Taranaki By-Products Ltd Monitoring Programme Annual Report 2016-2017

Technical Report 2017-13

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Executive summary

Taranaki By-Products Ltd (TBP) operates an animal rendering operation located on Kohiti Road at Okaiawa, in the Inaha catchment. Two rendering plants operate on the site: an inedibles plant owned by TBP, and a food grade plant owned by Taranaki Bio-Extracts Ltd (TBE). A trucking firm, Jackson Transport Ltd (JTL) operates from the site also.

This report for the period July 2016 to June 2017 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess TBP's environmental performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of TBP's activities.

Taranaki By-Products Ltd holds 12 resource consents, which include a total of 143 conditions setting out the requirements that they must satisfy. TBP holds two consents to allow it to take and use water, one consent for placing structures in a water course, one consent to realign a water course, two consents to discharge emissions into air at the site, four consents to discharge to the Inaha Stream and a tributary, and two consents to discharge to land.

During the monitoring period, Taranaki By-Products Ltd demonstrated an overall good level of environmental performance.

Monitoring was also carried out by both the Council and TBP. TBP monitors water abstraction rates, wastewater volumes and composition, effluent loading on irrigation areas, biofilter performance and weather conditions. The Council undertakes inspections of the plant site, irrigation and burial areas; water quality and biological monitoring of the Inaha Stream and its tributaries, riparian management, groundwater surveys, and facilitates community and Iwi engagement meetings.

The Council's monitoring programme for the year under review included 12 inspections, 158 water samples collected for physicochemical analysis, two biomonitoring surveys of receiving waters and odour surveys. In addition the Council also undertook continuous monitoring in the Inaha Stream and its tributaries relating to temperature and flow.

TBP largely met the requirements of their resource consents. They have also demonstrated a high level of commitment in regard to addressing environmental matters related to their operation, with various mitigation measures either planned or underway.

The contamination of groundwater as a result of TBP's activities has been reported on in previous years. During this monitoring period it was evident that some of the effects of this contamination have persisted and some further contamination has occurred. The consent holder has demonstrated a proactive response to these issues and has undertaken a number of steps to meet their consent requirements and reduce the potential for further contamination.

Similar to the previous monitoring period, the Council received a number of odour complaints relating to TBP's activities. Investigations by Council officers determined that one incident was found to be in breech of consent. This observation by the Council resulted in the issuance of an infringement fine and an abatement notice which required the mitigation of objectionable odours from the facility. The requirements of this notice were to be met by the 1st November 2017.

Taking their overall performance into account, TBP demonstrated a good level of environmental and a high level of administrative compliance and performance with their resource consents during the 2016-2017 monitoring period.

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

programmes, while for another 21% of the consents, a good level of environmental performance and compliance was achieved.

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

This report includes recommendations for the 2017-2018 year.

Table of contents

List of tables

List of figures

List of photos

1. Introduction

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

1.1.1. Introduction

This report is for the period July 2016 to June 2017 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Taranaki By-Products Ltd (TBP). TBP operates an animal rendering facility situated on Kohiti Road at Okaiawa, in the Inaha catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by TBP that relate to abstractions and discharges of water within the Inaha catchment, and the air discharge permit held by TBP to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the TBP's use of water, land and air, and is the 25th annual report by the Council for TBP.

1.1.2. Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by TBP in the Inaha 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 TBP's site/catchment.

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

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

Section 4 presents recommendations to be implemented in the 2017-2018 monitoring year.

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

1.1.3. The Resource Management Act 1991 and monitoring

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

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;

b. physical effects on the locality, including landscape, amenity and visual effects;

c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and

e. risks to the neighbourhood or environment.

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

1.1.4. Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

Improvement required: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self

reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

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

Administrative performance

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

Good: Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

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

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

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

1.2. Process description

The TBP plant on Kohiti Road, Okaiawa is the major animal rendering plant in Taranaki. It was established in 1936. About 60 persons are employed. Raw material comes largely from meat and poultry processing plants in the central and southern North Island. TBP also runs a dead stock collection service in Taranaki and adjacent regions. Transport of raw materials to and products from the site is undertaken by a trucking firm that operates from the site, Jackson Transport Ltd.

The site is located beside the Inaha Stream in mid-catchment, about 13 km from the sea, and less than 1 km from Okaiawa, a village of about 50 dwellings. Intensive pastoral farming, mainly dairy, occurs around the site (Photo 1).

Inedible products are manufactured, including meat and bone, poultry, feather, and blood meals, as well as tallow and chicken oil. There are three separate processing lines – a mixed abattoir material line (processing beef and mutton, hard and soft offal, and fallen stock), a poultry line (processing soft poultry offal and feathers), and a blood line. The plant is able to process up to 26 t/h of raw material (18 t/h through the mixed abattoir material line and 6-8 t/h through the poultry feather and offal line). Up to 100,000 L/day of blood can be processed.

The plant operates 24 hours/day, seven days/week throughout the year, with weekly maintenance shutdowns on Sunday/Monday. There is some seasonal variation in beef offal processing, the peak occurring between January and May, being earlier in dry seasons, when the availability of stock feed is reduced. Processing of fallen stock peaks in July and August, during the calving season. Poultry processing

is relatively steady throughout the year, with a slight increase before Christmas and over the summer months. Poultry, originally planned to be phased out in the 2015-16 monitoring year, has been retained by the facility. However the collection and processing of poultry will be limited to deliveries from within the Taranaki region.

Photo 1 Taranaki By-Products and Taranaki Bio-Extracts aerial view

Animal rendering is essentially a two-stage process, involving separation of fat and drying of the residual solids. The TBP process is largely continuous low temperature (below 100˚ C) dry rendering with mechanical de-watering by screw press, and some thermal de-watering. Indirect (Rotadisc) steam-heated driers are employed. The dried product is milled, sieved and stored in bulk.

The mechanical de-watering of the raw material creates large quantities of stickwater, essentially the pressed-out meat juices. Waste heat exchangers dry the stickwater under vacuum to a stage where it can be incorporated back into the meal product. Washings and waste products from the stickwater system have been registered as a fertiliser (Zeal Grow) and are applied to an adjacent dairy farm owned by TBP. Solid wastes are buried in a designated area on the farm. Recent developments within the facility have limited the proposed output of the registered fertiliser Zeal Grow and correspondingly the plant has now undertaken the option to re-process the liquid and remove its applications from the surrounding environment.

1.2.1. Wastewater treatment system

Wastewater from TBP's plant comprises equipment and floor washings, condensates from treatment of gas emissions, and blood decanter liquids. There is potential for stickwater and blood losses to be put through the treatment system.

The wastewater treatment system comprises a contra-shear screen, a dissolved air flotation (DAF) unit, three anaerobic ponds (ponds 1-3), an aeration pond (pond 4), a settling pond (pond 5), and a large aerobic pond (pond 6).

All wastewater from the plant (except condensate wastewater from the waste heat exchanger) is pumped through the rotary screen, then a 100 m^3/h DAF unit to which flocculent is added to assist in recovery of solids. The wastewater then moves sequentially through ponds 1-3, with a total volume of about 15,000 m^3,

where anaerobic activity breaks it down. The condensate wastewater from the plant is pumped directly to pond 1. Ponds 1 and 2, on the northern side of the plant, may be operated in parallel, depending on loadings. The wastewater from pond 2 enters wet well pump station 1, from where it is pumped to pond 3, at a higher level on the southern side of the plant.

From pond 3, the wastewater discharges to an aerated lagoon (pond 4) with a volume of 8,000 m^3. Aerators of about 315 kW total capacity assist in the reduction of biochemical oxygen demand (BOD) and of ammonia concentration. The wastewater finally passes, via a small settling pond (5), into a large aerobic pond (6), with an area of 1.04 ha and a nominal volume of 30,000 m^3, with four brush aerators each of 17.5 kW capacity. The purpose of the aerobic pond is to allow further treatment of the effluent, and to provide for storage of treated wastewater. Pond 6 is also used as a source of scrubbing water in the odour control system.

The treated wastewater is discharged either to the Inaha Stream directly or to adjacent land by spray irrigation. This 'dual' wastewater disposal system addresses the limited capacity of the Inaha Stream to assimilate the treated wastewater, while promoting grass growth for dairy production on land that is well suited to irrigation. The total area utilised for irrigation increased from 269 ha in 2011-2012 to 291 ha in 2012-2013. This was further extended in the 2015-2016 monitoring year to a total area of 340 ha.

1.2.2. Bio-extracts plant

In April 2003, an edible (food grade) tallow and gelatine bone chip recovery plant was commissioned adjacent to the existing rendering plant at Okaiawa. A new company, Taranaki Bio Extracts Ltd (TBE), was established for the venture that is owned by TBP and Riverlands Eltham Ltd in equal partnership.

The TBE operation involves the processing of boning-room waste that has been separated from other raw offal at meat processing plants. The rendering and drying is carried out at lower temperatures than at the inedibles plant, resulting in less odour generation and heat emission. Certain utilities are shared between the two plants, including the steam generators, the wastewater treatment plant, and biofilters (now separate biofilters for each plant) for treatment of air emissions.

1.2.3. Odour management

The rendering operations have potential to generate offensive odour. Sources include the raw materials, rendering processes, wastewater treatment and disposal systems, odour control system, and solid waste burial areas. The generation of odour is controlled through the quality and preservation of raw materials, design and operation of the rendering processes, maintenance of the buildings, treatment of odorous emissions, and management of the wastewater treatment and disposal systems and burial areas.

Odour extraction, cooling and biofilters are the main components of the odour control systems that are operated at the TBP and TBE plants. There are four extraction systems, one each for concentrated odour sources in the two plants, and two independent factory building air systems (FA1 and FA2) at the TBP plant to capture fugitive emissions that are not collected by the concentrated sources (CS) biofilter.

Concentrated odorous gases from the TBP bovine, poultry and feather rendering (but not blood) lines are collected at source, then cooled and scrubbed in two water spray condenser towers before being discharged to the biofilter. Hot exhaust gases, from pre-cookers and driers, are passed through three waste heat evaporators to concentrate stick liquor, then a vertical condenser, before going to the spray towers with the other concentrated emissions.

The FA1 ventilation system extracts air from above the mixed abattoir and poultry rendering lines in the northern part of the TBP building. The FA2 system collects air from the dead stock pre-breaker, blood drying processes within the blood room, meal mill exhausts and the poultry dryer room, in the southern part of the building, and passes the air through a wet scrubber.

At the TBE plant, humid odorous air streams from the concentrated sources are extracted, and cooled and scrubbed, before being ducted to the CS biofilter. TBE building air is vented directly to atmosphere as it contains no significant odour.

There are three biofilter systems, comprising two factory air biofilters, and a concentrated sources biofilter. FA1 biofilter is of coarse bark set in the ground, with three parallel zones that are each 30 m x 40 m x 1.5 m (total volume of 5,400 m^3). FA2 biofilter is also formed of coarse bark, set above ground over pea gravel with two zones 25 m x 30 m x 1 m (1,500 m^3). The CS biofilter has two parallel beds 25 m x 20 m x 0.7 m (700 m^3) of coarse bark overlaid with fine bark compost. The locations of the biofilters are given in Figure 1, labelled BF1 and BF2.

