tawhiti Stream at Tawhiti Road, July 2014 – June 2015, °C

The recorded median temperature was 13.6°C. The maximum temperature recorded was 22.3 °C, on 29 January 2015 at 1630 NZST. The minimum temperature recorded was 6.7 °C on 19 July 2014 at 0900 NZST. Temperature exceeded 20 °C on 26 days, between 24 December 2014 and 3 February 2015, for periods of up to 15.75 hours (29/30 January).

#### 2.4.1.3 Results of discharge monitoring

The discharge and receiving water body sites are described in Table 4 and shown in Figure 1.

**Table 4** Sampling sites for Silver Fern Farms (Hawera)

Site Code	Number	Location	NZTM
TWH000295	1	Outlet of ponded area, upstream of plant	1711202 - 5618450
TWH000300	2	Approx 100m u/s Tawhiti Road, opposite trout hatchery	1711313 - 5618417
STW001071		Minor stormwater discharge from truck wash facility	1711306 - 5618393
STW001072		Major stormwater discharge and hide cooler discharge	1711295 - 5618353
TWH000320	3	Just below Tawhiti Road culvert, u/s of solid waste area	1711342 - 5618260
TWH000350	4	Approx. 300m d/s of Tawhiti Road, d/s of solid waste area	1711249 - 5617867

In the 2014-2015 period, three samples were collected of both the minor (STW001071) and the major (STW001072) stormwater discharges and analysed for biological oxygen demand (BOD), ammonia-N, dissolved reactive phosphorus, conductivity, pH, turbidity, suspended solids, visible hydrocarbons and temperature. The results are presented in Table 5 and Table 6. In previous years, samples of the condenser discharge were also taken. However with the installation of the new condenser system there is no longer a condenser discharge.

**Table 5** Physico-chemical results for Silver Fern Farms minor drain stormwater samples for 2014-2015, with summary of previous monitoring data (TRC site code STW001071)

	BOD <sub>5</sub> g/m <sup>3</sup>	Conductivity mS/m	Ammonia g/m <sup>3</sup> -N	DRP g/m <sup>3</sup> -P	Suspended solids g/m <sup>3</sup>	Oil & Grease g/m <sup>3</sup>	pH	Turbidity NTU	Temperature °C
14-Aug-14	2.2	23.2	0.052	0.029	19	*	7.5	21.0	9.9
26-Mar-15	1.1	25.3	0.044	0.044	15	*	7.6	8.9	16.6
17-Jun-15	1.8	25.7	0.028	0.050	23	*	7.8	18.0	8.6
Number	32	31	32	10	29	4	31	12	30
Range	<0.5 - 230	2.8 - 47.7	0.020-6.3	0.014-0.067-	3 - 2100	<0.5 -17	7.2 - 8.8	3.0 - 91	9.3 - 20.2
Median	8.4	24.5	0.36	0.026	34	12.3	7.7	10	13.0
Consent limits	-	-	-	-	100	10	6 - 9	-	-

\* = pass for visual and hydrocarbon odour so not tested

**Table 6** Physico-chemical results for Silver Fern Farms main drain stormwater samples for 2014-2015, with summary of previous monitoring data (TRC site code STW001072)

	BOD <sub>5</sub> g/m <sup>3</sup>	Conductivity mS/m	Ammonia g/m <sup>3</sup> -N	DRP g/m <sup>3</sup> -P	Suspended solids g/m <sup>3</sup>	Oil & Grease g/m <sup>3</sup>	pH	Turbidity NTU	Temperature °C
14-Aug-14	0.6	22.0	0.071	0.008	5	*	7.4	4.5	11.0
26-Mar-15	3.6	26.8	0.81	0.015	4	*	7.6	6.2	16.8
17-Jun-15	<0.5	23.9	0.065	0.010	<2	*	7.6	2.5	13.3
Number	58	69	69	13	59	11	61	31	67
Range	<0.5 - 130	3.2 - 48.5	0.057 - 13	0.004-0.036-	<2 - 560	<0.5 - 44	7.1 - 7.9	1.8 - 200	8.8 - 18.9
Median	1.8	23.7	0.23	0.011	6	<0.5	7.6	4	14.2
Consent limits	-	-	-	-	100	10	6 - 9	-	-

\* = pass for visual and hydrocarbon odour so not tested

Suspended solids and pH were found at levels within those required by consent 5598-2 in the three samples collected. Oil and grease levels were low, on the basis of visual assessment.

On each monitoring occasion, the discharge from the main stormwater drain was composed largely of a combination of spillover from the water delivery channel and water from the hide cooler. Estimated flow rate varied from <0.1 to 5 litres/second.

#### 2.4.1.4 Results of receiving environment monitoring

The Tawhiti Stream was sampled at four sites, upstream and downstream of the various discharges, on three occasions in 2014-2015. The sites were sampled in accordance with the monitoring programme requirements allowing possible impacts from stormwater discharge and solid waste disposal practices to be assessed. The receiving water body is sampled for Silver Fern Farms in conjunction with Graeme Lowe Protein and the Taranaki Fish and Game fish hatchery, as all three sites discharge within the same reach of the Tawhiti Stream. These sites have the potential to discharge an effluent with a combined effect, to increase BOD<sub>5</sub> and ammonia

concentrations within the Tawhiti Stream, and therefore are assessed in conjunction with each other.

Condition 5 (d) of consent 5598-2 states that the stream must not be made unsuitable for consumption by farm animals and that there must be no adverse effects on aquatic life. There are no other specific conditions attached to the consent, relating to the concentrations of particular parameters.

Table 7 outlines the acceptable levels of contaminants for the protection of aquatic systems.

**Table 7** Contaminant trigger levels drawn from the ANZECC Water Quality Guidelines for Fresh and Marine Waters, 2000

Contaminant	Acceptable levels for the protection of aquatic ecosystems	Acceptable level for stock drinking water
Biological oxygen demand (g/m <sup>3</sup> )	Less than 2	-
Conductivity (mS/m)	A change of less than 50	Less than 373
Ammonia (g/m <sup>3</sup> )	Less than 2.2	-
Nitrate/nitrite nitrogen (g/m <sup>3</sup> )	Less than 1.5-4.0	-
pH	In the range of 6.6-8.0	-

Table 8 gives the results of the receiving water surveys at the pond outlet upstream of industrial discharge (TWH000295), 100m upstream of Tawhiti Road (TWH000300), the culvert on Tawhiti Road (TWH000320), and 300m downstream of Tawhiti Road (TWH000350).

**Table 8** Results of receiving water sampling conducted during 2014-2015

Date	Site	Time NZST	Temp °C	Condy mS/m	pH	Turbidity (NTU)	SS g/m <sup>3</sup>	BOD <sub>5</sub> g/m <sup>3</sup>	NH <sub>4</sub> g/m <sup>3</sup>	NNN g/m <sup>3</sup> N	DRP g/m <sup>3</sup> P
14-Aug-14	1	1008	10.3	23.2	7.2	28	46	2.4	0.056	2.1	0.030
	2	1026	9.8	23.1	7.4	22	31	2.1	0.052	2.2	0.030
	3	1058	9.9	23.2	7.5	20	32	4.5	0.061	2.2	0.025
	4	1106	10.3	23.3	7.5	20	28	6.2	0.061	2.1	0.024
26-Mar-15	1	0830	16.5	25.3	7.4	5.1	8	0.9	0.040	1.29	0.043
	2	0840	16.6	25.2	7.7	9.9	17	1.2	0.044	1.28	0.043
	3	0912	16.7	25.3	7.7	6.2	10	1.0	0.044	1.28	0.044
	4	0921	16.6	25.4	7.6	6.7	11	1.1	0.045	1.37	0.045
17-Jun-15	1	1018	8.2	25.7	7.6	20	26	1.5	0.040	2.6	0.024
	2	1035	8.2	25.7	7.7	14	18	1.7	0.032	2.6	0.023
	3	1152	9.0	25.7	7.8	20	29	1.8	0.028	2.7	0.024
	4	1207	9.0	26.0	7.8	24	34	1.8	0.024	2.6	0.023

(refer to Table 4 for an explanation of sampling sites)

The results of sampling show little difference between the upstream and downstream sites with regard to the parameters tested on the dates sampled, with the one exception. On 14 August 2014, in fine weather following rain the previous

day (9mm at Duffy's meteorological station, 4.0 km SE), BOD was elevated upstream, at 2.4 g/m<sup>3</sup>, and increased at Tawhiti Road and at the lowermost monitoring site, to the highest values recorded for those sites, of 4.5 and 6.2 g/m<sup>3</sup>, respectively. The reason is unexplained. The two stormwater discharges monitored at Silver Fern Farms had low BOD values, and no discharge was found at Graeme Lowe Protein. Ammonia concentration, which often is indicative of meat waste contamination, did not change significantly.

Variation between sampling dates related largely to proximity to rain events in the catchment.

The concentrations of most tested parameters were found to be similar between sites and within the ANZECC water quality guidelines. Total BOD exceeded the 2 g/m<sup>3</sup> guideline after the rainfall event prior to 14 August 2014, as is typical of lowland streams in pastoral areas of Taranaki at times after rainfall.

#### **2.4.1.5 Fish survey**

In summer 2013-2014, a programme of triennial fish community surveys was established to assess the performance of the fish pass at the water abstraction weir. The summary and conclusions of the first survey are given below. The location of the survey sites, weir and fish pass are given in Figure 5. The full survey report is attached as Appendix II. A similar survey was carried out in relation to the Fonterra Whareroa dairy factory intake structure, about 6.6 km downstream, over the same period.

On 13 and 14 January 2014, two sites were surveyed for freshwater fish in the Tawhiti Stream, in relation to the water intake weir and fish pass monitored as a part of the Tawhiti Catchment monitoring programme. Site 1 was located approximately 900 m upstream of the intake, while site 2 was located approximately 150 m downstream of the intake (Figure 5). The survey method involved deploying baited fine and coarse mesh fyke nets and g-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 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. Unfortunately, only two species of eel were recorded, along with freshwater crayfish. The upstream site had the highest abundance of fish, with nine individuals recorded, compared with the seven fish and one crayfish recorded downstream. The downstream site recorded the highest species richness, with longfin eel, shortfin eel and crayfish present. Of note was the observation of trout in the stream, with a number of fish observed at site 2.



**Figure 5** Location of the two sampling sites in relation to the weir and fish pass

The low numbers of fish at site 2 may be related to activities undertaken at the weir. For example, low flows 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. However, this does not seem likely, as flows did not drop below MALF for over 9 months prior to this survey, and no significant issues have been noted with the discharge of sediment. It is more likely that the sampling technique may have influenced 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 g-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.

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. The

results of this survey indicate that the intake weir and fish pass does not constitute a barrier to the passage of those species recorded downstream of the weir. It should also be noted that a waterfall exists between the two monitored sites.

Overall, this survey does not indicate that the intake and fish pass 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.

## **2.5 Air**

### **2.5.1 Inspections**

The Silver Fern Farms site in Hawera was visited five times in 2014-2015 with the purpose of monitoring compliance with resource consent 5599-1 to discharge to air. These inspections were carried out in conjunction with inspections of the plant processes and discharges to water covered in section 2.4.1.1.

Minor sources of emissions to air exist at the site. These include the stockyards, truck wash, hide bins and ammonia condenser systems, paunch disposal and contingency pond, and the paunch contrashear. Areas within the blood transfer system also have the potential for odours.

Odours were observed around the stockpile of paunch on four of the five inspections, though none was detected beyond the boundary of the property.

## **2.6 Investigations, interventions, and incidents**

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

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

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

In the 2014-2015 review period, it was necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with Silver Fern Farms' conditions in resource consents or provisions in Regional Plans on one occasion.

On 14 September 2014, a complaint was received about flooding of a property upstream of the Silver Fern Farms water supply dam on Tawhiti Stream, following a large rain event. Investigation by Council found that the Company was in compliance with the conditions on consent 4995-2, that provides for placement of the 6 m high dam. No further action was taken.

## **2.7 Discussion**

### **2.7.1 Discussion of plant performance**

Silver Fern Farm's environmental performance during the 2014-2015 period was high.

The on-site management and operation of the Hawera meat plant site was undertaken in a satisfactory manner.

One incident was recorded by the Council that was associated with the Silver Fern Farms site, involving flooding above the water supply dam on Tawhiti Stream. Investigation showed that there was no breach of consent.

For water abstraction, there was full compliance with the limit on maximum daily rate taken from Tawhiti Stream during the 2014-2015 review period. The telemetry system for delivery of abstraction data to Council that was installed in October 2012 was maintained.

For the (minor) cooling and stormwater discharges to Tawhiti Stream, compliance with consent conditions was demonstrated through sampling and chemical analysis.

Prior to 2004, Silver Fern Farms had problems with the impact of the cooling water discharge on the downstream water temperatures with effects being largely determined by weather and river flow conditions. In the 2004-2005 monitoring year a new condenser system was installed, this meant that there has been no discharge from the condenser and the volume of water abstracted has also decreased significantly. This should have had a positive effect on the water quality and ecological communities in the Tawhiti Stream.