The CS biofilter was repaired in November 2010, when two sides of both beds were replaced. Bed 3 of FA1 biofilter was reconstructed between July and December 2011, improving the pipework for air distribution and for drainage of liquids. The remainder of FA1 biofilter was reconstructed between October 2012 and April 2013, the corrosion-prone corrugated iron manifolds being replaced with concrete pipes, and bark replacement being delayed by problems with supply.

Upon upgrade of FA1 biofilter, the concentrated sources air flow from the TBP plant was redirected to it temporarily, reducing heat load on the designated CS biofilter, now dedicated to the TBE plant. At the end of the 2012-2013 review period, construction began on the fourth zone for FA1 biofilter, intended to receive the TBP plant concentrated sources (CS) streams.

The CS biofilter was completed and operational prior to Christmas in 2013, and presently both TBE and TBP have independent biofilters.

Engineering certification, as part of TBP's consent to emit emission and odour to the air, TBP must receive certification from a suitably qualified independent person that the works, processes and equipment relevant to all discharges to air from the site are operational in accordance with good engineering practice. In this monitoring year TBP engaged Golder Associates to undertake the certification of the process. This is the third time this certification of apparatus associated with odour control has been undertaken by Golder Associates.

The most recent assessment undertaken by Golder Associates is provided in section 2.6.1. The full report is provided in Appendix III.

1.3. Resource consents

A summary of the consents held by TBP in relation to activities at its Okaiawa plant is given in Table 1 below, and the consents are discussed in Sections 1.3.1 to 1.3.7. A copy of each of the consents can be found in Appendix I. These summaries of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consents which are appended to this report.

Table 1 Summary of resource consents held by Taranaki By-Products

Consent number	Purpose	Volume	Next review date	Expiry date
2049-4	Discharge treated wastewater to Inaha Stream	940 m^3/day	2017	2019
2050-4	Discharge cooling/backwash water to Inaha Stream	2,160 m^3/day	2017	2019
2051-4	Take from Inaha Stream	2,160 m^3/day (50L/s)	2017	2019
3941-2	Discharge treated wastewater to land and air	1,400 m^3/day	2014	2019
4058-4	Discharge emissions to air from rendering operations		2015	2024
5426-1	Discharge stormwater to Inaha tributary	1,025 L/s	2017	2019
5495-1	Discharge meat wastes by burial into land	200 tonne/day	2017	2019
6431-1	Place culverts in Inaha Stream		2017	2023
7234-1	Disturb to realign Inaha Stream		2017	2023
7329-1	Discharge sediment during Inaha Stream realignment		2017	2023
9756-1	Take groundwater	22.8 L/s (1,970 m^3/day)	2017	2029
10054-1	Discharge emissions to air from burning		2017	2029

In addition, TBP holds consents **2446** and **3117** to discharge untreated farm dairy effluent by irrigation to land. Consent 2446 was exercised until the 2004-2005 dairy season, when dairy operations were consolidated at a new shed on Kohiti Road from which wastewater is transferred to the treatment system for the nearby rendering operations. Consent **3117** now applies to a small shed used for sick cows on Katotauru Road.

1.3.1. 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.

TBP holds two water permits that provide for abstraction of water, one from the Inaha Stream and one from groundwater.

TBP holds water permit **2051-4** to cover the abstraction of up to 50 L/s of water from the Inaha Stream for a rendering operation. This permit was issued by the Council on 31 May 1999 under Section 87(d) of the RMA. It is due to expire on 1 June 2019.

There are six conditions imposed on consent 2051-4.

- Condition 1 requires the means of taking water to be satisfactory to Council.
- Condition 2 imposes a minimum flow of 25 L/s be maintained in the stream.
- Condition 3 requires installation of a measuring device and records to be kept of daily abstraction.
- Condition 4 requires the flow of the Inaha Stream to be measured and recorded.
- Condition 5 sets out provision for review of the consent.

Condition 4 was changed on 21 January 2015 to remove the requirement to install a flow recorder, but preserve the requirement to visually record the stream height daily, and keep records of the flows within the Inaha Stream.

1.3.1.1. Groundwater extraction consent

TBP holds water permit **9756-1** to cover the take and use of groundwater for industrial water supply. This permit was issued by the Council on 3 February 2014 under Section 87(d) of the RMA. It is due to expire on 1 June 2029.

There are 12 conditions imposed on consent 9756-1.

- Condition 1 imposes a limit on maximum abstraction rate.
- Condition 2 requires the bore to be permanently labelled for identification.
- Conditions 3 and 6 address water level monitoring.
- Conditions 4 and 5 address metering and logging of water use, and certification.
- Condition 7 deals with the telemetry of monitoring data to Council.
- Conditions 8 and 9 relate to access to and failure of monitoring equipment.
- Condition 10 requires adoption of the best practicable option.
- Conditions 11 and 12 relate to lapse and review of consent.

1.3.2. Water discharge permit

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

TBP holds four discharge permits that provide for discharge to surface water, one of wastewater, one of cooling water, and two of stormwater.

1.3.2.1. Wastewater discharge consent

TBP holds water discharge permit **2049-4** to cover discharge of up to 940 m^3/day of treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream. This permit was issued by the Council on 31 May 1999 under Section 87(e) of the RMA. It is due to expire on 1 June 2019.

The consent was changed on 4 October 2006, following a review of conditions invoked by Council to deal with adverse effects resulting from exercise of the consent, and an application by TBP to include provision for farm dairy wastewater.

There are 19 special conditions imposed on consent 2049-4.

- Conditions 1 and 2 relate to the location and area of the mixing zone.
- Condition 3 relates to the point of discharge into the Inaha Stream.
- Condition 4 requires the consent holder to give notice of changes in process which may affect the nature of the discharge.
- Condition 5 requires the consent holder to monitor consent conditions as deemed reasonably necessary by Council.
- Condition 6 sets a minimum dilution rate on the discharge.
- Condition 7 prohibits the discharge of stickwater, and deals with increase in dairy herd size.
- Condition 8 requires cessation of discharge into the stream at the specified minimum flow rate.
- Condition 9 prohibits the discharge from giving rise to specific adverse effects in the receiving waters.
- Condition 10 sets a limit on the level of ammonia in the receiving waters.

- Condition 11 requires controls on discharge and records of discharge rate.
- Condition 12 requires the consent holder to maintain a stream flow gauge.
- Conditions 13 and 14 relate to the requirement for a wastewater disposal management plan.
- Conditions 15 and 16 require notice of changes to the management plan, provide for review of the plan, and require a designated manager of the wastewater system.
- Condition 17 requires the wastewater management plan be adhered to, and that site staff are trained in implementation and advised of any changes to the plan.
- Condition 18 relates to a consent holder donation to Taranaki Tree Trust and commitment to riparian planting.

Condition 19 is a provision for review of consent conditions.

The changes of conditions from the review were a requirement to operate the dual wastewater disposal system so as to minimise discharge to the Inaha Stream, increasing the minimum dilution of treated wastewater in the stream, prohibiting the discharge of stickwater, and requiring an annual review of the wastewater management plan.

The changes of conditions in relation to the inclusion of farm dairy wastewater were an increase in discharge volume, a limit on the number of cows provided for, and an additional review date.

1.3.2.2. Cooling water discharge consent

TBP holds water discharge permit **2050-4** to cover discharge of up to 2,160 m^3/day of cooling water and backwash water into the Inaha Stream. This permit was issued by the Council on 31 May 1999 under Section 87(e) of the RMA. It is due to expire on 1 June 2019.

There are 7 special conditions imposed on consent 2050-4.

- Condition 1 requires the consent holder to monitor consent conditions as deemed reasonable and necessary by Council.
- Condition 2 prohibits the increase in concentration of pollutants in the discharge.
- Conditions 3 and 4 place a temperature and suspended solids limit on the cooling water discharge.
- Condition 5 prohibits specific adverse effects in the receiving waters of the Inaha Stream.
- Condition 6 requires the consent holder to measure and keep record of discharge temperature, to make available on request.
- Condition 7 sets out provision for review of the consent.

The permit is attached to this report in Appendix I.

1.3.2.3. Stormwater discharge consent

TBP plant site

TBP holds water discharge permit **5426-1** to cover discharge of up to 1,095 L/s of stormwater into an unnamed tributary of the Inaha Stream. This permit was issued by the Council on 31 May 1999 under Section 87(e) of the RMA. It is due to expire on 1 June 2019.

There are five special conditions imposed on consent 5426-1.

- Condition 1 requires the consent holder to give notice of changes in process which may alter the nature of the discharge.
- Condition 2 sets chemical limits on the discharge.
- Condition 3 prohibits specific adverse effects in the receiving waters of the Inaha Stream.

- Condition 4 requires the consent holder to provide Council with a contingency plan.
- Condition 5 sets out provision for review of the consent.

Land re-contouring

TBP holds water discharge permit **7329-1** to cover the discharge of stormwater and sediment into the Inaha Stream from earthworks associated with the re-contouring of land and the re-alignment of a section of the Inaha Stream. This permit was issued by the Council on 30 June 2008 under Section 87(e) of the RMA. It is due to expire on 1 June 2023.

There are 10 conditions imposed under consent 7329-1.

- Condition 1 requires the consent to be exercised in accordance with documentation submitted.
- Conditions 2 and 3 limit the area and volume of soil disturbed.
- Conditions 4 and 5 address sediment control measures and mitigation of effects in the stream.
- Condition 6 requires notification and a programme of works.
- Condition 7 deals with stabilisation of completed earthwork areas.
- Condition 8 lays down procedure in case an archaeological site is encountered.
- Conditions 9 and 10 relate to lapse and review of consent.

1.3.3. 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.

TBP holds two discharge permits that provide for emissions to air, one from rendering operations and one from burning waste wooden material.

1.3.3.1. Rendering operations

TBP holds discharge permit **4058-4** to cover the discharge to air of emissions from rendering operations and associated processes including wastewater treatment and burial of material. This permit was issued by the Council under Section 87(e) if the RMA on 11 October 2011. It expires on 1 June 2024,

There are 12 special conditions imposed on consent 4058-4.

- Condition 1 requires the consent holder to adopt the best practicable option to minimise adverse effects of the discharge on the environment.
- Condition 2 prohibits offensive or objectionable odour beyond the property boundaries at any time, and Condition 3 defines such odour.
- Condition 4 requires the employment of a suitable person to ensure compliance with consent conditions.
- Condition 5 prohibits fish processing.
- Condition 6 requires certification of the works, processes and equipment by a suitable independent engineer biennially.
- Conditions 7 to 9 relate to an Air Discharge Management Plan.
- Condition 10 deals with dust.
- Condition 11 deals with community consultation.
- Condition 12 is a review condition, applicable in June 2013 and biennially thereafter.

1.3.3.2. Burning

TBP holds discharge permit **10054-1** to cover the discharge to air of emissions from the burning of pallets, paper and cardboard. This permit was issued by the Council under Section 87(e) of the RMA on 21 January 2015. It expires on 1 June 2029.