The management of the site has generally been good with no problems noted during site inspections.

The stormwater consent 5598-2 held by Silver Fern Farms requires that it maintain a contingency plan for the site. An updated contingency plan was received in November 2010.

### **2.7.2 Environmental effects of exercise of consents**

As mentioned above, as there is no longer a discharge from the condenser to the Tawhiti Stream there has been no significant impact on the temperature of the stream as a result of activities on the site. The volume abstracted from the Tawhiti Stream has also been dramatically reduced.

Physico-chemical receiving water monitoring did not show any significant adverse impacts from activities on the site. In general, the results of sampling show little

difference between the upstream and downstream sites with regard to the parameters tested on the dates sampled, though, on one occasion after a rain event, a substantial increase in stream BOD occurred. Otherwise, the concentrations of tested parameters were found to be similar and within the ANZECC water quality guidelines.

A triennial fish survey, conducted around the water intake weir in January 2014, did not indicate that the intake or fish pass, in relation to the joint Silver Fern Farms and Graeme Lowe Protein abstraction, has had any impact on fish communities of Tawhiti Stream.

With regard to the discharge of odour, it should be noted that the facility's location is not ideal, as it is nestled within a sheltered valley. When atmospheric conditions are calm and clear, there is a high potential for emissions to hang over the site and intensify rather than disperse any odour. Encroachment of residential development towards the facility has aggravated the situation. Despite this there was no complaint in relation to odour from Silver Fern Farms in the monitoring period under review. Localised odours were detected in the paunch disposal area during four of five inspections over 2014-2015, however, odour from the meat processing plant was found not to extend beyond the site boundary.

## 2.8 Evaluation of performance

A tabular summary of Silver Fern Farms's compliance record for the year under review is set out in Table 9 **Error! Reference source not found.** to Table 14.

**Table 9** Summary of performance for Consent 1091-4

<b>Purpose: To take water from a dam and intake structure on the Tawhiti Stream for general use in a meat processing plant and for cooling purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Limit on abstraction volume	Metering by consent holder and telemetry of data to Council	Yes
2. Limit on volume not used for cooling	Metering by consent holder	Yes
3. Limit on volume used for cooling, all to be returned to Tawhiti Stream	Metering by consent holder and inspection	Yes
4. Installation of meters and loggers	Inspection	Yes
5. Certification of meters	Receipt of certification.	Yes, delayed by technician availability
6. Actions on failure of monitors	Receipt of notification, inspections	N/A
7. Monitors to be accessible	Inspections	Yes
8. Provision of records	Receipt of records as required	Yes
9. Use of best practicable option	Inspections and liaison.	Yes

<b>Purpose: To take water from a dam and intake structure on the Tawhiti Stream for general use in a meat processing plant and for cooling purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
10. Optional review provision	Next optional review in June 2016	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 10** Summary of performance for Consent 1103-4

<b>Purpose: To discharge cooling water from a meat processing plant into the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Limit on volume discharged	Not monitored during period under review, as under limit on condition 4	N/A
2. Limit on temperature increase in Tawhiti Stream, with GLP discharge	Not monitored during period under review, as under limit in condition 3.	N/A
3. Trigger volume for temperature monitoring	Inspection	N/A
4. Trigger volume for flow metering	Inspection	N/A
5. Trigger volume for suspension of temperature and flow monitoring	Metering by consent holder, inspection	N/A
6. Methodology for temperature and flow metering	Assessment of records received by Council	N/A
7. Actions on failure of monitors	Inspections	N/A
8. Monitors to be accessible	Inspections	N/A
9. Maintenance of hydrometric station on Tawhiti Stream	Inspections	Yes
10. No contaminant other than heat	Inspections and sampling by Council	Yes
11. Notification of exceedance of volume trigger	Receipt of notification, inspections	N/A
12. Adoption of best practicable option	Inspections and liaison	Yes
13. Provision for lapse of consent		N/A
14. Optional review provision	Next scheduled review in June 2016	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 11** Summary of performance for Consent 4832-2

<b>Purpose: To discharge screened paunch and stockyard solids onto and into land by spreading and composting in the vicinity of the Tawhiti Stream in the Tangahoe catchment</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Maximum volume of discharge 4,500 tonnes/year	Inspections of site	Yes
2. Consent holder to maintain records of volume disposed	Not requested during period under review	Yes
3. Consent holder to adopt best practicable option to prevent or minimise adverse effects	Inspections of site	Yes
4. Bunding of areas used for stockpiling and stabilisation to ensure no run-off to Tawhiti Stream	Inspections of site	Yes
5. No direct discharge of contaminants from storage pond to Tawhiti Stream	Inspections	Yes
6. Run-off from storage pond pumped to wastewater holding tank	Inspections	Yes
7. Management plan for paunch disposal area to be maintained	Received February 2010	Yes
8. Optional review provision	Next optional review June 2016	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 12** Summary of performance for Consent 4995-2

<b>Purpose: To use an existing 6 metre high concrete and earth dam and associated intake structure to dam and divert the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Fish pass as certified by Council	Inspection and fish surveys – fish pass considered adequate by Council (letter dated 27 August 1999). Fish survey undertaken 13/14 January 2014	Yes
2. Maintenance of structure	Inspection	Yes
3. Optional review provision	Next optional review June 2016	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 13** Summary of performance for Consent 5598-2

<b>Purpose: To discharge stormwater from a meat processing plant into the Tawhiti Stream in the Tangahoe catchment</b>
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Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt BPO to prevent or minimise adverse effects	Inspections	Yes
2. Catchment area not to exceed 3.8 ha	Inspections	Yes
3. Hazardous substances contained	Inspections	Yes
4. Concentrations of contaminants in discharge	Sampling	Yes
5. Effects on receiving water	Sampling and inspections. One unexplained BOD increase, possibly related to a rain event	Yes
6. Maintenance of contingency plan	Received November 2010	Yes
7. Maintenance of stormwater plan	Received February 2010	Yes
8. Notification of changes to processes	Inspections and liaison with consent holder	Yes
9. Review of consent	Next optional review in June 2016.	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 14** Summary of performance for Consent **5599-2**

<b>Purpose: To discharge emissions into the air from meat processing operations and associated activities</b>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections of site	Yes
2. Consent holder to minimise emissions and impacts	Inspections of site	Yes
3. Discharge not to give rise to objectionable odour beyond boundary	Inspections of site	Yes
4. Paunch management plan	Received February 2010	Yes
5. Consultation over significant proposed changes	Liaison during visits. No significant changes undertaken during year	Yes
6. Optional review provision	Next optional review in June 2016.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

During the period under review, the Silver Fern Farms demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in section 1.1.4.

## 2.9 Recommendations from the 2012-2014 Biennial Report

It was recommended in the 2012-2014 monitoring period:

1. THAT monitoring of air emissions from Silver Fern Farms Ltd's site in Hawera in the 2014-2015 year continue at the same level as in 2013-2014.
2. THAT monitoring of stormwater discharges from Silver Fern Farms Ltd's site in Hawera in the 2014-2015 year continue at the same level as in 2013-2014.
3. THAT reporting of water abstraction rates as required under consent 1091-4 continue in 2014-2015 at the same level as 2013-2014.
4. THAT reporting of Tawhiti Stream flow rate as required under consent 1103-4 in the 2014-2015 year continue at the same level as in 2013-2014.
5. THAT the Tawhiti catchment monitoring programme developed in the 2007-2008 year and implemented in the 2013-2014 monitoring period, combining consents for the Silver Fern Farms Ltd site, the Graeme Lowe Protein site, and the F&G hatchery continue in 2014-2015.
6. THAT the option for a review of resource consent 1091-4 (take) in June 2015, as set out in condition 10 on consent 1091-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects, and that it is not appropriate to consider the cumulative environmental effects associated with the activities of Fonterra Co-operative Dairies Ltd at this time.
7. THAT the option for a review of resource consent 1103-4 (discharge cooling water) in June 2015, as set out in condition 14 on consent 1103-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects and that it is not appropriate to consider the cumulative environmental effects associated with the activities of Fonterra Co-operative Dairies Ltd at this time.

These recommendations were carried out in full in 2014-2015.

## 2.10 Alterations to monitoring programme for 2015-2016

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, its obligations to monitor emissions/discharges and effects under the RMA, and report to the regional community. The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/ discharging to the environment.

In the case of Silver Fern Farms the programme for 2014-2015 was largely unchanged from that for 2013-2014. Telemetry to Council of water abstraction data was instituted in 2012-2013. A triennial fish survey was introduced in 2013-2014 to assess the effect of the water intake and fish pass on fish communities of Tawhiti Stream. It is proposed that for 2015-2016, a similar level of monitoring is maintained. A recommendation to this effect is attached to this report.

## **2.11 Exercise of optional review of consents**

All six consents held for operation of the meat processing plant provide for an optional review in June 2016.

Condition 10 on consent 1091-4 (take), condition 14 on consent 1103-4 (discharge cooling water), condition 8 on consent 4832-2 (discharge paunch material), condition 3 on consent 4995-2 (dam), condition 9 on consent 5598-2 (discharge stormwater), and condition 6 on consent 5599-2 (discharge to air) allow the Council to review the consents, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the consent, which either were not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

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

Recommendations to this effect are presented in Section 2.12 of this report.

## 2.12 Recommendations

1. THAT monitoring of air emissions from Silver Fern Farms Ltd's site in Hawera in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT monitoring of stormwater discharges from Silver Fern Farms Ltd's site in Hawera in the 2015-2016 year continue at the same level as in 2016-2015.
3. THAT reporting of water abstraction rates as required under consent 1091-4 continue in 2015-2016 at the same level as 2014-2015.
4. THAT reporting of Tawhiti Stream flow rate as required under consent 1103-4 in the 2015-2016 year continue at the same level as in 2014-2015.
5. THAT the Tawhiti catchment monitoring programme developed in the 2007-2008 year and implemented in the 2014-2015 monitoring period, combining consents for the Silver Fern Farms Ltd site, the Graeme Lowe Protein site, and the F&G hatchery continue in 2015-2016.
6. THAT the option for a review of resource consent 1091-4 (take) in June 2016, as set out in condition 10 on consent 1091-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects..
7. THAT the option for a review of resource consent 1103-4 (discharge cooling water) in June 2016, as set out in condition 14 on consent 1103-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
8. THAT the option for a review of resource consent 4832-2 (discharge paunch material) in June 2016, as set out in condition 8 on consent 4832-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
9. THAT the option for a review of resource consent 4995-2 (dam) in June 2016, as set out in condition 3 on consent 4995-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
10. THAT the option for a review of resource consent 5598-2 (discharge stormwater) in June 2016, as set out in condition 9 on consent 5598-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
11. THAT the option for a review of resource consent 5599-2 (discharge to air) in June 2016, as set out in condition 6 on consent 5599-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

### 3. Graeme Lowe Protein Limited

#### 3.1 Process description

Figure 3 shows the Graeme Lowe Protein site in detail, highlighting the rendering and blood processing areas referenced in this document, as well as the location of sampling sites in the Tawhiti Stream and the previous stormwater sampling site.



**Figure 6** Layout of the Graeme Lowe Protein site and location of sampling sites

The description in the sections below, on rendering, gel bone processing and blood processing, applies until September 2014, when the plant operation was scaled down to blood processing only and washing/storage/transfer of offal from the adjacent meat processing plant of Silver Fern Farms.

Since November 2014, the plant has processed up to 25 tonne/day of blood, mainly from the adjacent meat plant, but also from outside the Taranaki region.. Fully enclosed blood storage tanks, with air extraction to the bio-filter via a wet scrubber, were installed.

Offal is stored in one tonne bins, which are transferred by road to Okaiawa approximately six times per day. An extraction system to vent and treat air from the offal storage building by wet scrubber and bio-filter was installed during the review period.

Water use is for gut washing, blood processing (mainly to wash tanks), the pack tower air scrubber and the blood air scrubber.

### **Rendering (pre September 2014)**

In 1994, the rendering process was changed from a combination of continuous low temperature and high temperature batch rendering to all low temperature rendering. The plant now incorporates two parallel low temperature (95°C) rendering systems with a capacity of five and seven tonnes per hour of raw material. Low temperature rendering plants have the advantage that much of the moisture in the raw material is separated after cooking by mechanical means, rather than by cooking and evaporation in the same vessel. The volume of vapour discharged (and therefore requiring treatment) from low temperature rendering plants is approximately 50% less than that discharged from high temperature rendering systems.

Low temperature rendering (LTR) processes are continuous and utilise centrifuges to separate the cooked solids from cooking liquids. The cooking liquids are passed through a disc separator, which removes tallow. The tallow is stored in three silos on-site prior to removal by tanker. The waste liquid from separation is pumped to the effluent treatment units on site for further treatment prior to discharge off site.

The solids, separated from the water-fat phase by decanter centrifuge, are pneumatically conveyed to a rotary disc dryer that was installed in September 2011, replacing eight batch dryers. The product is then conveyed to a mill where it is screened. Meal can be blow-loaded directly into bulk containers after milling and screening.