There are nine special conditions imposed on consent 10054-1.

- Condition 1 requires the consent holder to adopt best practicable options to minimise adverse effects of discharge on the environment.
- Condition 2 restricts the type of material combusted.
- Condition 3 prohibits objectionable or offensive odour beyond the property boundaries.
- Condition 4 requires burning to be supervised at all times.
- Conditions 5 to 7 deal with dust and other contaminants.
- Conditions 8 and 9 relate to lapse and review of consent.

1.3.4. Discharges of wastes to land

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

TBP holds two discharge permits that provide for disposal of untreated farm dairy effluent on land.

Discharge permit **2446-2** to cover the discharge of untreated farm dairy effluent by honey wagon onto and into land was issued by the Council on 18 November 2004 under Section 87(e) of the RMA. It is due to expire on 1 December 2023.

Discharge permit **3117-2** to cover the discharge of untreated farm dairy effluent by spray irrigation onto and into land was issued by the Council on 13 July 2004 under Section 87(e) of the RMA. It is due to expire on 1 December 2023.

The two consents have essentially the same nine conditions, relating to volume, location, control of effects, system maintenance, and review of conditions. Consents 2446-2 and 3117-2 provide for up to 1,000 and 250 cows, respectively.

Consent 2446-2 is no longer exercised, but has been retained by TBP in case it is needed in future. Consent 3117-2 applies to a small shed used for sick cows on Katotauru Road.

The permit is attached to this report in Appendix I.

1.3.4.1. Spray irrigation

TBP holds discharge permit **3941-2** to cover the discharge of up to 1,400 m^3/day of treated wastewater by irrigation onto and into land. This permit was issued by the Council on 15 December 1999 under Section 87(e) of the RMA. It is due to expire on 1 June 2019.

The consent was changed on 21 December 2005, following a review of conditions invoked by Council to deal with adverse effects resulting from exercise of the consent, and an application by TBP to extend the irrigation area and include the discharge of farm dairy effluent. The consent was changed again on 9 November 2009 to allow a further extension of the irrigation area.

- Condition 1 outlines the authorised area for the discharge.
- Condition 2 outlines the requirement to provide a spray irrigation management plan and specific matters it must address.

- Condition 3 requires adherence to the plan and states that consent conditions prevail over any contradictory aspects.
- Condition 4 provides for review of the management plan.
- Condition 5 requires a designated manager to implement the management plan.
- Condition 6 requires adoption of the best practicable option to deal with adverse effects, with particular reference to minimisation of nitrogen in the effluent.
- Condition 7 requires notification to Council when irrigation is not possible and discharge to the stream will cause dilution limits to be exceeded.
- Condition 8 places a minimum limit on the level of dissolved oxygen in the discharge.
- Conditions 9 and 10 stipulate there shall be no objectionable odour or spray drift as a result of irrigation.
- Condition 11 limits the sodium adsorption ratio in the wastewater.
- Condition 12 prohibits ponding of wastewater or direct discharge.
- Conditions 13 and 14 specify the area of the irrigation spray zone and limit the rate of nitrogen loading.
- Condition 15 requires the consent holder to investigate and report on options for reducing ammonia concentrations in wastewater prior to discharge.
- Conditions 16 and 17 restrict the average application rate and specify the return period between effluent applications.
- Conditions 18 and 19 require the consent holder to monitor groundwater bores and to monitor consent activities deemed necessary by Council.
- Condition 20 relates to liaison meetings with interested submitters to the consent, and condition 21 addresses notification of Ngati Manuhiakai hapu of discharges to the Inaha Stream.
- Condition 22 relates to mitigating effects in the case of contamination of groundwater.
- Condition 23 allows for the consent holder to apply for change of conditions.
- Conditions 24, 25 and 26 all set out provisions for review of specific conditions and the consent in general.

The changes of conditions from the review were a requirement to operate the dual wastewater disposal system so as to minimise discharge to Inaha Stream, adoption of the best practicable technology to minimise wastewater nitrogen concentration, and an annual review of the spray irrigation management plan.

The changes of conditions in relation to first extension of the irrigation area were increased wastewater volume, increased safety buffer zones, and greater liaison with neighbours and interested parties. The second change of consent simply increased the irrigation area with no other change of condition.

1.3.5. Waste burial

TBP holds two discharge permits that provide for burial of wastes into land.

TBP holds water discharge permit **5495-1** to cover discharge of up to 200 tonnes/day of wastes from meat rendering operations by burial into land in the vicinity of the Inaha Stream.

This permit was issued by the Council on 30 March 2000 under Section 87(e) of the RMA. It is due to expire on 1 June 2019.

There are 18 conditions imposed on consent 5495-1.

- Condition 1 requires the consent holder to provide a waste burial management plan addressing specific matters.
- Conditions 2, 3 and 4 relate to the implementation and exercise of the management plan and provide for a review with notice from either party.
- Condition 5 prohibits disposal pits from intercepting shallow groundwater.
- Conditions 6 and 7 relate to the construction of the disposal pits and Condition 8 requires inspection by Council prior to disposal.
- Condition 9 relates to the timing of conditions 1-4.
- Condition 10 imposes a time limit on the covering of discharged material.
- Conditions 11 and 12 impose a certain quality of cover material and suitable stormwater contouring.
- Condition 13 requires the disposal site be reinstated satisfactorily.
- Conditions 14 and 15 prohibit irrigation of effluent onto disposal area or direct discharge of contaminants to surface water.
- Condition 16 requires a minimum of eight monitoring bores to monitor groundwater quality.
- Condition 17 allows the consent holder to apply for change to consent conditions.
- Condition 18 sets out provision for review of the consent.

1.3.6. Land use permits

1.3.6.1. Stream culverts

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.

TBP holds land use permit **6431-1** to erect and maintain two culverts in the Inaha Stream for farm access. This permit was issued by the Council on 4 October 2004 under Section 87(e) of the RMA. It is due to expire on 1 June 2023.

There are 12 conditions imposed on consent 6431-1.

- Conditions 1 and 2 require the consent holder to adopt best practicable option to minimise adverse environmental effects and establishes that consent conditions prevail over conflicting information.
- Condition 3 requires notice of initial construction and subsequent maintenance of the culverts.
- Condition 4 stipulates dates within which maintenance must occur.
- Conditions 5 and 6 require the consent holder to minimise adverse effects on the water quality and riverbed disturbance.
- Condition 7 requires removal and reinstatement of area when structures are no longer needed.
- Condition 8 prohibits the structure from preventing fish passage.
- Conditions 9 and 10 set out requirements for the establishment and maintenance of fenced riparian margins.
- Condition 11 specifies the placement of culverts and structures to prevent erosion.
- Condition 12 relates to lapse of consent.
- Condition 13 provides for review of consent conditions.

1.3.6.2. Stream diversion

Section 13(2)(b) of the RMA stipulates that no person may disturb, remove, damage, or destroy any plant or part of any plant or habitats of any such plants or of animals in, or under, or over the bed of any lake or river, unless the activity is expressly allowed for by a resource consent, or rule in a regional plan and in any relevant proposed regional plan.

TBP holds land use permit **7234-1** to realign a section of approximately 350 m of the Inaha Stream for land improvement purposes. This permit was issued by the Council on 12 March 2008 under Section 87(a) of the RMA. It is due to expire on 1 June 2023.

There are 11 conditions imposed on consent 7234-1.

- Condition 1 requires the consent to be exercised in accordance with documentation submitted.
- Conditions 2 and 4 relate to notification and timing of works.
- Condition 3 specifies the construction of a rock wall for bank protection.
- Conditions 5 and 6 address the control and mitigation of riverbed disturbance and sediment effects.
- Conditions 7 and 8 address the removal of fish from the old channel and future fish passage.
- Condition 9 prohibits the burial of the removed vegetation near the stream.
- Conditions 10 and 11 relate to lapse and review of consent.

1.4. Monitoring programme: Water

1.4.1. Introduction

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

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

The monitoring programme for the TBP site consisted of five primary components.

1.4.2. Programme liaison and management

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

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

1.4.3. Site inspections

The TBP site was visited on 12 occasions (Section 2.5.1) during the 2016-2017 monitoring period. With regard to consents for the abstraction of water and for the discharge of wastes to water and land, 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.

1.4.4. Water take

The water take is checked during site inspections. A rating curve for the stage board at Kohiti Road has been developed and maintained by the Council and updates provided to TBP since April 2001.

1.4.5. Chemical sampling

Compliance sampling is undertaken by the Council to assess the TBP's discharges to receiving waters. TBP operates a dual wastewater disposal system. The system discharges wastewater from the final (aerobic pond) pond 6 (Table 2 and Figure 1). The pond 6 discharge is either directly to the Inaha Stream under a 300:1 dilution ratio, when flow rates are appropriate as defined by consent, or through land application. The land application is undertaken through the use of travelling irrigators, on to and into TBP's irrigation area (Figure 2). Land application occurs mainly in the summer months when the flow rates within the Inaha Stream are insufficient to meet the consent 300:1 dilution rate.

In terms of monitoring of the dual wastewater system, the main focus of the sampling undertaken by the Council is to assess the likely effects associated with exercise of this system in this instance.

Surface water sampling focuses on sampling the Inaha Stream and associated tributaries (Northern and Western) (Table 3 and Figure 2) to firstly assess the likely effects of the discharge on the Inaha Stream when the site is discharging. Secondly, it is undertaken when TBP is discharging to land to assess the likely contribution from the irrigation areas' discharge to the groundwater (Figure 3) which may result in surface water interaction. Surface water analytes are provided in Table 4.

In terms of the irrigation areas, the Council sampled groundwater monitoring bores to assess the likely effects of the wastewater discharge on the groundwater. Groundwater analytes are provided in Table 4.

The site also operates a waste burial area, whereby if mechanical breakdown of the plant results in un-process able product, this material may be buried in a specific consented area. As a result the Council monitors the burial pit monitoring wells to assess the likely effects of the process.

In addition, three temperature recorders (one installed in the cooling water tributary and the others upstream and downstream of the confluence of the Inaha Stream and its tributary) were run continuously and downloaded as required. TBP took responsibility for this monitoring in July 2010, and forwarded the data to Council monthly. The responsibility was returned to the Council in September 2013, at the request of TBP.

Table 2 Point source sample key

Site	Description	Map reference, NZTM		Site code
		Easting	Northing	
A	Aerobic pond effluent	1703086	5623907	IND004004
B	Cooling water discharge	1702015	5623991	IND002004
C	Stormwater, firewater, coolant and groundwater seepage from reservoir	1701968	5624052	IND001014
D	Stormwater, firewater, coolant and groundwater seepage to Inaha	1701894	5624084	IND001015
E	No 1 stormwater: main reception, garage and yard to firewater reservoir	1702022	5623983	STW001075

Table 3 Sampling points for receiving waters - Inaha Stream and associated tributaries

Site	Description	Map reference, NZTM		Site code
		Easting	Northing	
1	Ahipaipa Road	1703013	5625271	INH000334
3	Bridge, 420 m u/s Kohiti Road	1702138	5624345	INH000348
4	Unnamed northern tributary at Inaha confluence	1701947	5624362	INH000397
5	Kohiti Road	1701874	5624322	INH000400
6	110 m d/s cooling water discharge and 30 m d/s pond 6 discharge	1701861	5623980	INH000408
7	500 m d/s pond waste discharge	1702021	5623745	INH000420
8	Normanby Road bridge, 1,450 m d/s discharges	1701650	5623262	INH000430
9a	Unnamed western tributary, 3,500 m u/s Inaha confluence	1701109	5625496	INH000433
9	Unnamed western tributary 2,550 m u/s Inaha confluence	1700816	5624558	INH000435
9b	Unnamed western tributary ~2,000 m u/s Inaha confluence	1700818	5624175	
9c	Unnamed western tributary ~1,450 m u/s Inaha confluence	1701183	5623577	
9d	Unnamed western tributary ~900 m u/s Inaha confluence	1701013	5623963	
10	Unnamed western tributary 250 m u/s Inaha confluence	1701518	5623227	INH000440
11	State Highway 45	1700393	5620330	INH000470

Figure 1 Point source sample location and labelling

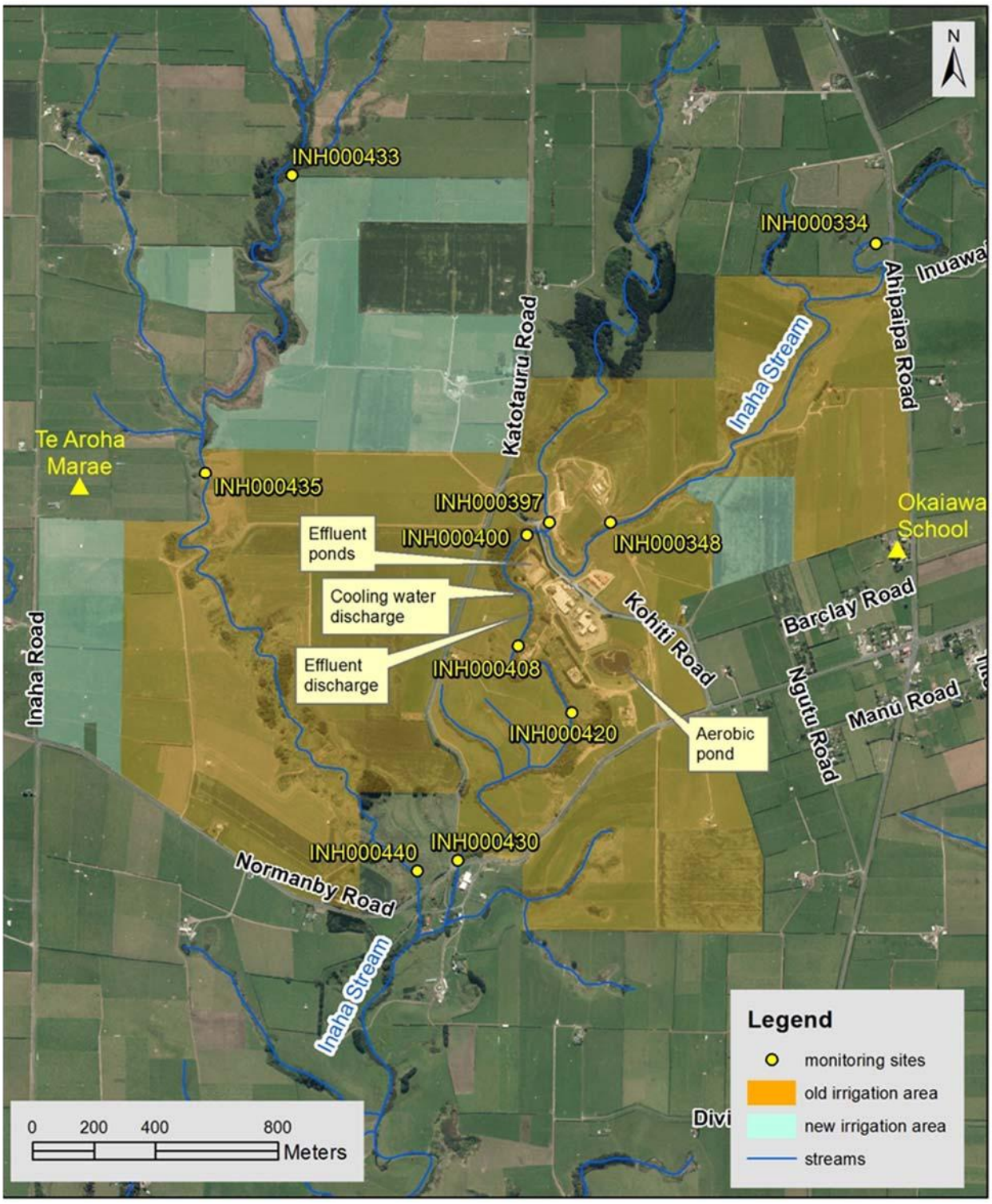

Figure 2 Taranaki By-Products surface water and discharge sampling locations

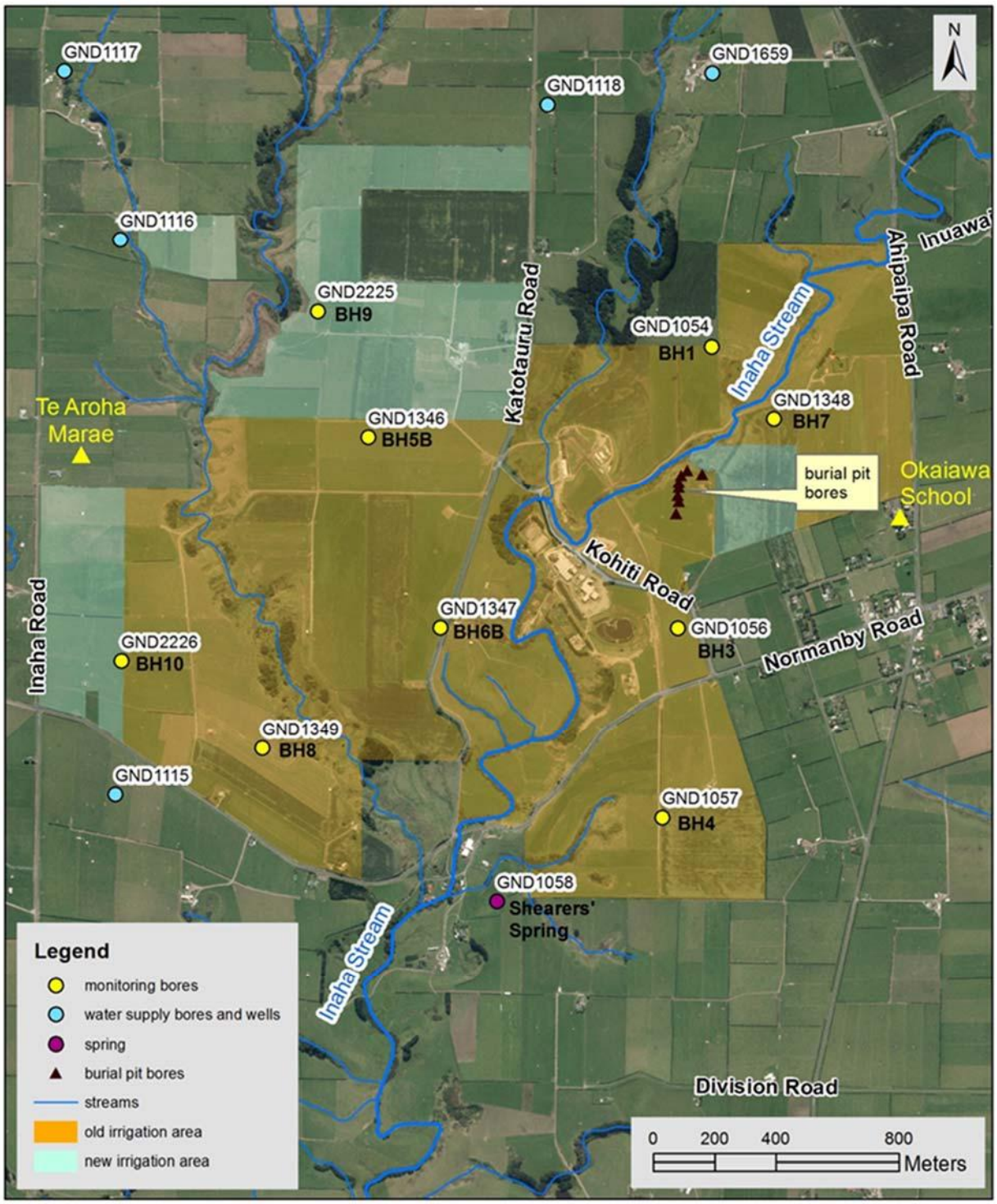

Figure 3 Taranaki By-Products groundwater monitoring well locations

Table 4 Surface water and groundwater monitoring analytes Taranaki By-Products 2016-2017

Parameter	Description	Units
BOD	Biochemical oxygen demand 5day	g/m^3
CL	Chloride	g/m^3
CONDY	Conductivity @ 20°C	mS/m@20°C
DO	Dissolved Oxygen	g/m^3
DRP	Dissolved reactive phosphorus	g/m^3 P
FC	Faecal Coliforms	/100ml
NH_3	Un-ionised ammonia	g/m^3
NH_4	Ammoniacal nitrogen	g/m^3 N
NNN	Nitrite/nitrate nitrogen	g/m^3 N
NO_2	Nitrite nitrogen	g/m^3 N
NO_3	Nitrate nitrogen	g/m^3 N
PERSAT	Dissolved Oxygen Saturation %	%
pH	pH	pH
TEMP	Temperature	°C
TURBY	Turbidity	NTU
BODCF	Bioch.Ox.Demand,5day,filt;Ninh	g/m^3
FLOW	Flow	m^3/s
LEVEL	Water Level	m
ALKT	Alkalinity Total	g/m^3 $CaCO_3$
CA	Calcium	g/m^3
COD	Chemical Oxygen Demand	g/m^3
HCO_3	Bicarbonate	g/m^3 HCO_3
K	Potassium	g/m^3
KAR	Potassium Adsorption Ratio	None
MG	Magnesium	g/m^3
NA	Sodium	g/m^3
SAR	Sodium Adsorption Ratio	None
SO_4	Sulphate	g/m^3
SS	Suspended solids	g/m^3
ST	Sulphide Total	g/m^3
TG	Total grease	g/m^3
TN	Total nitrogen	g/m^3 N
TP	Total phosphorus	g/m^3 P
O&G	Oil and Grease	g/m^3

1.4.6. Biomonitoring surveys

Two surveys of biological communities at up to eight sites in the Inaha Stream and a major tributary were scheduled each year. These surveys assessed the effects of TBP's discharges (point source discharges and any diffuse source discharges as a result of spray irrigation) on benthic invertebrate communities of the stream. These surveys are further discussed in Section 2.4.6.