The dryer is connected to a heat recovery and odour control system during the loading, cooking and unloading operations. With the introduction of the single disc dryer, improved control of dryer gases via a fully automated condensing system enables heat recovery for hot water generation to Silver Fern Farms. This system is completely enclosed through to the bio-filter, with significant improvement in process efficiency and control of odour emissions. A heat exchanger is used to ensure accurate control of hot water to correct temperature for Silver Fern Farms requirements.

Since June 2009, process air from the low temperature condenser and other potentially odorous sources has been directed to a bark bio-filter for treatment to remove odour.

An induced-draught fan maintains a negative pressure in the dryer at all times. This ensures that no process gases are discharged to the atmosphere if the heat recovery system becomes overloaded. A packed-tower water scrubber scrubs gases from the heat exchanger and other potentially odorous sources, and controls the temperature of off-gases discharged to the bio-filter so that they do not exceed 30°C.

### **Gel bone processing (pre-September 2014)**

In the 2001-2002 monitoring year, a new gel bone drier was installed on site. This superheated steam (SHS) dryer is a rotary dryer, where the product is cascaded through a rotating drum by a series of longitudinal lifting flights (similar to a concrete mixer) and is conveyed slowly down the length of the dryer primarily by the flow of superheated steam and rotational speed of the drum.

There are several advantages to using this dryer. At atmospheric pressure, superheated steam above 200°C dries about 20% faster than hot air at the same temperature. The reduced volume of exhaust gases after steam condensation means that the bio-filters are significantly smaller than those in conventional hot air dryers. The condensers are significantly smaller than in conventional air dryers because of the high heat transfer coefficients associated with condensing steam. The SHS dryer uses 20% less energy than a conventional air dryer, which means less fuel consumption and lower greenhouse gas emissions. A lack of oxygen in the SHS dryer also removes the possibility of dust explosions or fires. The final product is of higher quality because there is no possibility of scorching, even if over-dried.

The specific process and drying of gelatine bone for export was discontinued during 2013 due to economic reasons. This resulted in negligible effect on processing systems or performance with offal material presented through a single rotary disc steam dryer. Graeme Lowe Protein may review the economic benefits to reinstate this system in the future.

### **Blood processing**

Blood processing begins with collection in the slaughtering area. Raw blood is predominantly received from the neighbouring Silver Fern Farms (previously PPCS (Hawera) Limited) meat processing plant. Raw blood may also be received from licensed meat plants (Silver Fern Farms Takapau, Waitotara) and also via Taranaki By-Products in response to emergency break-downs at those plants.

All blood processed on site is aged prior to heat coagulation and drying. Ageing of blood, before heat coagulation and separation of liquids from the blood solids, is known to increase product yield. This reduces the amount of liquid discharged to the effluent treatment plant. The Company adds sodium meta-bisulphite to raw blood at an approximate dose rate of 0.07% by weight, to stabilise it and reduce odour potential.

The blood ring-drier is gas-fired and has a furnace temperature of 355°C, with a stack temperature of 75°C. Problems with the control of the blood ring dryer have occurred in the past, which resulted in burning of product inside the dryer. This produced a characteristic burnt blood smell. Exhaust gases from the dryer pass through a waste

heat evaporator to recover heat and treat condensable odour, then through a secondary “pack tower” water scrubber, before entering the bio-filter.

The gas-fired blood ring dryer was replaced late in 2012 with a steam-heated rotary disc dryer (similar technology to the offal drier). Installation of this dryer enabled introduction of a high technology meal-bagging system (total capture of dust) and direct ducting of exhaust gases from the dryer via a shell-and-tube condenser through a water scrubber then a further “pack tower” water scrubber, before entering the bio-filter.

Edible white fat recovery took place alongside the existing rendering plant.

Stormwater is collected in perimeter drains. Areas with the potential for contamination are bunded with stormwater directed to the process wastewater waste-stream.

All process wastewater is discharged to Hawera municipal wastewater treatment plant.

### **Biofilter**

In June 2009, Graeme Lowe Protein commissioned a bark bio-filter for treatment of process air from potentially odorous sources. The system is 20 m by 25 m in area with a bark media depth of 1,300 mm, and is designed to extract 22,750 m<sup>3</sup>/h at a loading rate of 35 m<sup>3</sup>/h. The bio-filter is located about 100 m northwest of the plant.

Graeme Lowe Protein has targeted the principal sources of hot odour, being: both render vessels and associated decanters, rotary screens and liquid phase tanks; the blood dryer exhaust and decanter; the low temperature rendering condenser air discharge; and hydrolyser exhaust air. New blood tanks installed during the 2014-2015 review period and the offal storage area were connected to the bio-filter.



**Photograph 1** The bio-filter at Graeme Lowe Protein

## 3.2 Resource consents

A summary of the four consents held by Graeme Lowe Protein in relation to activities at its Hawera rendering plant during the 2014-2015 review period is given in Table 15 below and the consents are discussed in Sections 3.2.1 to 3.2.3. A copy of each of the consents can be found in Appendix I.

**Table 15** Summary of resource consents held by Graeme Lowe Protein Limited

Consent Number	Purpose	Volume	Next Review Date	Expiry Date
1104-4	To discharge stormwater into the Tawhiti Stream		2016	2028
4033-6	To discharge emissions into the air		2016	2028
7610-2	To take surface water from the Tawhiti Stream	3,000 cubic metres/day	2016	2028
7611-2	To discharge condenser cooling water to Tawhiti Stream	2,500 cubic metres/day	2016	2028

### 3.2.1 Water abstraction permit

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.

Graeme Lowe Protein holds water permit **7610-2** to take water from a dam and intake structure on the Tawhiti Stream for cooling and general use at a rendering plant. This permit was issued by the Council on 11 April 2013 under Section 87(d) of the RMA. It is due to expire on 1 June 2028.

Conditions 1 to 3 limit the volumes of water taken, for general purposes and cooling, and require that cooling water be returned to Tawhiti Stream.

Conditions 4 to 8 relate to monitoring.

Condition 9 requires adoption of the best practicable option to minimise adverse environmental effects.

Condition 10 is a review provision.

### **3.2.2 Water discharge permits**

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

Graeme Lowe Protein holds two water discharge permits.

### **Stormwater**

Graeme Lowe Protein holds water discharge permit **1104-4** to cover the discharge of up to 750 L/s of stormwater from buildings and paved areas at the site of a meat processing plant into the Tawhiti Stream in the Tangahoe catchment. This permit was issued by the Council on 22 September 2010 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

There are ten Special Conditions attached to the consent.

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

Condition 2 puts limits on the catchment area while Condition 3 deals with storage of hazardous substances.

Condition 4 limits pH, oil and grease and suspended solids.

Condition 5 states that the discharge shall not give rise to certain adverse effects on the receiving waters beyond the 100 m mixing zone.

Condition 6 requires the consent holder to adequately maintain and update a contingency plan.

Condition 7 requires the preparation and maintenance of a stormwater plan.

Condition 8 states that the consent holder must inform Council and Fonterra if an event occurs that may have an adverse effect on drinking water quality downstream.

Condition 9 requires the consent holder to notify Council if there are significant changes to processes or operations.

Condition 10 is a review provision.

### **Cooling water**

Graeme Lowe Protein holds discharge permit **7611-2** to discharge cooling water from a rendering plant to the Tawhiti Stream. This consent was issued by the Council on 11 April 2013 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Conditions 1 and 2 limit the volume discharged to and temperature increase in the Tawhiti Stream.

Conditions 3 to 8 relate to monitoring of volumes and temperatures.

Condition 9 requires that a hydrological recording station be maintained downstream.

Condition 10 restricts discharge contaminants to heat, and condition 11 requires notification of discharge volume over a certain daily amount.

Condition 12 requires review of monitoring of Tawhiti Stream, in consultation with Ngati Ruanui Iwi, upon exercise of consent.

Condition 13 requires adoption of the best practicable option to minimise adverse environmental effects.

Conditions 14 and 15 are lapse and review provisions.

### **3.2.3 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.

Graeme Lowe Protein holds air discharge permit **4033-6** to cover the discharge of emissions into the air from rendering operations and associated activities. This permit was issued by the Council on 16 November 2010 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Seven special conditions are attached to this consent.

Condition 1 requires the consent holder to adopt the best practicable option to minimise emissions from the site.

Condition 2 states that there should be no objectionable or offensive odours beyond the boundary of the site.

Condition 3 requires that the consent holder prepare an Air Discharge Management Plan for the site.

Conditions 4 and 5 deal with emissions and process control.

Condition 6 gives limits on dust levels.

Condition 7 is a review provision.

## **3.3 Monitoring programme**

The monitoring programme for Graeme Lowe Protein site consisted of three primary components in addition to programme liaison and management.

### **3.3.1 Site inspections**

The Graeme Lowe Protein site was visited on six occasions during 2014-2015. With regard to consents, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater. 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 the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### **3.3.2 Abstraction, flow and water temperature monitoring**

Graeme Lowe Protein provided the Council with daily abstraction rates as per condition 2 of consent 7610-1 until 30 April 2013, after telemetry of abstraction data directly to Council was established.

A hydrological recording station with telemetry was installed in the Tawhiti Stream immediately downstream of the Graeme Lowe Protein site, at Tawhiti Road on 3 December 2009, to assess flow volumes in preparation for replacement of consent 7610-1 (and 1091-3 held by Silver Fern Farms) to take water, which expired in June 2010. The hydrometric station is required to be maintained under the consent 7611-2 and consent **1103-4** (held by Silver Fern Farms) which provide for the discharge of cooling water from the rendering and meat processing plants, respectively.

A temperature monitor was installed on 18 May 2011, with telemetry directly to the Council, to gather information in case the discharge of cooling water commences from either Graeme Lowe Protein or Silver Fern Farms. There is a water temperature record for this site for a 13-year period, from 4 December 1992 to 9 February 2006, in relation to a cooling water discharge from Silver Fern Farms that ceased on 16 December 2004.

### **3.3.3 Chemical sampling**

In previous years, chemical sampling was undertaken at up to three stormwater discharge points and of the receiving water body. As in the previous monitoring period, no stormwater sampling was undertaken during 2014-2015 as the process area is now fully bunded, with all potentially contaminated stormwater going to effluent (Hawera wastewater treatment system). The Tawhiti Stream itself was sampled on four occasions in 2014-2015.

## **3.4 Results**

### **3.4.1 Water**

#### **3.4.1.1 Inspections**

Routine monitoring inspections were performed on six occasions during the 2014-2015 monitoring period. These routine inspections were conducted on 14 August and 10 November 2014, and 12 January, 2 February, 26 March and 8 June 2015.

On each visit, the inside of the plant and surrounds including the blood store, tallow and meal load-out areas, the stormwater catchments and trade waste area, and the bio-filter were inspected. An odour survey around the site was conducted on each occasion.

In general the site was found to be tidy and complying with consent conditions during inspections. Some erosion of the bank of Tawhiti Stream adjacent to the workshop was addressed through extension of a stormwater outfall serving non-process areas. Bank protection works were planned for summer 2015-2016.

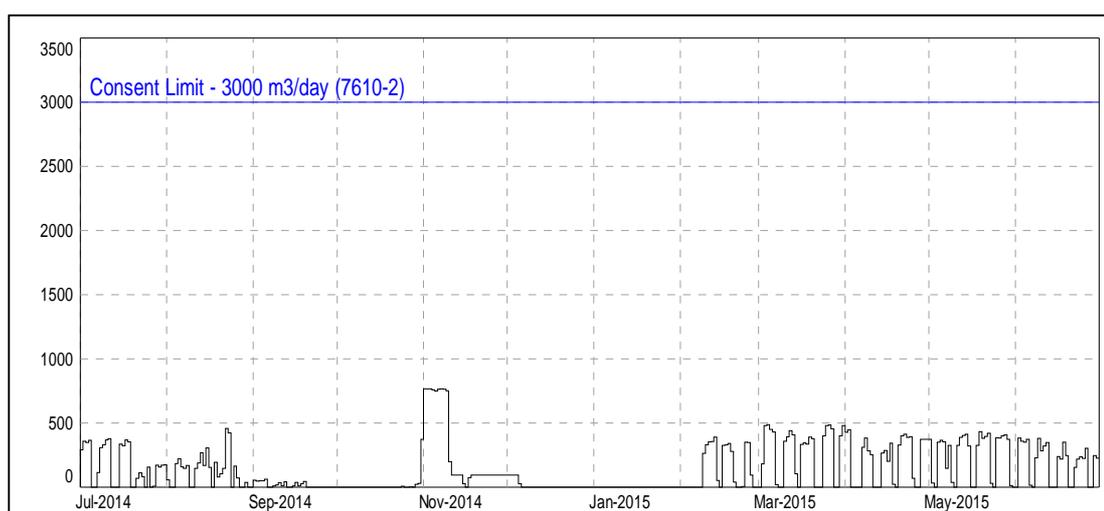
### 3.4.1.2 Water abstraction

Under condition 4 on consent 7610-2, Graeme Lowe Protein is required install and maintain water meters and dataloggers to measure and record, to an accuracy of  $\pm 5\%$ , the rate and volume of water taken for general purposes, and for cooling. Condition 8 requires that the records of water taken be transmitted directly to the Council's computer system, in a format suitable for 'real time' record over the internet.