1.4.7. Monitoring by Taranaki By-Products

TBP measures and records rate of abstraction from the Inaha Stream and, since March 2015 from groundwater.

It also monitors the following:

The flow rate of the Inaha Stream (at Kohiti Road staff gauge) and of the wastewater discharge to the stream are measured daily in order to control dilution of the wastewater.

The Inaha Stream, and wastewater discharged to the stream and to land, as integral part of the management of its wastewater disposal system. The stream is sampled and analysed weekly to determine compliance with the consent limit for ammonia concentration.

The wastewater is analysed weekly for nitrogen species to enable calculation of allowable ammonia discharge rate to the stream and of the nitrogen loading on the irrigation areas.

The results of the stream and effluent monitoring were forwarded to the Council on a monthly basis.

1.5. Monitoring programme: Air

1.5.1. Introduction

The air quality monitoring programme for the TBP site consisted of three primary components.

1.5.2. Programme liaison and management

This part of the monitoring programme was combined with that for the water monitoring programme, and involved discussion and liaison with TBP staff, both on site during regular inspections and at the Regional Council's and TBP's offices.

1.5.3. Site investigations

The TBP site was inspected on 12 occasions during the 2016-2017 monitoring period as part of the annual monitoring programme. An additional number of inspections were undertaken in response to complaints received – this is addressed further in Section 2.5.1 and 2.7.

The main points of interest were plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, and noxious or offensive emissions.

As far as was practicable, inspections in relation to air emissions were integrated with inspections undertaken for other purposes for example water monitoring or in response to complaints. A list of incidents which led to complaints is summarised in Section 2.7 of this report.

1.5.4. Monitoring by Taranaki By-Products

From 2 February 2012, TBP was required, under the new air discharge permit 4058-4 to operate in accordance with an Air Discharge Management Plan. In respect of monitoring, the Plan included the production of a daily activities log, the requirement to conduct ambient odour surveys, and maintenance of a register of complaints. The monitoring components of the Plan had been in place for several years.

The daily activities log presents a checklist of operational monitoring items that must be recorded on a routine daily basis, such as climatic data, condition of the wastewater and odour treatment systems, cleaning and maintenance of plant, and various process records such as temperature in the driers and blood coagulator.

The results of biofilter and weather monitoring, and comment from the daily activities log on events affecting environment quality, were forwarded to the Council on a monthly basis. Odour survey reports and the complaints register are made available during site inspections.

2. Results

2.1. Water

2.1.1. Inspections

Compliance monitoring inspections were undertaken at approximately monthly intervals throughout the monitoring period. Inspections pertaining to water-related matters were undertaken in conjunction with air quality inspections (Section 2.5.1).

A total of 12 routine inspections were undertaken during the 2016-2017 year. Council holds a record of detailed inspection notes which are available by request. Additional inspections were carried out in response to public complaints as they arose. Inspections were also carried out at the times of effluent and receiving water chemistry monitoring. During or immediately after each inspection, an officer of the Council made contact with a TBP representative to discuss the findings.

During inspections particular attention was given to the following items:

- rendering processes;
- air emission control systems;
- load-in and load-out areas;
- workshops;
- truck depot;
- chemical and oil/fuel storage areas;
- stormwater system;
- wastewater treatment system;
- land irrigation system;
- waste burial areas.

2.2. Water abstraction

In the previous monitoring period all water for processing at TBP's in-edibles rendering plant was drawn from the Inaha Stream at a point beside the plant under consent 2051-4. Water for the adjacent edibles plant, and potable water for both plants, came from Waimate West rural water supply.

In February 2014, following surface water quality problems experienced with new high pressure boilers and with other processes, TBP started to use groundwater taken under consent 9756-1 from a 151.2 m bore that had been sunk beside the old cowshed on Katotauru Road, about 800 m north-west of the in-edibles plant.

2.2.1. Surface water abstraction - Inaha Stream

The water take from the Inaha Stream resulted in no compliance issues with regard to the maintenance of the minimum flow (25 L/s downstream of the abstraction point) required under special condition 2 of consent 2051-4.

In terms of the abstraction rate and specifically the limit of the abstraction rate, whereby consent 2051-4 allows for maximum daily abstraction rate of 2,160 m^3 /day or 25 L/s on average, and an instantaneous maximum of 50 L/s. TBP continuously operate one of two pumps rated at 33 and 25 L/s, with the larger pump as the primary supply.

Under the *Resource Management Regulations 2010 (Measurement and Reporting of Water Takes)*, TBP has been required since 10 November 2012 to take continuous measurements and keep daily records of volume

taken, and thereafter supply, by 31 July each year, the record of the preceding 1 July to 30 June period. TBP installed a flow measurement and recording system as required. Verification of the accuracy of the system was carried out by an approved certifier.

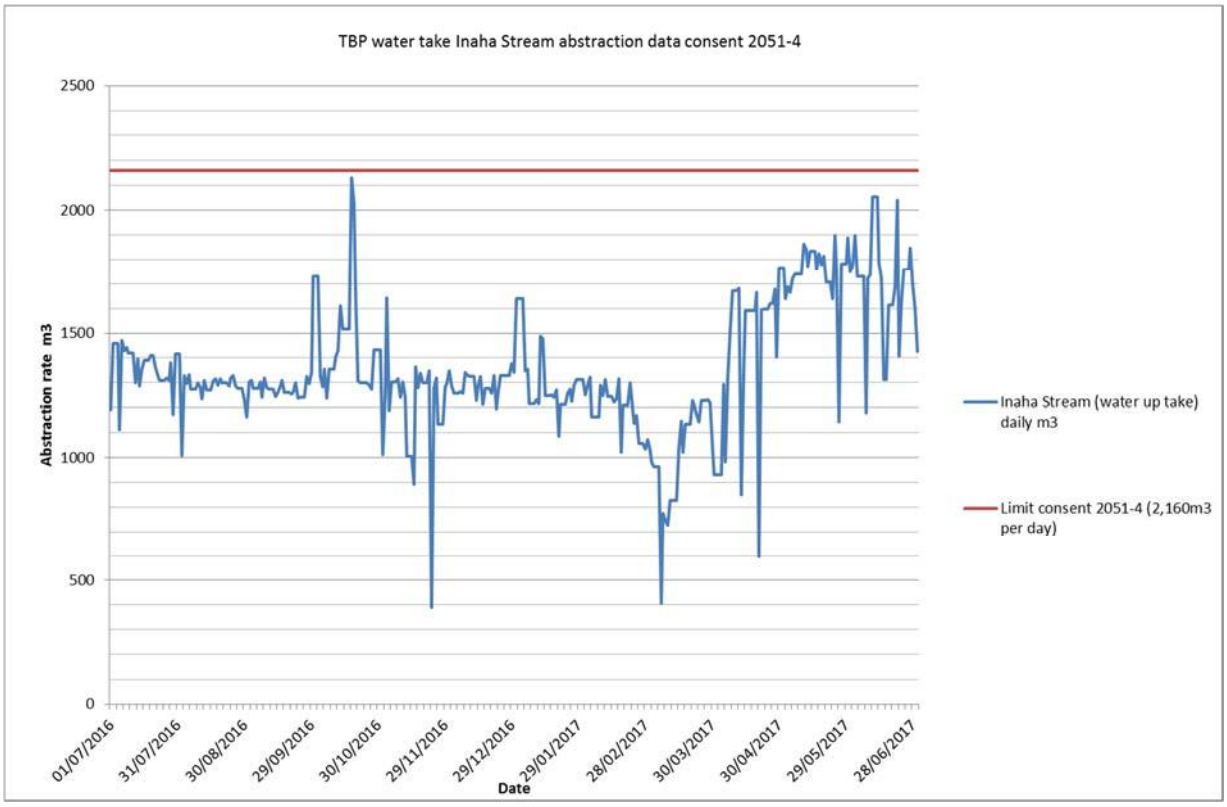

Figure 4 Consent 2051-4 surface water abstraction data, Inaha Stream 2016-2017 monitoring year

The records show (Figure 4) that the limit of 2,160 m^3/day of maximum daily abstraction volume was complied with throughout the period monitored; the highest reading was 2,130 m^3 on the 18 October 2016. The total volume abstracted from the Inaha was 493,787 m^3.

2.2.2. Groundwater abstraction

Consent 9756-1 allows groundwater abstraction at a rate not exceeding 22.8 L/s (1,970 m^3/day). The consent was first exercised in February 2014, before the required installation of a flow measurement, recording and telemetry system, for which abatement and infringement notices were issued at the time. Telemetry to Council's computer system was established on 27 March 2014. Verification of the accuracy of the measurement system was undertaken by an approved certifier. The telemetered record for the period ending 30 June 2016 is presented in the following Figure 5.

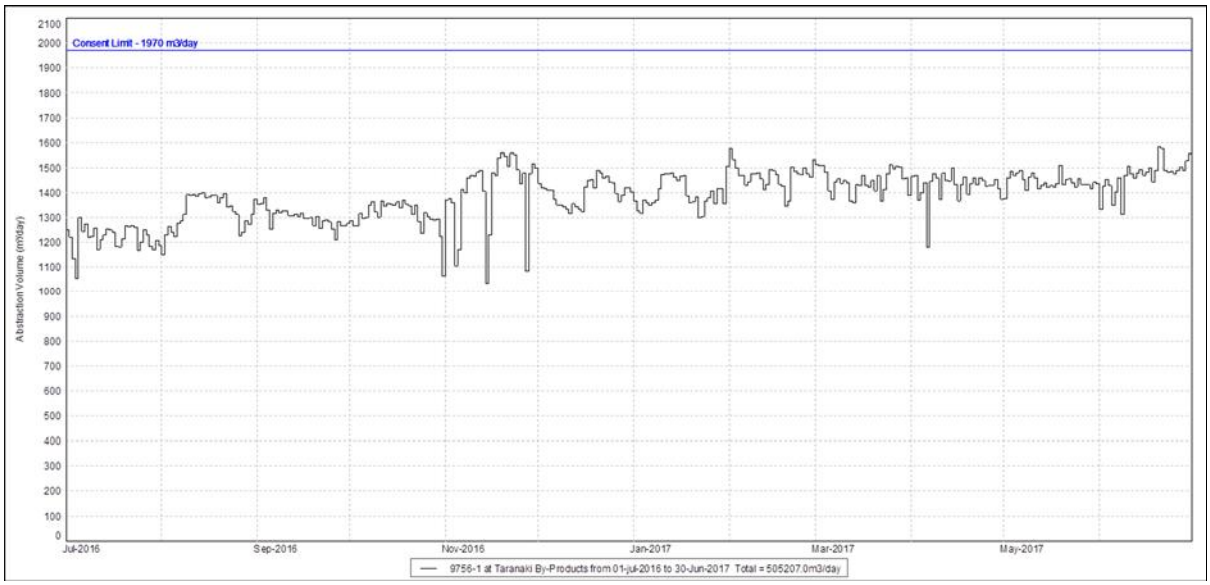

Figure 5 Daily groundwater abstraction volumes consent 9756-1 TBP 2016-2017

The total groundwater abstraction volume over this monitoring year (2016-2017) was 505,207m^3 and this equated to a daily average of 1,384 m^3/ day. The consent limit as shown in the above Figure 5 is for a maximum daily abstraction rate of 1,970 m^3 /day. Compliance was achieved.