Also, under the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010, Graeme Lowe Protein was required by 10 November 2012 to take continuous measurements and keep daily records of volume taken, and thereafter supply by 31 July each year the record for the preceding 1 July to 30 June period.

Suitable flow meters were already installed, and appropriate data transmission and recording systems in place, when consent 7610-2 was issued and when the Regulations came into force. Fifteen-minute average flow values are recorded.

The telemetered record, from 1 July 2014 to June 2015 is presented in Figure 7.



**Figure 7** Daily water abstraction by Graeme Lowe Protein, July 2014 – June 2015, m<sup>3</sup>

The record shows that the limit of 3,000 m<sup>3</sup>/d on maximum abstraction rate was complied with throughout the monitoring period. The recorded total volume abstracted in 2014-2015 was 51,428 m<sup>3</sup>. On 10 November 2014, the Company reported a fault with the datalogger, which caused high volumes of up to 768 m<sup>3</sup>/day to be recorded, irrespective of actual volume taken. The fault was repaired promptly. Disregarding this period of about nine days of faulty record, the maximum recorded daily volume was 488 m<sup>3</sup>, on 4 March 2015, which is in compliance with the daily limit of 500 m<sup>3</sup> on maximum volume that is allowed to be taken for general use purposes, other than cooling.

### 3.4.1.3 Results of receiving environment monitoring

The Tawhiti Stream was sampled at four sites upstream and downstream of the various discharges on three occasions in 2014-2015. The sites were sampled in

accordance with the monitoring programme requirements allowing possible impacts from stormwater discharge and solid waste disposal practices to be assessed. The results of the physico-chemical analyses of these samples are given in section 2.4.1.4, Table 8.

The receiving water body is sampled for Graeme Lowe Protein in conjunction with Silver Fern Farms and the Taranaki Fish and Game fish hatchery, as all three sites discharge within the same reach of the Tawhiti Stream. These sites have the potential to discharge an effluent with a combined effect, to increase BOD<sub>5</sub> and ammonia concentrations within the Tawhiti Stream, and therefore are assessed in conjunction with each other.

Condition 5 of consent 1104-4 states that the stream must not be made unsuitable for consumption by farm animals and that there must be no adverse effects on aquatic life.

The results of sampling show little difference between the upstream and downstream sites with regard to the parameters tested on the dates sampled, with the one exception. On 14 August 2014, in fine weather following rain the previous day (9 mm at Duffy's meteorological station, 4.0 km SE), BOD was elevated upstream, at 2.4 g/m<sup>3</sup>, and increased at Tawhiti Road and at the lowermost monitoring site, to the highest values recorded for those sites, of 4.5 and 6.2 g/m<sup>3</sup>, respectively. The reason is unexplained. The two stormwater discharges monitored at Silver Fern Farms had low BOD values, and no discharge was found at Graeme Lowe Protein. Ammonia concentration, which often is indicative of meat waste contamination, did not change significantly.

The concentrations of most tested parameters were found to be similar and within the ANZECC water quality guidelines. Total BOD exceeded the 2 g/m<sup>3</sup> guideline after the rainfall event prior to 14 August 2014, as is typical of lowland streams in pastoral areas of Taranaki at times after rainfall.

## **3.4.2 Air**

### **3.4.2.1 Inspections**

Inspections with regard to air discharges were conducted in conjunction with the inspections for plant processes and discharges to water.

During each inspection particular attention is given to the rendering and blood processing areas to ensure compliance with resource consent conditions, and to ensure any potential off-site odours are prevented and to determine potential for offsite effects.

Odours were noticeable beyond the boundary of the property during five of the six inspections, along Tawhiti Road in each case. On 14 August 2014 (west wind), and 12 January (northwesterly), 2 February (northerly) and 26 March 2015 (northeasterly), meaty/cooking odours were detected. The odour was found unpleasant on Monday 2 February 2015 when held-over blood was processed. On 8 June 2015 (northeasterly), light intermittent odour was detected, while no processing was occurring and offal was loaded out.

### 3.5 Investigations, interventions, and incidents

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

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

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

In the 2014-2015 period, it was necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with Graeme Lowe Protein's conditions in resource consents or provisions in Regional Plans on three occasions.

On the evening of Thursday 5 March 2015, a complaint was received about odour on Mason Road, northwest of the rendering plant. Immediate inspection by Council found occasional slight noticeable odour. No further action was taken.

On the morning of Sunday 15 March 2015, a complaint was received about an odour on Tawhiti Road, southwest of the rendering plant. Inspection by Council half an hour later found that the wind had changed direction. Noticeable odour was detected on the rendering plant site. No odour was detected at the boundary of the rendering plant site, or at the property of the complainant. No further action was taken.

On the afternoon of Wednesday 6 May 2015, a complaint was received about an odour on Clifford Street, south of the rendering plant. Inspection by Council about an hour later found no odour downwind of the rendering plant, which had ceased operation about two hours before. No further action was taken.

**Table 16** Number of air related incident investigations at the Graeme Lowe Protein rendering plant since June 1996

Monitoring Period	Number of incidents
1996-1997	2
1997-1998	2
1998-1999	1
1999-2000	0
2000-2001	3
2001-2002	4

Monitoring Period	Number of incidents
2002-2003	0
2003-2004	4
2004-2005	0
2005-2006	1
2006-2007	4
2007-2008	4
2008-2009	13
2009-2010	0
2010-2011	0
2011-2012	0
2012-2013	2
2013-2014	1
2014-2015	3

## 3.6 Discussion

### 3.6.1 Discussion of plant performance

Rendering activity decreased during the 2014-2015 review period, with the cessation of offal and bone gel processing in September 2014. Blood processing continued, and improved facilities were constructed for blood storage, with extraction of potentially odorous air for treatment.

During inspections site management was generally found to be satisfactory throughout the monitoring period under review.

An updated contingency plan for the site was received and accepted in November 2010.

A Stormwater Management Plan was due by 22 December 2010. However, given that all stormwater is directed to process waste, the contingency plan in case of spillage was considered to suffice.

The Air Discharge Management Plan required by condition 3 of consent 4033 formed part of the application for the consent granted in November 2010.

### 3.6.2 Environmental effects of exercise of consents

Although Graeme Lowe Protein now holds permits to discharge both condenser cooling water and stormwater to the Tawhiti Stream, all process water and stormwater with potential to contain contaminants is currently directed to the wastewater stream which is discharged to the Hawera wastewater treatment plant. Should the new consent 7611-2 to discharge cooling water be exercised, condition 12 requires review of the monitoring programme, in consultation with Ngati Ruanui Iwi, to determine the effects on stream ecology.

It is noted that a fish survey was carried out around the proposed Graeme Lowe Protein discharge point in January 2014, in relation to the abstraction weir and fish-

pass upstream. A survey around the Fonterra intake downstream was performed simultaneously. Neither survey indicated that the instream structures constituted a barrier to fish passage.

There were three odour complaints by members of the public during the 2014-2015 review period, none of which was substantiated. However, odour was noticeable to Council officers during a number of inspections, at times when blood was delivered or processed outside of normal work days.

In the 2008-2009 monitoring period there were 13 odour complaints received from members of the public. In response to the issues associated with odours the Company installed a bark bio-filter and ancillary works to extract air from the plant between March and June 2009. This action seems to have largely remediated this issue, except occasionally when off-specification material is brought on site. Measures to prevent this are being implemented.

### 3.6.3 Evaluation of performance

A summary of the Company's compliance record for the year under review is set out in Table 17 to Table 20.

**Table 17** Summary of performance for Consent 1104-4

<b>Purpose: To discharge stormwater from buildings and paved areas at the site of a rendering facility into the Tawhiti Stream</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 effects	Inspections	Yes
2. Stormwater catchment area <1.9 ha	Inspections	Yes
3. Appropriate storage of hazardous substances	Inspections	Yes
4. Discharge limits	Samples not collected during period under review	N/A
5. No effects upon receiving water following mixing	Inspections and sampling	Yes
6. Maintenance of contingency plan	Updated November 2010	Yes
7. Prepare and maintain stormwater management plan	Due 22 December 2010. Contingency plan under condition 6 suffices, as stormwater directed to sewer	Yes
8. Notification of event that may have adverse effect on water quality downstream		N/A
9. Notification of changes to processes or activities		N/A
10. Optional review provision	Next optional review June 2016	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 18** Summary of performance for Consent 4033-6

<b>Purpose: To discharge emissions to air from rendering operations and associated activities</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Adopt best practicable option to minimise discharge to air	Inspections	Yes
2. No objectionable or offensive odours beyond the site boundary	Inspections. Three complaints were made about odour, none of which was substantiated	Yes
3. Preparation of Air Discharge Management Plan	Due 16 February 2011. Incorporated into consent application.	Yes
4. Emissions to be treated by bio-filter	Inspections	Yes
5. Consent holder to minimise emissions and impacts of contaminants	Inspections	Yes
6. Discharge not to give rise to dust	Inspections	Yes
7. Optional review provision on environmental effects	Next scheduled in June 2016 if required	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 19** Summary of performance for Consent 7610-2

<b>Purpose: To take water from a dam and intake structure on the Tawhiti Stream for cooling and general use at a rendering plant</b>		
<b>Condition requirement</b>	<b>Condition requirement</b>	<b>Condition requirement</b>
1. Limit on abstraction volume	Metering by consent holder and telemetry of data to Council	Yes
2. Limit on volume not used for cooling	Metering by consent holder	Yes
3. Limit on volume used for cooling, all to be returned to Tawhiti Stream	Metering by consent holder and inspection	Yes
4. Installation of meters and loggers	Inspection	Yes
5. Certification of meters	Receipt of certification	Yes
6. Actions on failure of monitors	Receipt of notification, inspections	Yes
7. Monitors to be accessible	Inspections	Yes
8. Provision of records	Receipt of records as required	Yes
9. Use of best practicable option	Inspections and liaison	Yes
10. Optional review provision	Next optional review in June 2016	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 20** Summary of performance for Consent 7611-2

<b>Purpose: To discharge cooling water from a rendering plant into the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Limit on volume discharged	Not monitored as consent not exercised	N/A
2. Limit on temperature increase in Tawhiti Stream, with GLP discharge	Not monitored as consent not exercised	N/A
3. Trigger volume for temperature monitoring	Not monitored as consent not exercised	N/A
4. Trigger volume for flow metering	Not monitored as consent not exercised	N/A
5. Trigger volume for suspension of temperature and flow monitoring	Not monitored as consent not exercised	N/A
6. Methodology for temperature and flow metering	Not monitored as consent not exercised	N/A
7. Actions on failure of monitors	Not monitored as consent not exercised	N/A
8. Monitors to be accessible	Not monitored as consent not exercised	N/A
9. Maintenance of hydrometric station on Tawhiti Stream	Inspections	N/A
10. No contaminant other than heat	Not monitored as consent not exercised	N/A
11. Notification of exceedance of volume trigger	Not monitored as consent not exercised	N/A
12. Review of monitoring programme, with lwi, upon exercise of consent	Not applicable, as consent not exercised	N/A
13. Adoption of best practicable option	Not monitored as consent not exercised	Yes
14. Provision for lapse of consent		N/A
15. Optional review provision	Next scheduled review in June 2016	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>N/A</b>
Overall assessment of administrative performance in respect of this consent		<b>N/A</b>

N/A = not applicable

During the 2014-2015 review period, overall, Graeme Lowe Protein demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in section 1.1.4.

### **3.7 Recommendations from the 2012-2014 Biennial Report**

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

1. THAT monitoring of air emissions from Graeme Lowe Protein Ltd in the 2014-2015 period continue at the same level as in 2013-2014.
2. THAT monitoring of stormwater discharges from Graeme Lowe Protein Ltd in the 2014-2015 year continue at the same level as in 2013-2014.
3. THAT the option for a review of resource consent 7610-2 (take) in June 2015, as set out in condition 10 on consent 7610-2 not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects and that it is not appropriate to consider the cumulative environmental effects associated with the activities of Fonterra Co-operative Dairies Ltd at this time.
4. THAT the option for a review of resource consent 7611-2 (discharge cooling water) in June 2015, as set out in condition 15 on consent 7611-2 not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects and that it is not appropriate to consider the cumulative environmental effects associated with the activities of Fonterra Co-operative Dairies Ltd at this time.

These recommendations were implemented in the 2014-2015 monitoring period.

### **3.8 Alterations to monitoring programme for 2015-2016**

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, its obligations to monitor emissions/discharges and effects under the RMA, and report to the regional community. The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/ discharging to the environment.

In the case of Graeme Lowe Protein, the programme for 2014-2015 was largely unchanged from that for 2013-2014.

It is proposed that for 2015-2016, a similar level of monitoring is maintained. A recommendation to this effect is attached to this report.

### 3.9 Exercise of optional review of consents

All of the four consents held for operation of the meat rendering plant provide for an optional review in June 2016.