2.3. Discharges of Wastewater

2.3.1. Wastewater

TBP hold consent 3941-2; to discharge up to 1,400 m^3/ day of treated wastewater from a rendering operation and from a farm dairy onto and into land, in the vicinity of the Inaha Stream and its tributaries. It contains specific conditions with regard to the concentration of dissolved oxygen within this wastewater as well as the sodium absorption ratio (SAR). These conditions state that the level of dissolved oxygen within the wastewater should be above 1.0 g/m^3 at all times and that the SAR of the wastewater should not exceed 15.

The following Table 5 contains the analysis of the four samples of pond 6 collected and analysed by the Council in the 2016-2017 monitoring period. A comparison with max and median results from 2000-2016 is also provide in Table 5.

- Dissolved oxygen concentrations were found to be compliant with the consent required standard of 1.0 g/m3 in all three recorded results this period. Dissolved oxygen was not analysed in the January sample. This is an improvement on the previous monitoring period where five samples were analysed and three were found to be below this value.
- Sodium absorption ratio (SAR) ranged between 4.4-9.2 SAR this period, the limit is set at 15.
- Alkalinity ranged from 80-336 g/m3 CaCO3 this period in the four samples analysed.
- Biochemical oxygen demand 5day (BOD) ranged from 40-76 g/m3.
- Chloride concentrations ranged form 156-227 g/m3
- Dissolved reactive phosphate ranged from 15-34 g/m3 P this period.
- In similarity to the previous monitoring period. Total nitrogen indicated a decreasing value throughout the year. The highest value was found in the January sample, 276 g/m3 N and the lowest, 166 g/m3, was in August 2017.

- Nitrite and ammoniacal nitrogen were the dominate species in the wastewater, opposed to nitrate and un-ionised ammonia.
- Potassium ranged from 91-117 g/m3 which were all below the long term median value of 118 g/m3.
- Sodium ranged from 14-202 g/m3, these values were below the long term median of 214 g/m3.
- pH of the wastewater ranged from pH 7-7.9, narrowly below the long term median value of pH 8.
- Suspended solids of the wastewater varied considerably with a range of 36-330 g/m3. Above the median value which was 140 g/m3.
- Total grease indicated two results this monitoring period, 5 and 16 g/m3.
- Total phosphorous results remained below the median value of 39 g/m3, ranging from 22-31 g/m3.
- Turbidity ranged from 24-180 NTU, exceeding the long term median value of 100 NTU.
- Note median values were composed of the previous 16 years of monitoring values.

Table 5 Effluent monitoring data Pond 6 discharge location IND004004 2016-2017

Parameter	ALKT	BOD	BODCF	CA	CL	COD	CONDY	DO	DRP	FC	HCO_3	K	KAR	MG	NA	NH_3
Unit	g/m^3 CaCO3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	mS/m@20°C	g/m^3	g/m^3 P	/100ml	g/m^3 HCO_3	g/m^3	None	g/m^3	g/m^3	g/m^3
11 Aug 2016	256	76	57	13.7	199	194	206	1.8	25.9	190	312.	92.5	2.65	11	180	3.82
12 Jan 2017	80	51	2.5	26	227	324	260	NR	18.5	110	97.6	117	2.60	16.4	202	1.16
16 May 2017	329	40	12	12.8	197	240	191	1.3	34	180	401	91.3	2.84	8.6	174	6.20
03 Aug 2017	336	68	41	53.9	156	462	179	1.51	15.1	2,600	409	92.7	1.64	17.9	149	1.34
Max	2,260	>480	79	67.5	339	7,200	561	11.2	53.6	20,000	1,720	188	7.76	20.2	343	54.0
Median	568	110	6.2	17.4	240	370	281	0.22	35	410	257	118	5.00	11.8	214	1.98
Mean	734	130	14.1	18.7	233	482	292	1.29	35.3	1,415	505	121	4.86	12.2	214	10.9

Parameter	NH_4	NNN	NO_2	NO_3	PERSAT	PH	SAR	SO_4	SS	ST	TEMP	TG	TN	TP	TURBY
Unit	g/m^3 N	g/m^3 N	g/m^3 N	g/m^3 N	%	pH	None	g/m^3	g/m^3	g/m^3	˚C	g/m^3	g/m^3 N	g/m^3 P	NTU
11 Aug 2016	118	93.6	56.1	37.5	21.5	7.7	8.78	110	36	<0.05	24.4	No result	228	26.9	24
12 Jan 2017	130	135	140	<0.001	NR	7	7.64	147	130	<0.05	28.5	No result	276	31	49
16 May 2017	115	36.8	35	1.8	15.3	7.9	9.22	134	92	No result	25.3	5	174	34.5	46
03 Aug 2017	88.8	67	75.2	<0.001	16.1	7.5	4.49	147	330	<0.05	20.2	16	166	22	180
Max	570	189	150	111.8	110	8.5	14.0	257	840	2.4	32.8	49	814	88.6	390

Median	205	79.95	35.45	11.7	3	8	9.78	121	140	0.02	22	2	312	39.8	100
Mean	225	74.31	43.9	30.6	14.6	7.8	9.74	130	193	0.11	22.1	10	330	39.7	122

2.3.2. Cooling water

The cooling water discharge (to the firewater pond) was sampled on four occasions in this monitoring period (Table 6). The results indicated the following:

- Temperature ranged in the cooling water from 9-38 °C, with the long term median value at 27 °C.
- Biological oxygen deficit (BOD) ranged from 1.1-2.6, narrowly below the maximum value found in the long term data set of 2.7 BOD.
- Conductivity ranged from 20-29 mS/m@20°C.
- Ammoniacal nitrogen ranged from 0.024 – 2.04 g/m3, the higher value was the most elevated concentration of NH4 to date in this data set, eclipsing the previous value of 1.91 g/m3.
- pH ranged from pH 7.4-8 in this monitoring period, which were close to the median value of pH 7.7.

Table 6 2016-2017 monitoring of cooling water discharge IND002004

Parameter	BOD	CONDY	NH_4	pH	TEMP	TURB
Date	g/m^3	mS/m@20°C	g/m^3 N	pH	°C	NTU
11 Aug 2016	1.1	20.2	0.024	7.6	9	9.6
12 Jan 2017	1.2	23.9	0.053	8	38	2.4
16 May 2017	1.1	29.8	1.86	7.4	24.7	12
03 Aug 2017	2.6	29.4	2.04	7.4	31.4	8.9
Number	72	72	71	72	70	49
Max	2.7	30	1.91	8.2	65.1	31
Median	1	21.8	0.09	7.7	27	7.5

BOD_5 = total 5-day biochemical oxygen demand, g/m^3
Condy = conductivity, mS/m at 20˚C Temp = temperature, ˚C
NH_4 = ammonia, g/m^3 N Turb – turbidity, NTU

2.3.3. Stormwater

Stormwater from the main yard, garage and raw material reception area, flow via a drain, from Kohiti Road in the firewater pond (monitoring location STW01075). The Council sampled this location four times this monitoring period. The results of the sampling are provided in the following Table 7. A comparison with values recorded for this site since 2000 is also provided.

Table 7 2016-2017 monitoring of stormwater location STW001075

Parameter	BOD	CONDY	FC	NH_4	O&G	PH	SS	TEMP	TURBY
Date	g/m^3	mS/m@20°C	/100ml	g/m^3 N	g/m^3	pH	g/m^3	°C	NTU
11 Aug 2016	6.1	64.9	70,000	0.609	0.6	7	6	11.3	48
12 Jan 2017	>80	60.5	No result	1.61	No result	8.7	46	19.6	25
16 May 2017	20	20.2	11,000	0.55	8.8	6.8	140	24.7	46

Parameter	BOD	CONDY	FC	NH_4	O&G	PH	SS	TEMP	TURBY
Date	g/m^3	mS/m@20°C	/100ml	g/m^3 N	g/m^3	pH	g/m^3	°C	NTU
03 Aug 2017	7.5	50.3	370,000	0.663	2.0	7.2	10	12.9	8.7
Number	59	67	63	67	46	67	66	64	46
Max	1,600	895	12,000,000	337	180	11.2	6,000	24.4	1,400
Median	33	57.1	62,000	2.81	1.9	7.2	74	14.6	23.5

BOD5 = total 5-day biochemical oxygen demand, g/m3
Condy = conductivity, mS/m at 20˚C
NH4 = ammonia, g/m3 N
FC = faecal coliforms, cfu/100 ml
SS = suspended solids, g/m3
Temp = temperature, ˚C
Turb – turbidity, NTU
O&G = oil & grease g/m3

Consent 5426-1 places a limit on the range of pH (6 to 9) allowable in the stormwater, as well as a maximum concentration for suspended solids (100 g/m^3) and oil and grease (15 g/m^3).

- pH ranged from 6.8-8.7, narrowly below the consented requirement on one occasion in May 2017.
- Suspended solids results ranged from 6-140 g/m3, which exceeded the consented value of 100 g/m3 in the May 2017 sample.
- Oil and grease ranged from 0.8-8.8 g/m3. The median value was 1.9 g/m3 O&G with two of the three results above this value. The limit is set at 15 g/m3.
- Faecal coliforms ranged from 11,000-370,000 /100ml this period. Of the three results analysed, two were above the long term median value of 62,000 /100 ml.
- Biological oxygen deficit ranged from 6->80 g/m3 in this monitoring period.
- Ammoniacal nitrogen ranged from 0.55-1.61 g/m3 N this period. The results were all below the long term median value of 2.81 g/m3 N.
- Temperature analysis indicated a range of 11.3-24.7 °C, which also corresponded with the highest temperature recorded at this site since 2000, 24.7 °C.

Specifically the only exceedance with respect to the stormwater in relation to the consent 5426-1 was the suspended solids, in the January 2017 sample, with a result of 140 g/m^3. However, the ammonia and corresponding pH in the same January sample indicated the potential for un-ionised ammonia (NH_3) within the pond, with a calculated value of 0.261 g/m^3.

2.3.4. Inaha tributary at plant site

The Council also collected samples from the tributary which runs through the firewater pond. The aim of this sampling exercise was to ascertain the combined discharges of the stormwater and the cooling water, as well as any seepage which may occur from the ring drain around the final pond 6. The sample location is IND001015, the analysis is provided in the following Table 8 with data comparison since 2000.

Table 8 2016-2017 monitoring results of IND001015

Parameter	ALKT	BOD	CL	CONDY	DO	DRP	FC	NH_3	NH_4	NNN	NO_2	NO_3	O&G	PERSAT	PH	SS	TEMP	TURBY
Date	g/m^3 CaCO3	g/m^3	g/m^3	mS/m@ 20°C	g/m^3	g/m^3 P	/100ml	g/m^3	g/m^3 N	g/m^3 N	g/m^3 N	g/m^3 N	g/m^3	%	pH	g/m^3	˚C	NTU
11 Aug 2016	76	2.8	34.8	27.7	5.19	0.09	3,600	0.004	0.951	3.28	0.099	3.18	0.6	46.6	7.3	7	10.7	7.8
12 Jan 2017	89	1.8	31.9	28.1	No result	0.12	3,200	0.01	1.15	1.5	0.089	1.41	No result	No result	7.4	6	23.8	5.7
16 May 2017	76	4.4	30.1	26.1	7.3	0.13	23,000	0.009	1.06	2.66	0.054	2.60	<0.5	74.8	7.4	9	16.4	7.1
03 Aug 2017	80	1.6	71.9	41.6	7.8	0.20	5,900	0.03	0.982	3.83	0.10	3.72	<0.5	75.9	8.1	11	14.1	9.8
Number	71	65	62	75	70	71	69	18	75	63	17	16	61	23	75	57	73	49
Max	118	120	90.8	49	9.2	0.73	45,000	0.21	6.84	10.8	2.61	6.45	3.6	95	8	140	33.6	44
Median	61	2.8	35.9	25.4	7	0.04	1,000	0.01	0.874	3.84	0.13	3.28	0.2	79.6	7.4	7	22.5	4.4

BOD_5 = total 5-day biochemical oxygen demand, g/m^3
Condy = conductivity, mS/m at 20˚C
NH4 = ammonia, g/m^3 N
FC = faecal coliforms, cfu/100 ml
DRP= dissolved reactive phosphorus
SS = suspended solids, g/m^3
Temp = temperature, ˚C
Turb – turbidity, NTU
O&G = oil & grease g/m^3
NNN = Nitrite/ Nitrate nitrogen
Cl= chloride

- The analysis of IND0001015 (Table 8) details the following:
- Alkalinity readings indicated results above the long term median value of 61 g/m3 CaCO3.
- Biological oxygen deficit indicated a range of results, 1.6-4.4 g/m3. This equalled or exceeded the median value which was 2.8 g/m3 on two occasions in this monitoring period.
- Chloride concentrations were found to range from 30-72 g/m3. On one occasion it exceeded the long term median value of 36 g/m3.
- Conductivity concentrations were above the long term median value of 25 g/m3 in all four samples.
- Dissolved oxygen concentrations ranged from 5.1-7.8 g/m3 O2, on two occasions the median value of 7 g/m3 was exceeded.
- Dissolved reactive phosphorous (DRP) results were found to be above the median value of 0.046 g/m3 P in all four samples analysed in this period.
- Faecal coliform concentrations were all found to be above the long term median value for this analyte (1,000 /100ml), ranging from 3,200-23,000 /100ml.
- Un-ionised ammonia concentrations (NH3) exceeded the median value on two occasions this period. The median value was 0.017 g/m3.
- Ammonia concentrations were close to or slightly elevated above the median value of 0.87 g/m3 in the four samples analysed this monitoring period. This ranged from 0.951-1.15 g/m3 NH4.
- Nitrate was the dominant species opposed to nitrite in these samples of this source in this period. Nitrate ranged from 1.4-3.1 g/m3 while nitrite ranged from 0.054-0.103 g/m3.
- pH remained relatively stable in the four results collected this period ph 7.3-8.1.
- Suspended solid concentrations were close to the median value of 7 g/m3.
- Temperatures ranged from 10.7-23.8 °C.
- Turbidity readings were all above the long term median value of 4.4 NTU.

2.4. Results of receiving environment monitoring

2.4.1. Inaha Stream Flows

The flow rate of Inaha Stream is measured for the purpose of managing the dilution of TBP's treated wastewater in the stream, and also the rate of abstraction. A water level staff gauge is installed at Kohiti Road bridge, about 300 m upstream of the TBP discharge point. Stream flow rate is calculated from a rating curve developed from manual stream gaugings taken at the staff gauge site. The Council undertook four stream gaugings in the 2016-2017 reporting period.

TBP has regularly recorded staff gauge readings since May 2008. Previously, readings were taken less frequently, usually when wastewater was discharging to the stream, and during Council inspections.

The hydrograph for 2016-2017 period, drawn from the staff gauge readings at Kohiti Road is provided in the following Figure 6, included to this graph is a plot of the rate of the wastewater discharge to the stream, as measured at the v-notch weir at the outlet of Pond 6.

Special condition 6 on consent 2049 requires that minimum dilution rate of 1:300 for effluent discharged to the stream be maintained at all times, and special condition 8 requires that the discharge cease when flows in the stream, as measured at Kohiti Road Bridge, decrease to below 100 L/s. Special condition 2 on consent 2051 requires that a minimum flow of 25 L/s be maintained in the stream at the point of abstraction.

The results from the monitoring of wastewater and receiving water discharge rates by TBP show that the limit on the minimum dilution rate of 300:1 fold was achieved for the majority of 2016-2017. Of the 83 days which the site discharged to the Inaha Stream, on two non-consecutive days the minimum dilution was not achieved. The lowest dilution rate found was 1:276, recorded on the 07 April 2017.

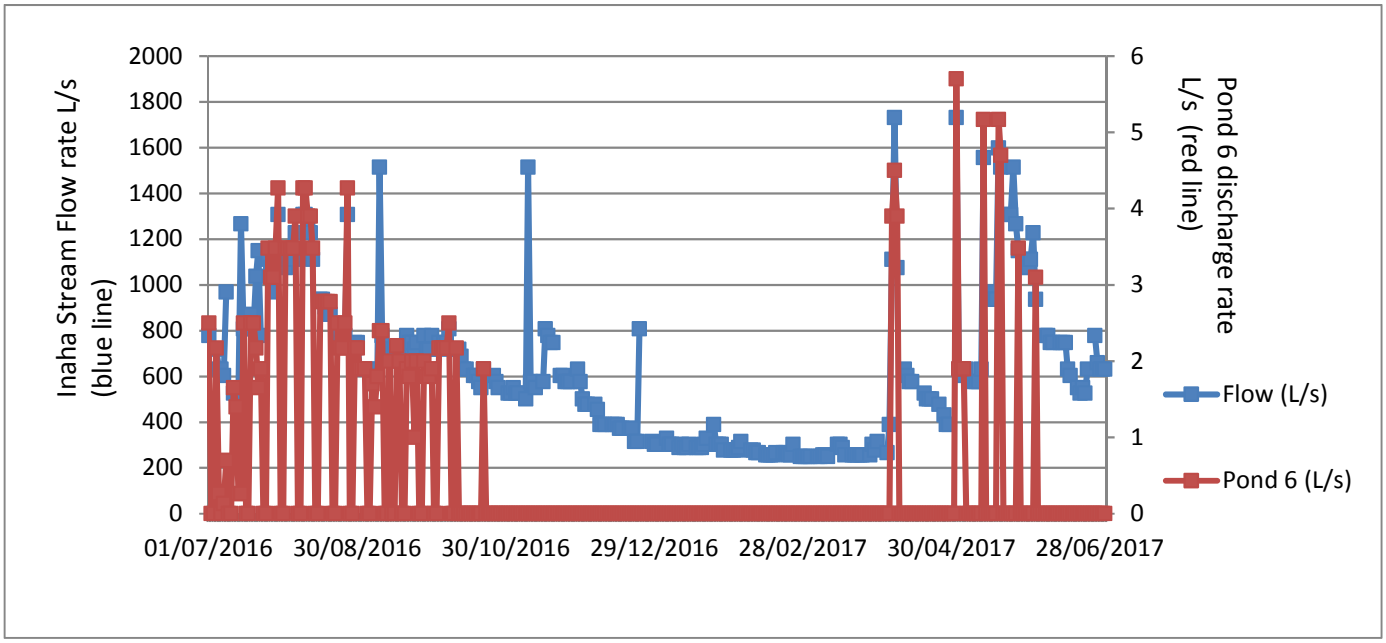

Figure 6 Hydrograph for Inaha Stream at Kohiti Road July 2016-June 2017 with overlay of pond 6 discharge rate

2.4.2. Instream Temperatures

In-stream temperature recorders were operated throughout the monitoring period. These monitors are located within the unnamed tributary which receives the cooling water discharge and in the Inaha Stream upstream of the confluence with the tributary, and downstream of the confluence at the end of the mixing zone. In September 2013, the Council took over the temperature monitoring from TBP, at TBP's request.

The record over the 2016-2017 monitoring period for the temperature of cooling water discharged, and the increase in Inaha Stream temperature, is given in Figure 7 and Figure 8. The error on the cooling water temperature is ± 0.2 ˚C, and the error on the in-stream temperature increase is ±0.4 ˚C.

For background, special condition 3 on consent 2050 requires that the temperature of the cooling water discharge must not exceed 35 ˚C. In this monitoring period (Figure 7) the limit was not exceeded, marking the fifth year TBP has been in compliance with this cooling water temperature condition.

Special condition 9 (c) on consent 2049 and special condition 5 (g) on consent 2050 require that there be no more than a 3.0 °C temperature differential in the receiving waters below the mixing zone as a result of the wastewater and cooling water discharges, respectively. Results presented in Figure 8 indicate compliance with this condition.