Condition 10 on consent 1104-4 (discharge stormwater), condition 7 on consent 4033-6 (discharge to air), condition 10 on consent 7610-2 (take), and condition 16 on consent 7611-2 (discharge cooling water) allow the Council to review the consents, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the consent, which either were bit foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

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

Recommendations to this effect are presented in Section 5 of this report.

### 3.10 Recommendations

1. THAT monitoring of air emissions from Graeme Lowe Protein Ltd in the 2015-2016 period continue at the same level as in 2014-2015.
2. THAT monitoring of stormwater discharges from Graeme Lowe Protein Ltd in the 2015-2016 year continue at the same level as in 2014-2015.
3. THAT the option for a review of resource consent 1104-4 (discharge stormwater) in June 2016, as set out in condition 10 on consent 1104-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
4. THAT the option for a review of resource consent 4033-6 (discharge to air) in June 2016, as set out in condition 7 on consent 4033=6 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
5. THAT the option for a review of resource consent 7610-2 (take) in June 2016, as set out in condition 10 on consent 7610-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects
6. THAT the option for a review of resource consent 7611-2 (discharge cooling water) in June 2016, as set out in condition 15 on consent 7611-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

## 4. Taranaki Fish and Game Council Trout Hatchery

### 4.1 Process description

The Taranaki Fish and Game Council (Taranaki Fish and Game) trout hatchery is situated beside the Tawhiti Stream about 2 km north west of Hawera. The trout hatchery has been operating on its present site since 1980. The hatchery received 6,000 eyed rainbow and brown trout ova in 2014-2015. As trout in the outside raceways grow, they are progressively released into Department of Conservation approved lakes and rivers. The average annual production from the hatchery is about 5,000 rainbow trout, with about 1,000 fish held in the hatchery through to an age of 14-15 months.

The trout hatchery is situated in a section of Tawhiti Stream where water quality is monitored to assess compliance with resource consent conditions for Silver Fern Farms and Graeme Lowe Protein. A number of water quality parameters are monitored at four sites on the Tawhiti Stream, with one site upstream of the hatchery intake and three sites downstream of the hatchery discharge. Currently, water is diverted from the Tawhiti Stream at a location immediately upstream of Silver Fern Farms' water supply weir (Figure 4). Three 100 mm diameter PVC slotted pipes are submerged in Silver Fern Farms' water supply dam; water is then gravity fed to the hatchery. The water is discharged back into Tawhiti Stream at about 60 m downstream of the diversion point. The hatchery outflow pipe-work is configured so that all troughs and raceways discharge to a common silt trap.

The silt, fish faecal matter and uneaten trout food that accumulates on the floor of the fingerling troughs and outside raceways is cleaned out periodically. Water levels are drawn-down, the discharge pipe is closed, and the sluiced material is diverted via the 700-litre silt trap to a series of three small settling/soakage ponds located to the side of the hatchery building (Photograph 2). The accumulated solids are disposed of off site.



**Photograph 2** The settling system at Taranaki Fish and Game trout hatchery



**Figure 8** Location of Taranaki Fish and Game trout hatchery showing discharge site and stream sampling sites

## 4.2 Resource consents

Until June 2010, Taranaki Fish and Game held only one consent to provide for the hatchery, to allow the diversion of water from Tawhiti Stream. Given that there was no provision for use of the water, and as there was some waste material in the discharge from the hatchery, Council decided that the consent should be replaced

with two consents: one to take and use water, and one to discharge water containing contaminants.

#### **4.2.1 Water use permit**

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.

Taranaki Fish and Game holds water permit **0523-3** to take and use water from the Tawhiti Stream in the Tangahoe catchment for trout hatchery purposes. This consent was granted on 29 July 2010 under Section 87(d) of the RMA. It is due to expire on 1 June 2028.

Four special conditions attached to the permit.

Condition 1 sets limits on the volume of water taken.

Condition 2 requires the consent holder to adopt the best practicable option to prevent or minimise adverse effects on the environment.

Condition 3 requires that the intake structure is screened.

Condition 4 sets out review provisions.

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

#### **4.2.2 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.

Taranaki Fish and Game holds discharge permit **7546-1** to cover the discharge of water containing contaminants into the Tawhiti Stream from a trout hatchery facility. This permit was issued by the Council on 1 April 2010 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Condition 1 requires the adoption of the best practicable option.

Condition 2 describes effects which the discharge shall not give rise to in the receiving water beyond a defined mixing zone.

Conditions 3 and 4 address the addition and discharge of chemicals.

Condition 5 relates to notification of events with potential adverse effect on a downstream drinking water supply.

Condition 6 deals with review of the conditions of the consent.

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

## **4.3 Monitoring programme**

The monitoring programme for Taranaki Fish and Game consisted of two primary components in addition to programme liaison and management.

### **4.3.1 Site inspections**

The Taranaki Fish and Game trout hatchery site was inspected twice in 2014-2015. With regard to consents for the abstraction of and 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. Sources of data being collected by the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### **4.3.2 Chemical sampling**

The Taranaki Regional Council undertook sampling both of the discharges from the site and of the water quality upstream and downstream of the discharge point and mixing zone.

The trout hatchery discharge was programmed to be sampled on two occasions in 2014-2015, and the sample analysed for ammoniacal nitrogen, nitrate, biochemical oxygen demand, conductivity, pH, turbidity, suspended solids, and temperature. The Tawhiti Stream was sampled on three occasions in 2014-2015, and the sample analysed for ammoniacal nitrogen, nitrates, dissolved reactive phosphorus, biochemical oxygen demand, conductivity, pH, turbidity, suspended solids, and temperature.

## **4.4 Results**

### **4.4.1 Water**

#### **4.4.1.1 Inspections**

Two compliance monitoring inspections of the Taranaki Fish and Game trout hatchery site were conducted during 2014-2015. Inspections focused on tank cleaning and the discharge to the Tawhiti Stream. Effluent sampling was undertaken in combination with the site inspection on one occasion. Additional sampling was undertaken on three other occasions, when surveys of Tawhiti Stream were undertaken in relation to discharges from Silver Fern Farms' meatworks.

On 14 November 2014, the site was unmanned at the time of inspection. The water intake was clear of obstructions; the fish pass was satisfactory; trees had been cleared from around the area; the return discharge was clear, flowing at one third of the outlet pipe. No effect was observed in the receiving water.

On 23 June 2015, a sample of the discharge (1 L/s) to the settling pond was taken after the tanks had been cleaned. There was no odour or other issues noted.

#### 4.4.1.2 Results of discharge monitoring

The results of chemical monitoring of the discharge from Taranaki Fish and Game's trout hatchery discharge pipe for 2014-2015 are presented in Table 21. The results of previous monitoring are summarised for comparison.

**Table 21** Physico-chemical results for Taranaki Fish and Game trout hatchery (Hawera) discharge pipe samples for 2014-2015 (TRC site code IND002037)

Date	Time	Temp	Cond. 20C	pH	Turb	SS	BOD	NH4	NNN	DRP
	NZST	°C	mS/m	pH	NTU	g/m <sup>3</sup>	g/m <sup>3</sup>	g/m <sup>3</sup> N	g/m <sup>3</sup> N	g/m <sup>3</sup> P
14.08.14	1016	10.0	23.3	7.4	18	28	2.4	0.080		0.034
28.03.15		16.5	25.3	7.0	7.3	11	1.3	0.064		0.047
17.06.15	1022	8.2	25.6	7.6	14	17	2.0	0.060		0.029
23.06.15	1030	8.1	26.3	7.6	26	92	4.0	0.068		0.068
N		19	20	20	20	20	20	20	13	14
Min		8.8	21.8	7.4	4.3	6	<0.5	0.024	1.26	0.020
Max		17.8	26.5	7.7	270	850	20	0.193	2.2	0.056
Median		12.0	25.0	7.6	12	18	1.2	0.051	1.98	0.031

Considering the rate of discharge from this discharge point, and the degree of assimilation available in the Tawhiti Stream, it is considered that this discharge would not have caused a noticeable increase in these parameters in the receiving water body. This was confirmed by visual inspection during sampling.

#### 4.4.1.3 Results of receiving environment monitoring

The Tawhiti Stream was sampled at four sites upstream and downstream of the various discharges on seven occasions. The sites were sampled in accordance with the monitoring programme requirements allowing possible impacts from stormwater discharge and solid waste disposal practices to be assessed. The results of the physico-chemical analyses of these samples are given in section 2.4.1.4, Table 8. The receiving water body is sampled for the Taranaki Fish and Game fish hatchery in conjunction with Silver Fern Farms and Graeme Lowe Protein, as all three sites discharge within the same reach of the Tawhiti Stream. These sites have the potential to discharge an effluent of such quality, as to increase BOD<sub>5</sub> and ammonia concentration within the Tawhiti Stream, and therefore are assessed in conjunction with each other.

Condition 3 of consent 7546-1 states that the stream must not be made unsuitable for consumption by farm animals and that there must be no adverse effects on aquatic life.

The results of sampling show little difference between the upstream and downstream sites at the hatchery with regard to the parameters tested on the dates sampled. Variation between sampling dates related largely to proximity to rain events in the catchment.

The concentrations of most tested parameters were found to be similar and within the ANZECC water quality guidelines. Total BOD exceeded the 2 g/m<sup>3</sup> guideline

after the rainfall event of 14 August 2014, as is typical of lowland streams in pastoral areas of Taranaki at times after rainfall.

## **4.5 Investigations, interventions, and incidents**

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

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

In the 2014-2015 period, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with Taranaki Fish and Game conditions in resource consents or provisions in Regional Plans.

## **4.6 Discussion**

### **4.6.1 Discussion of plant performance**

The environmental performance of the trout hatchery run by Taranaki Fish and Game during the period under review has been high. In the 2014-2015 period, there were no incidents recorded by the Council that were associated with the Taranaki Fish and Game trout hatchery site. The management of the site has generally been good with no issues arising during the period.

In 2010, Taranaki Fish and Game installed a three-pond settling system to remove suspended material that is produced when the fingerling troughs and outside raceways are cleaned. This has improved the quality of the discharge to the Tawhiti Stream during cleaning operations.

### **4.6.2 Environmental effects of exercise of consents**

Water quality data collected for the receiving waters of Tawhiti Stream in relation to the Taranaki Fish and Game trout hatchery monitoring programme suggests that there have been no significant adverse effects in the Tawhiti Stream as a result of the activities of the Taranaki Fish and Game trout hatchery (in combination with

discharges from Silver Fern Farms and Graeme Lowe Protein) during the period under review.

### 4.6.3 Evaluation of performance

A tabular summary of Taranaki Fish and Game's compliance record for the period under review is set out in Table 22 and Table 23.

**Table 22** Summary of performance for Consent 0523 -3

<b>Purpose: To take and use water from the Tawhiti Stream in the Tangahoe catchment for trout hatchery purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Volume of water taken not to exceed 11.4 L/sec	Not monitored during period under review	N/A
2. Adopt best practicable option	Inspection	Yes
3. Intake structure to be screened	Inspections	Yes
4. Optional review provision	Next review date June 2016	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 23** Summary of performance for Consent 7546-1

<b>Purpose: To discharge water containing contaminants into the Tawhiti Stream in the Tangahoe catchment from a trout hatchery facility</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Adopt best practicable option	Inspections of site	Yes
2. Effects not to occur in receiving waters beyond the established mixing zone	Inspection and chemical sampling of receiving water	Yes
3. Prohibition on chemicals except potassium permanganate	Inspection and chemical sampling of discharge	Yes
4. No water through-flow during salt treatment	Inspections	Yes
5. Notification of events that may cause adverse effect on water quality	Liaison with consent holder	N/A
6. Optional review provision	Next optional review date June 2016	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A == not applicable

During the period under review, the Taranaki Fish and Game demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in section 1.1.4. Inspections and water quality surveys were conducted, which indicated that contaminants in the discharge to the Tawhiti Stream were minimal and had no significant environmental effect.

#### **4.6.4 Recommendations from the 2012-2014 Biennial Report**

The 2012-2014 Biennial Report recommended:

1. THAT monitoring of discharges from Taranaki Fish and Game trout hatchery in the 2014-2015 year continue at the same level as in 2013-2014.

This recommendation was followed.

#### **4.6.5 Alterations to monitoring programme for 2014-2015**

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

In the case of the Taranaki Fish and Game trout hatchery, the monitoring programme for 2014-2015 was unchanged from that of 2013-2014. It is now proposed that for 2015-2016, a similar level of monitoring is maintained. A recommendation to this effect is attached to this report.

### **4.7 Exercise of optional review of consents**

Both consents held for operation of the hatchery provide for an optional review in June 2016.

Condition 4 on consent 0523-3 (take) and condition 6 on consent 7546-1 (discharge) allow the Council to review the consents, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the consent, which either were not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

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

Recommendations to this effect are presented in Section 4.8 of this report.

## 4.8 Recommendation

1. THAT monitoring of abstraction to and discharges from Taranaki Fish and Game trout hatchery in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT the option for a review of resource consent 0523-3 (take) in June 2016, as set out in condition 4 on consent 0523-3 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
3. THAT the option for a review of resource consent 7546-2 (discharge) in June 2016, as set out in condition 7 on consent 7546-2 not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

## 5. Summary of Recommendations

### Silver Fern Farms Limited

1. THAT monitoring of air emissions from Silver Fern Farms Ltd's site in Hawera in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT monitoring of stormwater discharges from Silver Fern Farms Ltd's site in Hawera in the 2015-2016 year continue at the same level as in 2016-2015.
3. THAT reporting of water abstraction rates as required under consent 1091-4 continue in 2015-2016 at the same level as 2014-2015.
4. THAT reporting of Tawhiti Stream flow rate as required under consent 1103-4 in the 2015-2016 year continue at the same level as in 2014-2015.
5. THAT the Tawhiti catchment monitoring programme developed in the 2007-2008 year and implemented in the 2014-2015 monitoring period, combining consents for the Silver Fern Farms Ltd site, the Graeme Lowe Protein site, and the Taranaki Fish and Game hatchery continue in 2015-2016.
6. THAT the option for a review of resource consent 1091-4 (take) in June 2016, as set out in condition 10 on consent 1091-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects..
7. THAT the option for a review of resource consent 1103-4 (discharge cooling water) in June 2016, as set out in condition 14 on consent 1103-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
8. THAT the option for a review of resource consent 4832-2 (discharge paunch material) in June 2016, as set out in condition 8 on consent 4832-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
9. THAT the option for a review of resource consent 4995-2 (dam) in June 2016, as set out in condition 3 on consent 4995-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
10. THAT the option for a review of resource consent 5598-2 (discharge stormwater) in June 2016, as set out in condition 9 on consent 5598-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
11. THAT the option for a review of resource consent 5599-2 (discharge to air) in June 2016, as set out in condition 6 on consent 5599=2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

**Graeme Lowe Protein Limited**

1. THAT monitoring of air emissions from Graeme Lowe Protein Ltd in the 2015-2016 period continue at the same level as in 2014-2015.
2. THAT monitoring of stormwater discharges from Graeme Lowe Protein Ltd in the 2015-2016 year continue at the same level as in 2014-2015.
3. THAT the option for a review of resource consent 1104-4 (discharge stormwater) in June 2016, as set out in condition 10 on consent 1104-4 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
4. THAT the option for a review of resource consent 4033-6 (discharge to air) in June 2016, as set out in condition 7 on consent 4033-6 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
5. THAT the option for a review of resource consent 7610-2 (take) in June 2016, as set out in condition 10 on consent 7610-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects
6. THAT the option for a review of resource consent 7611-2 (discharge cooling water) in June 2016, as set out in condition 15 on consent 7611-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

**Taranaki Fish & Game (trout hatchery)**

1. THAT monitoring of abstraction to and discharges from Taranaki Fish and Game trout hatchery in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT the option for a review of resource consent 0523-3 (take) in June 2016, as set out in condition 4 on consent 0523-3 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.
3. THAT the option for a review of resource consent 7546-2 (discharge) in June 2016, as set out in condition 7 on consent 7546-2 not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

## Glossary of common terms and abbreviations

The following abbreviations and terms are used within this report:

Biomonitoring	Assessing the health of the environment using aquatic organisms
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate
BODF	Biochemical oxygen demand of a filtered sample
bund	A wall around a tank to contain its contents in the case of a leak
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample
Condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
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>3</sup>	Grammes per cubic metre, and equivalent to milligrammes per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident
l/s	Litres per second
MALF	Mean annual low flow
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
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15)
RMA	Resource Management Act 1991 and including all subsequent amendments
SS	Suspended solids
SQMCI <sub>s</sub>	Semi-quantitative macroinvertebrate community index. A numerical indication of the state of biological health in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats, and also their abundance within the sample collected
Temp	Temperature, measured in °C (degrees Celsius)
Turb	Turbidity, expressed in NTU
UI	Unauthorised Incident
UIR	Unauthorised Incident Register - contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan

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

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

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## **Appendix I**

### **Resource consents held by industries in the Tawhiti Stream catchment**

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



# **Silver Fern Farms Limited**



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

Name of  
Consent Holder: Silver Fern Farms Management Limited  
PO Box 941  
Dunedin 9054

Decision Date: 18 March 2013

Commencement Date: 18 March 2013

**Conditions of Consent**

Consent Granted: To take water from a dam and intake structure on the Tawhiti Stream for general use in a meat processing plant and for cooling purposes

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2-4 DP 20278 Sec 1 SO 438635 Blk VI Hawera SD  
(Site of take)

Grid Reference (NZTM) 1711265E-5618342N

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 volume of water taken shall not exceed 3,500 cubic metres per day.
2. The volume of water used for general purposes (that is, for purposes other than cooling) shall not exceed 1,000 cubic metres per day.
3. The volume of water used for cooling shall not exceed 2,500 cubic metres per day. All used cooling water shall be returned to the Tawhiti Stream in accordance with consent 1103-4.
4. Before exercising this consent, the consent holder shall install, and thereafter maintain water meters and dataloggers. The water meters and dataloggers shall be tamper-proof and shall separately measure and record, to an accuracy of  $\pm 5\%$ , the rate and volume of water taken for:
  - (a) general purposes (condition 2); and
  - (b) cooling water (condition 3).

Records of the date, the time and the rate and volume of water taken for each use, at intervals not exceeding 15 minutes shall be kept and provided to the Chief Executive, Taranaki Regional Council in accordance with condition 8.

Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.

5. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording equipment required by the conditions of this consent ('the equipment'):
  - (a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or
  - (b) has been tested and shown to be operating to an accuracy of  $\pm 5\%$ .

The documentation shall be provided:

- (i) within 30 days of the installation of a water meter or datalogger;
- (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and
- (iii) no less frequently than once every five years.

## Consent 1091-4

6. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.
7. The water meters and dataloggers shall be accessible to Taranaki Regional Council officers at all reasonable times for inspection and/or data retrieval.
8. The records of water taken shall:
  - (a) be transmitted directly to the Council's computer system, in a format suitable for providing a 'real time' record over the internet;
  - (b) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing; and
  - (c) specifically record the water taken as 'zero' when no water is taken.
9. 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 taking of water, including, but not limited to, the efficient and conservative use of water.
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 2015 and/or June 2016 and/ or June 2022 for the 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 18 November 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: Silver Fern Farms Management Limited  
PO Box 941  
Dunedin 9054

Decision Date: 18 March 2013

Commencement Date: 18 March 2013

**Conditions of Consent**

Consent Granted: To discharge cooling water from a meat processing plant  
into the Tawhiti Stream

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2 & 4 DP 20278 Sec 1 SO 738635 Blk VI Hawera SD  
(Site of discharge)

Grid Reference (NZTM) 1711295E-5618303N

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 volume of cooling water discharged shall not exceed 2,500 cubic metres per day.
2. The discharge, in combination with the discharge authorised by consent 7611-2 (Graeme Lowe Protein Limited), shall not alter the ambient temperature of the receiving water by more than 3 degrees Celsius or cause it to exceed 25 degrees Celsius, as determined by simultaneous measurements immediately upstream and 150 metres downstream of the point of discharge.
3. From the date that the discharge first exceeds 100 m<sup>3</sup> per day, the consent holder shall measure and record the temperature, to an accuracy of  $\pm 0.1$  °C, of the:
  - (a) cooling water discharge;
  - (b) Tawhiti Stream immediately upstream of the discharge point; and
  - (c) Tawhiti Stream 150 metres downstream of the discharge point.

Records of the date, the time and the water temperature at intervals not exceeding 15 minutes, shall be kept and provided to the Chief Executive, Taranaki Regional Council in accordance with condition 6.

Note: To avoid duplication this equipment may be installed and maintained jointly with the holder of Consent 7611-2 (Graeme Lowe Protein Limited)

4. From the date that the discharge first exceeds 100 m<sup>3</sup> per day, the consent holder shall install, and thereafter maintain a water meter and datalogger that measures and records the rate and volume of cooling water discharged, to an accuracy of  $\pm 5\%$ . Records of the date, the time and the rate and volume of cooling water discharged at intervals not exceeding 15 minutes shall be kept and provided to the Chief Executive, Taranaki Regional Council in accordance with condition 6.

Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.
5. The Chief Executive, Taranaki Regional Council may suspend the requirements for measuring and recording specified in condition 3 and/or condition 4 if the rate of discharge of cooling water is less than 100 m<sup>3</sup>/day for an extended period of time. The measuring and recording required by these conditions must resume before the discharge exceeds 100 m<sup>3</sup>/day again.
6. The records of cooling water discharged, and temperature monitoring, shall:
  - (a) be transmitted directly to the Council's computer system, in a format suitable for providing a 'real time' record over the internet; and
  - (b) be provided in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing.

## Consent 1103-4

7. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.
8. The water meters, dataloggers and temperature sensors shall be accessible to Taranaki Regional Council officers at all reasonable times for inspection and/or data retrieval.
9. Before exercising this consent, the consent holder shall install (in conjunction with Graeme Lowe Protein Limited), and thereafter maintain a hydrological recording station immediately downstream of the Silver Fern Farms Limited site to measure and record the flow of the Tawhiti Stream. The cost of installation and maintenance shall be met by the consent holders.
10. The discharge authorised by this consent shall contain no added contaminant other than heat when compared with the water abstracted by the consent holder under resource consent 1091-4.
11. The consent holder shall notify the Chief Executive, Taranaki Regional Council as soon as practicable if the volume discharged is to exceed 100 m<sup>3</sup>/day. Notification shall include the date and reason for the discharge, and shall be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
12. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
13. This consent shall lapse on 31 March 2018, 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.
14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2016 and/ or June 2022 for the 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 18 November 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: Silver Fern Farms Management Limited  
PO Box 941  
Dunedin 9054

Decision Date: 24 August 2010

Commencement Date: 24 August 2010

**Conditions of Consent**

Consent Granted: To discharge screened paunch and stockyard solids onto and into land by spreading and composting in the vicinity of the Tawhiti Stream in the Tangahoe catchment

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2-4 DP 20278 Blk VI Hawera SD (Discharge source)  
Pt Lot 1 DP 2590 Blk VI Hawera SD (Discharge site)

Grid Reference (NZTM) 1711349E-5618167N

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 maximum volume of paunch and stockyard solids to be discharged to land at the paunch disposal area shall not exceed of 4,500 tonnes in any processing year (1 October to 30 September).
2. The consent holder shall keep records of the volumes of paunch and stockyard solids discharged to land. These records shall be made available to the Chief Executive of Taranaki Regional Council upon request.
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. All areas used for the stockpiling and stabilisation of screened paunch and stockyard solids shall be bunded or run-off from these areas shall be diverted by a drain to the storage pond in order to ensure that no run-off from these areas enters the Tawhiti Stream.
5. There shall be no direct discharge of contaminants from the storage pond into the Tawhiti Stream.
6. Run-off stored in the storage pond will be pumped to the wastewater holding tank for treatment along with other effluent produced at the meat processing plant.
7. The consent holder shall prepare and thereafter maintain a management plan for the paunch and stockyard disposal area that, to the satisfaction of the Chief Executive of the Taranaki Regional Council, details how paunch disposal is to be managed to ensure there is no discharge of contaminants from this area into the Tawhiti Stream. The plan shall include but not necessarily be limited to:
  - a) Description of disposal areas and buffer zones;
  - b) Application rate and method;
  - c) Depth and frequency of coverage;
  - d) Composting management;
  - e) Prevention of run-off to the stream;
  - f) Minimisation of groundwater seepage to the stream; and
  - g) Contingency procedures.

## Consent 4832-2

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 18 November 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: Silver Fern Farms Management Limited  
PO Box 941  
Dunedin 9054

Decision Date: 18 March 2013

Commencement Date: 18 March 2013

**Conditions of Consent**

Consent Granted: To use an existing 6 metre high concrete and earth dam and associated intake structure to dam and divert the Tawhiti Stream

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2 & 4 DP 20278 Sec 1 SO 438635 Pt Lot 2 DP 3291  
Blk V Hawera SD (Site of structure)

Grid Reference (NZTM) 1711196E-5618439N (Intake structure)  
1711218E-5618472N (Dam)

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 dam shall include a concrete overflow channel that is roughened and has rocks fixed within it in a manner that, the Chief Executive, Taranaki Regional Council, has certified as providing passage for the migratory fish species that are likely to be present.
2. The structure licensed by this consent shall be maintained, to the satisfaction of the Chief Executive, Taranaki Regional Council. The dam shall remain the responsibility of the consent holder and be maintained so that:
  - a) it does not become blocked and at all times allows the free flow of water over it;
  - b) the integrity of the structure is protected;
  - c) fish passage is not impeded; and
  - d) any erosion, scour or instability of the stream bed or banks that is attributable to the structure authorised by this consent is remedied by the consent holder.
3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the months 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 18 November 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: Silver Fern Farms Management Limited  
PO Box 941  
Dunedin 9054

Decision Date: 27 July 2010

Commencement Date: 27 July 2010

**Conditions of Consent**

Consent Granted: To discharge stormwater from a meat processing plant into the Tawhiti Stream in the Tangahoe catchment

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022 and/or within 3 months of receiving a notification under special condition 8

Site Location: Tawhiti Road, Hawera

Legal Description: Lot 2 DP 202078 Blk VI Hawera SD

Grid Reference (NZTM) 1711288E-5618349N

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 discharge shall be from a catchment area on the site not exceeding 3.8 hectares.
3. Any significant volumes of hazardous substances (e.g. diesel fuel, hydrochloric acid and sulphuric acid) on site shall be:
  - a) contained in a double skinned tank, or
  - b) stored in a dedicated bunded area with drainage to sumps, or to other appropriate recovery systems, and not directly to the site stormwater system.
4. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm <sup>-3</sup>
oil and grease	Concentration not greater than 15 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.

5. After allowing for reasonable mixing, within a mixing zone extending 100 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) the rendering of fresh water unsuitable for consumption by farm animals;
  - e) any significant adverse effects on aquatic life.
6. The consent holder shall maintain a contingency plan. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

7. The consent holder shall maintain a stormwater management plan. This plan shall be adhered to at all times and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater. The plan shall include but not necessarily be limited to:
- a) the loading and unloading of materials;
  - b) maintenance of conveyance systems;
  - c) general housekeeping; and
  - d) management of the interceptor system.

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).

8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site, that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
9. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
- a) during the month of June 2016 and/or June 2022; and/or
  - b) within 3 months of receiving a notification under special condition 8 above;

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

Transferred at Stratford on 18 November 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: Silver Fern Farms Management Limited  
PO Box 941  
Dunedin 9054

Decision Date: 31 August 2010

Commencement Date: 31 August 2010

**Conditions of Consent**

Consent Granted: To discharge emissions into the air from meat processing operations and associated activities

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2-4 DP 20278 Blk VI Hawera SD  
(Meat Processing Site)  
Lot 2 Pt Lot1 DP 2590 Blk VI Hawera SD  
(Paunch Disposal Site)

Grid Reference (NZTM) 1711249E-5618267N

*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 consent holder shall minimise the emissions and impacts of contaminants discharged into air from the site by:
  - a) the selection of the most appropriate process equipment;
  - b) process control equipment and emission control equipment;
  - c) the methods of control;
  - d) supervision and operation;
  - e) the proper and effective operation, supervision, maintenance and control of all equipment and processes; and
  - f) the proper care of all stock on the site.
3. 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.
4. The consent holder shall prepare and thereafter maintain a management plan for the paunch disposal area that, to the satisfaction of the Chief Executive of the Taranaki Regional Council, details how paunch disposal is to be managed to ensure there is no offensive and objectionable odour beyond the boundary of the site.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site, that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).

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 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 18 November 2015

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**



**Graeme Lowe Protein Limited**



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

Name of  
Consent Holder: Graeme Lowe Protein Limited  
P O Box 505  
HAWERA 4640

Decision Date: 22 September 2010

Commencement  
Date: 22 September 2010

**Conditions of Consent**

Consent Granted: To discharge stormwater from buildings and paved areas at the site of a rendering facility into the Tawhiti Stream and into an unnamed tributary of the Tawhiti Stream at or about (NZTM) 1711317E-5618356N

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022 and/or within 3 months of receiving a notification under special condition 9

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2-4 DP 20278 Blk VI Hawera SD

Catchment: Tangahoe

Tributary: Tawhiti

### General condition

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

### 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 discharge shall be from a catchment area on the site not exceeding 1.9 hectares.
3. Any significant volumes of hazardous substances [e.g. sodium metabisulphite, sodium hypochlorite and sulphuric acid] on site shall be:
  - a) contained in a double skinned tank, or
  - b) stored in a dedicated bunded area with drainage to sumps, or to other appropriate recovery systems, and not directly to the site stormwater system.
4. Constituents of the discharge shall meet the standards shown in the following table.

<b>Constituent</b>	<b>Standard</b>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm <sup>-3</sup>
oil and grease	Concentration not greater than 15 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.

5. After allowing for reasonable mixing, within a mixing zone extending 100 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) the rendering of fresh water unsuitable for consumption by farm animals;
  - e) any significant adverse effects on aquatic life.
6. The consent holder shall maintain a contingency plan. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

## Consent 1104-4

7. Within three months of the commencement of this consent, the consent holder shall prepare and maintain a stormwater management plan. This plan shall be adhered to at all times and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater. The plan shall include but not necessarily be limited to:
- a) the loading and unloading of materials;
  - b) maintenance of conveyance systems;
  - c) general housekeeping; and
  - d) management of the interceptor system.

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).

8. If, as a consequence of the activity authorised by this consent, an event occurs that may have a significant adverse effect on water quality at the registered drinking-water supply abstraction point for Fonterra [grid ref: 1712833E-5616248N] the consent holder shall, as soon as reasonably practicable, telephone the Taranaki Regional Council and Fonterra and notify them of the event.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site, that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
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:
- a) during the month of June 2016 and/or June 2022; and/or
  - b) within 3 months of receiving a notification under special condition 9 above;

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

Signed at Stratford on 22 September 2010

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: Graeme Lowe Protein Limited  
P O Box 505  
HAWERA 4640

Decision Date: 16 November 2010

Commencement  
Date: 16 November 2010

**Conditions of Consent**

Consent Granted: To discharge emissions into the air from rendering  
operations and associated activities at or about (NZTM)  
1711318E-5618468N

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lot 1 DP 20278 Blk VI Hawera SD & Pt Lot 2 DP 3291 Blk  
VI Hawera SD

*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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

### **Special conditions**

#### **General**

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. There shall be no objectionable or offensive odour to the extent that it causes an adverse effect at or beyond the boundary of the site.

Note: For the purposes of this condition:

- The consent holder's site is defined as Lot 1 DP 20278 Blk VI Hawera SD& Pt Lot 2 DP 3291 Blk VI Hawera SD; and
  - Assessment under this condition shall be in accordance with the Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.
3. Within three months of the granting of consent, the consent holder shall prepare an Air Discharge Management Plan for the site that, to the satisfaction of the Chief Executive of the Taranaki Regional Council, details how discharges to air from the site will be managed to ensure compliance with conditions 2 and 6. The plan shall include but not necessarily be limited to;
    - a) A description of the environmental effects being managed;
    - b) The identification of key personnel responsible for managing and implementing the management system for mitigating adverse effects;
    - c) A description of the activities on site and describe the main potential sources of odour emissions;
    - d) A description of storage and treatment procedures(including specification of storage times and preservative dosing concentrations) for ensuring that only high quality raw material is processed;
    - e) The identification and description of the odour and dust mitigation measures in place;
    - f) The identification and description of relevant operating procedures and parameters that need to be controlled to minimise emissions;

- g) A description of contingency procedures for addressing emergency situations at the plant (such as equipment failure or spillage of raw material or chemicals) which could result in a discharge to air of odorous emissions that are offensive and objectionable beyond the boundary of the plant;
- h) A description of monitoring and maintenance procedures for managing the odour mitigation measures including record keeping of control parameters and maintenance checks; and
- i) Details of staff training proposed to enable staff to appropriately manage the odour mitigation measures.

Thereafter, an updated plan shall be submitted to the Chief Executive of the Taranaki Regional Council every two years.

### **Process control**

- 4. Emissions from all concentrated sources of odour relating to the rendering and blood processing activities undertaken on site, in particular from equipment used in the cooking, pressing and drying processes, must be treated in the biofilter prior to discharge.
- 5. The consent holder shall minimise the emissions and impacts of contaminants discharged into air from the site by:
  - a) the selection of the most appropriate process equipment; and
  - b) the proper and effective operation, supervision, maintenance and control of all equipment and processes.

### **Dust**

- 6. 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 purpose of this condition, discharges in excess of the following limits are deemed to be offensive or objectionable:
  - a) dust deposition rate 0.13 g/m<sup>2</sup>/day; and/or
  - b) suspended dust level 3 mg/m<sup>3</sup>.

**Review**

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 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 16 November 2010

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**

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

Name of  
Consent Holder: Graeme Lowe Protein Limited  
P O Box 505  
HAWERA 4640

Decision Date: 11 April 2013

Commencement Date: 11 April 2013

**Conditions of Consent**

Consent Granted: To take water from a dam and intake structure on the  
Tawhiti Stream for cooling and general use at a rendering  
plant

Expiry Date: 1 June 2028

Review Date(s): June 2015, June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2-4 DP 20278 Blk VI Hawera SD (Site of take)

Grid Reference (NZTM) 1711265E-5618342N

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 volume of water taken shall not exceed 3,000 cubic metres per day (34.7 litres per second).
2. The volume of water used for general purposes (that is, for purposes other than cooling) shall not exceed 500 cubic metres per day.
3. The volume of water used for cooling shall not exceed 2,500 cubic metres per day. All used cooling water shall be returned to the Tawhiti Stream in accordance with consent 7611-2.
4. Before exercising this consent, the consent holder shall install, and thereafter maintain water meters and dataloggers. The water meters and dataloggers shall be tamper-proof and shall separately measure, to an accuracy of  $\pm 5$ , and record the rate and volume of water taken for:
  - (a) general purposes (condition 2); and
  - (b) cooling water (condition 3).

Records of the date, the time and the rate and volume of water taken at intervals not exceeding 15 minutes shall be kept and provided to the Chief Executive, Taranaki Regional Council in accordance with condition 8.

*Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.*

5. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording equipment required by the conditions of this consent ('the equipment'):
  - (a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or
  - (b) has been tested and shown to be operating to an accuracy of  $\pm 5\%$ .

The documentation shall be provided:

- (i) within 30 days of the installation of a water meter or datalogger;
- (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and
- (iii) no less frequently than once every five years.

## Consent 7610-2

6. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.
7. The water meters and dataloggers shall be accessible to Taranaki Regional Council officer's at all reasonable times for inspection and/or data retrieval.
8. The records of water taken shall:
  - (a) be transmitted directly to the Council's computer system, in a format suitable for providing a 'real time' record over the internet;
  - (b) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing; and
  - (c) specifically record the water taken as 'zero' when no water is taken.
9. 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 taking of water, including, but not limited to, the efficient and conservative use of water.
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 2015 and/or June 2016 and/or June 2022 for the 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.

Signed at Stratford on 11 April 2013

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: Graeme Lowe Protein Limited  
P O Box 505  
HAWERA 4640

Decision Date: 11 April 2013

Commencement Date: 11 April 2013

**Conditions of Consent**

Consent Granted: To discharge cooling water from a rendering plant to the  
Tawhiti Stream

Expiry Date: 1 June 2028

Review Date(s): June 2015, June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Lots 2-4 DP 20278 Blk VI Hawera SD  
(Discharge source & site)

Grid Reference (NZTM) 1711295E-5618303N

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 volume of cooling water discharged shall not exceed 2,500 cubic metres per day.
2. The discharge, in combination with the discharge authorised by consent 1103-4 (Silver Fern Farms Limited), shall not alter the ambient temperature of the receiving water by more than 3 degrees Celsius or cause it to exceed 25 degrees Celsius, as determined by simultaneous measurements immediately upstream and 150 metres downstream of the point of discharge.
3. From the date that this consent is first exercised, the consent measure and record the temperature, to an accuracy of  $\pm 0.1$  °C, of the:
  - (a) cooling water discharge;
  - (b) Tawhiti Stream immediately upstream of the discharge point; and
  - (c) Tawhiti Stream 150 metres downstream of the discharge point.

Records of the date, the time and the water temperature at intervals not exceeding 15 minutes, shall be kept and provided to the Chief Executive, Taranaki Regional Council in accordance with condition 6.

*Note: To avoid duplication this equipment may be installed and maintained jointly with the holder of Consent 1103-4 (Silver Fern Farms Limited).*

4. Before exercising this consent, the consent holder shall install, and thereafter maintain a water meter and datalogger that measures and records the rate and volume of cooling water discharged to the Tawhiti Stream, to an accuracy of  $\pm 5\%$ . Records of the date, the time and the rate and volume of cooling water discharged at intervals not exceeding 15 minutes shall be kept and provided to the Chief Executive, Taranaki Regional Council in accordance with condition 6.

*Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.*

5. The Chief Executive, Taranaki regional Council may suspend the requirements for measuring and recording specified in condition 3 and/or condition 4 if there is to be no discharge of cooling water for an extended period of time. The monitoring and recording required by these conditions must resume before the discharge recommences.

## Consent 7611-2

6. The records of cooling water discharged and temperature monitoring, shall:
  - (a) be transmitted directly to the Taranaki Regional Council's computer system, in a format suitable for providing a 'real time' record over the internet; and
  - (b) be provided in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing.
7. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.
8. The water meters, dataloggers and temperature sensors shall be accessible to Taranaki Regional Council officer's at all reasonable times for inspection and/or data retrieval.
9. Before exercising this consent, the consent holder shall install (in conjunction with Silver Fern Farms Limited), and thereafter maintain a hydrological recording station immediately downstream of the Graeme Lowe Protein Limited site to measure and record the flow of the Tawhiti Stream. The cost of installation and maintenance shall be met by the consent holder.
10. The discharge authorised by this consent shall contain no added contaminant other than heat when compared with the water abstracted by the consent holder under resource consent 7610-2.
11. The consent holder shall notify the Chief Executive, Taranaki Regional Council before this consent is first exercised. Notification shall include the time and date the discharge is to commence, and shall be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz).
12. When the consent is exercised the consent holder shall, in consultation with Ngati Ruanui Iwi, review the environmental monitoring that is being undertaken on the Tawhiti Stream and ensure that additional monitoring is undertaken if it is needed to determine the effects of the exercise of this consent on stream ecology. Monitoring that may be undertaken to determine effects on stream ecology may include at least one of:
  - Macroinvertebrate Community Index (MCI);
  - Fish surveys including use of trapping, identifying and counting; and
  - Other methods that may be agreed between the consent holder and Ngati Ruanui.Frequency of monitoring shall be determined at the time.
13. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
14. This consent shall lapse on 30 June 2018, 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 7611-2

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 2015 and/or June 2016 and/or June 2022 for the 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.

Signed at Stratford on 11 April 2013

For and on behalf of  
Taranaki Regional Council

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**Chief Executive**

# **Taranaki Fish and Game Council**



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

Name of  
Consent Holder: Taranaki Fish & Game Council  
P O Box 4152  
WANGANUI 4541

Decision Date: 29 July 2010

Commencement  
Date: 29 July 2010

**Conditions of Consent**

Consent Granted: To take and use water from the Tawhiti Stream in the Tangahoe catchment for trout hatchery purposes at or about (NZTM) 1711249E-5618475N

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Pt Lot 2 DP 3291 Blk VI Hawera SD

Catchment: Tangahoe

Tributary: Tawhiti

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

**General condition**

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

**Special conditions**

1. The volume of water taken shall not exceed 11.4 litres per second.
2. 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 abstraction of water, including, but not limited to, the efficient and conservative use of it.
3. The consent holder shall ensure that the intake structure is screened and designed to avoid fish entering the intake.
4. 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 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.

Signed at Stratford on 29 July 2010

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: Taranaki Fish & Game Council  
P O Box 4152  
WANGANUI 4541

Consent Granted  
Date: 1 April 2010

**Conditions of Consent**

Consent Granted: To discharge water containing contaminants into the  
Tawhiti Stream in the Tangahoe catchment from a trout  
hatchery facility at or about (NZTM) 1711201E-5618461N

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Tawhiti Road, Hawera

Legal Description: Pt Lot 2 DP 3291 Blk VI Hawera SD

Catchment: Tangahoe

Tributary: Tawhiti

**General condition**

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

**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. That allowing for a mixing zone of 25 metres, the discharge shall not give rise to any of the following effects in the receiving water:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in 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, habitats or ecology.
3. No additional chemical except potassium permanganate at a rate no higher than 20 ml/300 litres of water shall be added to the water abstracted [as described in the application].
4. No water through-flow shall be provided to those troughs receiving salt treatment.
5. If, as a consequence of the activity authorised by this consent, an event occurs that may have a significant adverse effect on water quality at Fonterra's registered drinking-water supply abstraction point [grid ref: 1711488E-5614967N] the consent holder shall, as soon as reasonably practicable, telephone the Taranaki Regional Council and [Fonterra Co-operative Group] and notify them of the event.
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 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 1 April 2010

For and on behalf of  
Taranaki Regional Council



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**Director-Resource Management**

## **Appendix II**

### **Fish Survey of the Tawhiti Stream, January 2014**



## Memorandum

To James Kitto, Scientific Officer  
From Bart Jansma, Scientific Officer  
Report No BJ248  
Document 1466759  
Date 5 February 2015

### Fish Survey of the Tawhiti Stream in relation to the abstraction of water and the intake weir, Silver Fern Farms, January 2014

#### Introduction

This report describes the results of a fish survey of the Tawhiti Stream, which is part of the Tawhiti Catchment monitoring programme. This was the only fish survey scheduled for the 2013-2014 monitoring year. The primary consent related to this survey is 4995-2, which licenses the use of an existing concrete and earth dam (Photo 1) and associated intake structure, located just upstream of Tawhiti Road. However, the results of this survey can also provide some perspective on the effects of other activities, such as the discharge of stormwater and cooling water, and the diversion of water from behind the dam.

This survey is the first of this kind undertaken in the Tawhiti Stream in relation to the Silver Fern Farms weir 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. It should be noted that a waterfall exists just downstream of the weir (Photo 2). It is unknown whether this waterfall is naturally occurring, or formed when the weir was installed, and the stream possibly realigned.

**Photo 1 (left)** The weir and fish pass on the Tawhiti Stream (fish pass visible on far side)

**Photo 2 (bottom)** Waterfall located just downstream of the weir



## 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	TWH000280	Approx. 900m upstream of intake structure	80	19.7
2	TWH000340	Approx. 150m downstream of Tawhiti Stream	70	18.3

The fish populations were sampled using fyke nets and g-minnow traps. At each site, six g-minnow traps were set, and baited with marmite. They were set overnight, among macrophytes or alongside woody debris. Four fyke nets were also set at each site, two standard mesh (25mm) net and two fine mesh (13mm). 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 13 January 2014, and retrieved on 14 January 2014.



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

## Results and Discussion

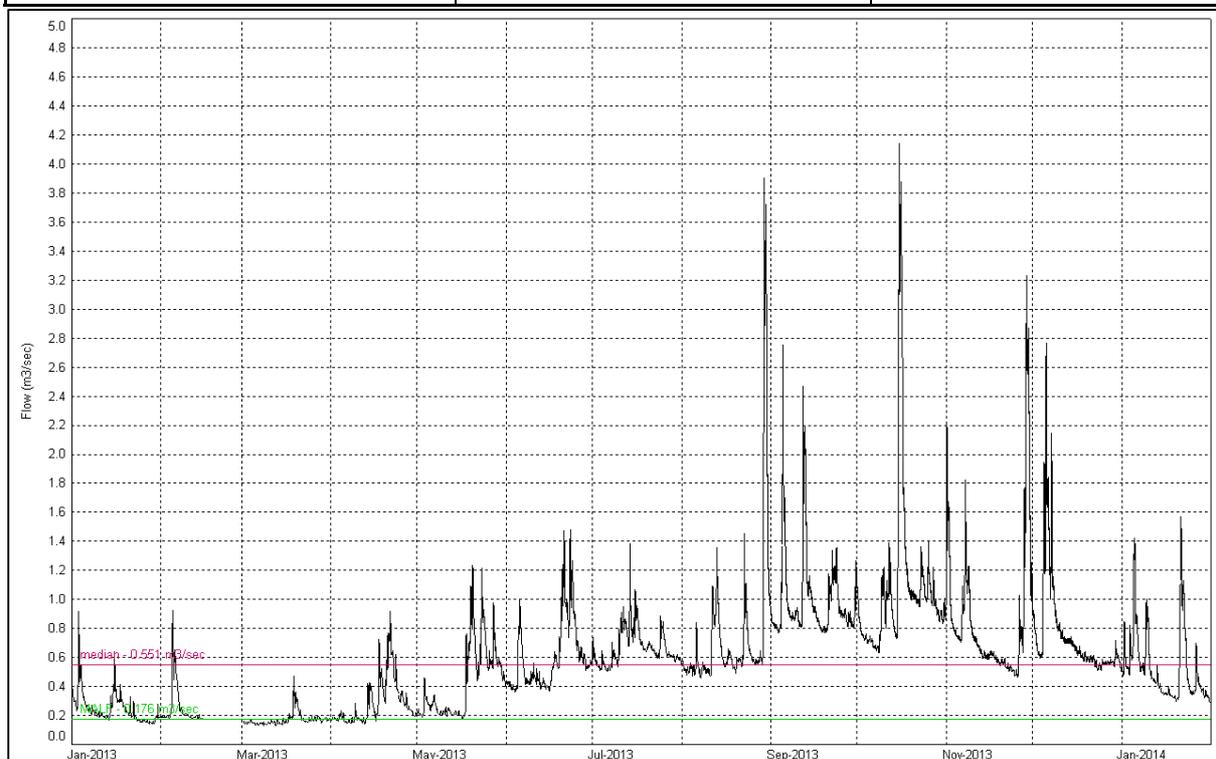
At the time of this survey, the Tawhiti Stream had a moderate flow which was brown and cloudy, relatively typical for this stream. Flows had remained above mean annual low flow since 13 April 2013, a period of over 9 months (Figure 2). The substrate of the stream contained some gravels, but over 50% of the stream bed consisted of sand or silt at both sites.

There was good fish habitat present, with both sites having undercut banks and some instream woody debris. Both sites were partially shaded, but only site 1 had any macrophytes and overhanging vegetation. In terms of stream structure, site 1 contained primarily runs, with no real pools surveyed, which is related to the flow constriction caused by the abundant willows growing in the channel. Site 2 had somewhat more pool habitat and some riffle habitat. There were no willows constricting the stream at site 2.

The full results of the fish survey are shown in Table 2.

**Table 2** Results of the fish survey undertaken in the Tawhiti Stream in relation to the Silver Fern Farms 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:		2270	2285	6845	2325	2340	6955
Longfin eel ( <i>Anguilla dieffenbachii</i> )	Number	3	4	0	2	2	0
	Length range (mm)	464-732	483-592	-	675-838	495-690	-
Shortfin eel ( <i>Anguilla australis</i> )	Number	1	1	0	1	2	0
	Length range (mm)	820	479	-	605	425-541	-
Koura ( <i>Paranephrops planifrons</i> )	Number	0	0	0	0	0	1
Total number of species		2			3		
Total number of fish		9			8		



**Figure 2** Flow in the Tawhiti Stream at Duffy's farm, from 1 January 2013 to 1 February 2014

### Site 1

Two species were recorded at site 1, being longfin and shortfin eel. Longfin eel were the most abundant, with 7 longfin eel recorded, compared with 2 shortfin eel. There was little difference between the coarse mesh and fine mesh fyke nets, but all g-minnow traps were empty. No koura were recorded at site 1.

There was some variation in size, and although longfin eel can grow to a larger size than shortfin eel, the largest fish recorded at this site was a 820mm shortfin eel. The largest longfin eel, at 732mm, is still likely to be more than 20 years old (Chisnall & Hicks, 1993). Assuming the eels in the Tawhiti Stream exhibit a weight to length relationship typical to the species, the longfin eel recorded at this site will have ranged from 238g and 1.08kg, while the shortfin eel will have ranged from 208g to 1.195kg (Jellyman *et al* 2013). Koura, although not recorded at this site, are likely to be present, and were for some reason not collected in the nets or traps.

### Site 2

This site, located downstream of the weir, contained the highest species richness (3), although only 8 individuals were recorded, including one koura. This site recorded the largest longfin eel of the survey (838mm), which may have been older than 30 years (Chisnall & Hicks, 1993), and would likely have weighed approximately 1.68kg (Jellyman *et al* 2013). The three shortfin eels recorded at this site were of moderate size, ranging from 425 640mm and 895mm, with weights likely ranging from approximately 0.14kg and 0.44kg respectively.

Of note is that a number of trout were observed while the traps and nets were being set and retrieved. Unfortunately these trout could not be identified to species level, but may have been escapees from the trout hatchery located upstream.

## **Summary and conclusions**

On 13 and 14 January 2014, two sites were surveyed for freshwater fish in the Tawhiti Stream, in relation to the water intake weir and fish pass monitored as a part of the Tawhiti Catchment monitoring programme. Site 1 was located approximately 900m upstream of the intake, while site 2 was located approximately 150m downstream of the intake. The survey method involved deploying baited fine and coarse mesh fyke nets and g-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 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.

Unfortunately only two species of eel were recorded, along with freshwater crayfish. The upstream site had the highest abundance of fish, with nine individuals recorded, compared with the seven fish and one crayfish recorded downstream. The downstream site recorded the highest species richness, with longfin eel, shortfin eel and crayfish present. Of note was the observation of trout in the stream, with a number of fish observed at site 2.

The low numbers of fish at site 2 may be related to activities undertaken at the weir. For example, low flows 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. However, this does not seem likely, as flows did not drop below MALF for over 9 months prior to this survey, and no significant issues have been noted with the discharge of sediment. It is more likely that the sampling technique may have influenced 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 g-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. This is an area that may need further investigation.

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. The results of this survey indicates that the intake weir and fish pass does not constitute a barrier to the passage of those species recorded downstream of the weir. It should also be noted that a waterfall exists between the two monitored sites.

Overall, this survey does not indicate that the intake and fish pass 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.

## References

- Chisnall, BL and Hicks, BJ., 1993 Age and growth of longfinned eels (*Anguilla dieffenbachii*) in pastoral and forested streams in the Waikato River basin, and in two hydroelectric lakes in the North Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research*, 27:317-332
- Jellyman, PG, Booker, DJ, Crow, SK, Bonnett, ML & Jellyman, DJ., 2013. Does one size fit all? An evaluation of length-weight relationships for New Zealand's freshwater fish species. *New Zealand Journal of Marine and Freshwater Research* 47: 450-468.
- McDowall, R.M., 2000: The Reed Field Guide to New Zealand Freshwater Fishes. Reed books, Reed Publishing (New Zealand) Ltd. 224pp.