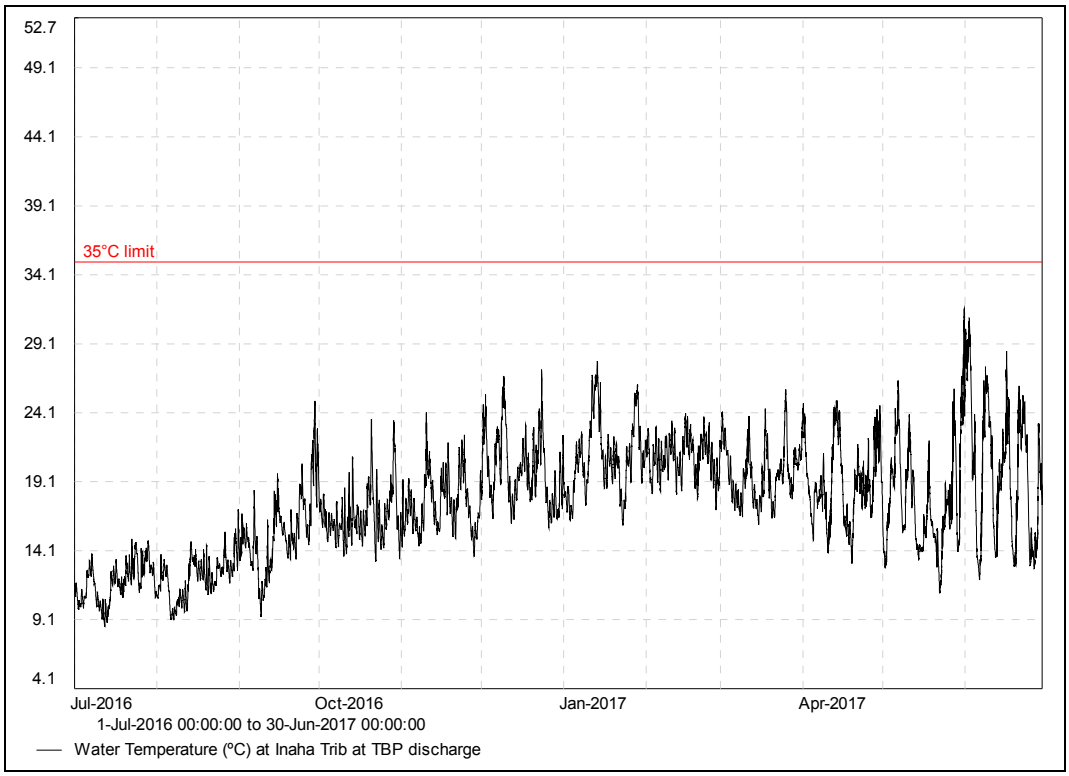

Figure 7 Cooling water temperature 2016-2017

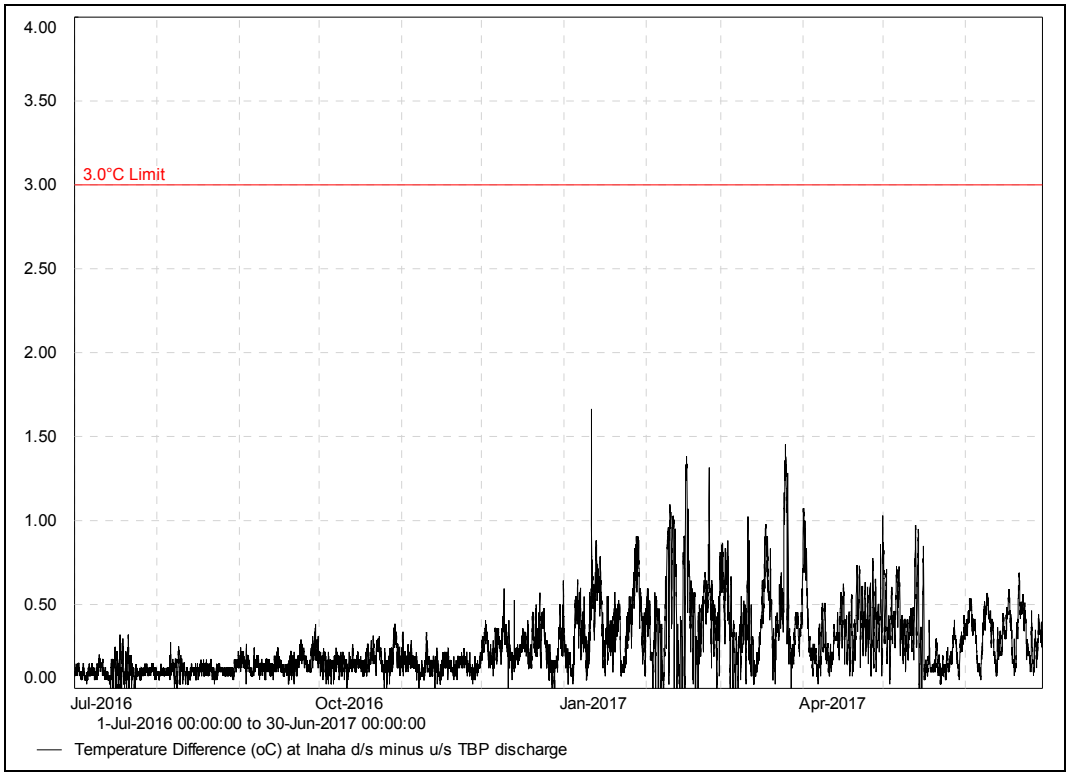

Figure 8 Inaha Stream temperature increase post discharge 2016-2017

2.4.3. Water chemistry

Four sampling runs were undertaken on the Inaha Stream in this monitoring period. The analysis of the Inaha Stream monitoring is provided in Table 10. The monitoring locations are defined in Table 9 and depicted in Figure 2 for ease of reference.

Please note that Table 10 details the surface water monitoring undertaken on the main stem of the Inaha Stream. Table 9 details the Inaha Stream monitoring locations, and also the monitoring locations on the Northern tributary (INH000397) and the Western tributary (INH000433, INH000435, INH000440). Analysis pertaining to the Northern tributary and the Western tributary are provided in the following Table 11 and Table 12.

Table 9 Surface water sampling locations

Site	Description	Map reference, NZTM		Site code
		Easting	Northing	
1	Ahipaipa Road	1703013	5625271	INH000334
3	Bridge, 420 m u/s Kohiti Road	1702138	5624345	INH000348
4	Unnamed northern tributary at Inaha confluence	1701947	5624362	INH000397
5	Kohiti Road	1701874	5624322	INH000400
6	110 m d/s cooling water discharge and 30 m d/s pond 6 discharge	1701861	5623980	INH000408
7	500 m d/s pond waste discharge	1702021	5623745	INH000420
8	Normanby Road bridge, 1,450 m d/s discharges	1701650	5623262	INH000430
9a	Unnamed western tributary, 3,500 m u/s Inaha confluence	1701109	5625496	INH000433

Site	Description	Map reference, NZTM		Site code
		Easting	Northing	
9	Unnamed western tributary 2,550 m u/s Inaha confluence	1700816	5624558	INH000435
9b	Unnamed western tributary ~2,000 m u/s Inaha confluence	1700818	5624175	
9c	Unnamed western tributary ~1,450 m u/s Inaha confluence	1701183	5623577	
9d	Unnamed western tributary ~900 m u/s Inaha confluence	1701013	5623963	
10	Unnamed western tributary 250 m u/s Inaha confluence	1701518	5623227	INH000440
11	State Highway 45	1700393	5620330	INH000470

Table 10 Surface water sampling results Inaha Stream 2016-2017

SW	Parameter	BOD	BODCF	CONDY	DO	DRP	FC	NH_4	NNN	PERSAT	pH	TEMP	TURBY
Site ID	Date	g/m³	g/m³	mS/m@ 20°C	g/m³	g/m³ P	/100ml	g/m³ N	g/m³ N	%	pH	°C	NTU
Surface water 1													
INH000334	11/08/2016	1		18.6	11.55	0.027	110	0.01	3.44	97	7.6	7.6	9
INH000348	11/08/2016	1.2		18.8	11.77	0.027	100	0.01	3.64	99.2	7.6	7.8	8.3
INH000397	11/08/2016	1		25.7	11.7	0.019	380	0.026	3.43	95.8	7.6	6.8	7.6
INH000400	11/08/2016	1	<0.5	19.9	11.72	0.026	140	0.015	3.69	98.7	7.6	7.8	8.3
INH000408	11/08/2016	1.3	0.6	20.6	11.6	0.048	170	0.149	3.67	99.1	7.6	8.4	9.4
INH000420	11/08/2016	2	<0.5	21	11.16	0.09	260	0.344	3.87	97.8	7.6	9.1	10
INH000430	11/08/2016	1.7	0.6	21.1	11.13	0.094	550	0.298	3.72	98.4	7.6	9.3	9.1
INH000470	11/08/2016	2.1		23.2	11.28	0.087	300	0.239	4.23	97.6	7.6	9.1	8.6
Surface water 2													
INH000334	12/01/2017	0.6		20.2	NR	0.042	510	0.022	1.4	NR	7.7	17.8	3.2
INH000348	12/01/2017	0.7		21.3	NR	0.039	570	0.011	1.9	NR	8.1	18.7	2
INH000397	12/01/2017	<0.5		26.4	NR	0.022	560	0.012	1.1	NR	7.5	16.6	2.7
INH000400	12/01/2017	0.7	0.6	22.4	NR	0.036	NR	0.022	1.77	NR	8	18.5	2.5
INH000408	12/01/2017	1.2	0.7	23.1	NR	0.041	770	0.145	2.01	NR	7.8	18.9	2.8
INH000420	12/01/2017	1.2	0.8	23.4	NR	0.039	730	0.105	2.01	NR	7.8	18.8	2.9
INH000430	12/01/2017	1.2	0.7	23.7	NR	0.037	540	0.056	2.46	NR	7.9	21.3	2.6
INH000470	12/01/2017	1.2		27.9	NR	0.049	1,700	0.018	2.79	NR	8	19.8	4.4
Surface water 3													
INH000334	16/05/2017	1.2		18.8	10.5	0.06	530	0.026	3.27	96.6	7.5	11.5	8.6
INH000348	16/05/2017	1.1		19.1	10.83	0.056	630	0.02	3.2	99.8	7.7	11.6	8.2
INH000397	16/05/2017	0.9		27.2	10.15	0.144	760	0.029	3.34	93.5	7.7	11.6	5
INH000400	16/05/2017	1	<0.5	20.4	10.74	0.065	670	0.014	3.32	99	7.7	11.6	7.8

SW	Parameter	BOD	BODCF	CONDY	DO	DRP	FC	NH_4	NNN	PERSAT	pH	TEMP	TURBY
Site ID	Date	g/m^3	g/m^3	mS/m@ 20°C	g/m^3	g/m^3 P	/100ml	g/m^3 N	g/m^3 N	%	pH	°C	NTU
INH000408	16/05/2017	1.3	0.5	21	10.68	0.051	730	0.058	3.37	99.8	7.6	16.4	8
INH000420	16/05/2017	1.1	<0.5	21	10.75	0.05	690	0.049	3.55	99.7	7.6	13.6	9.1
INH000430	16/05/2017	1.1	<0.5	21.2	10.7	0.049	580	0.043	3.38	100.4	7.8	12.5	11
INH000470	16/05/2017	1.6		23.4	10.54	0.068	760	0.031	3.72	98.4	7.7	12.4	8.6
Surface water 4													
INH000334	03/08/2017	0.8		20.1	10.69	0.025	560	0.032	3.83	96.9	7.6	10.2	12
INH000348	03/08/2017	1		20.6	10.99	0.024	620	0.031	4.33	98.3	7.7	10.1	12
INH000397	03/08/2017	0.6		27	10.74	0.016	490	0.029	4.61	95.3	7.6	9.9	10
INH000400	03/08/2017	0.7	0.5	22.3	10.97	0.025	520	0.029	4.32	97.8	7.7	10	14
INH000408	03/08/2017	0.9	<0.5	23.1	10.8	0.035	650	0.138	4.57	97.7	7.7	10.7	16
INH000420	03/08/2017	0.8	<0.5	23.2	10.9	0.049	580	0.209	4.66	98.2	7.7	10.5	12
INH000430	03/08/2017	1.4	<0.5	23.4	10.82	0.051	480	0.195	4.85	98.4	7.7	10.9	16
INH000470	03/08/2017	2.7		25.6	10.58	0.047	480	0.183	5.06	95.8	7.6	10.9	14

BOD_5 = total 5-day biochemical oxygen demand, g/m^3
$fcBOD_5$= filtered carbonaceous 5-day biochemical demand, g/m^3
Cond = conductivity, mS/m at 20˚C
DO = dissolved oxygen, g/m^3
DRP = dissolved reactive phosphorus, g/m^3P
FC = faecal coliforms, cfu/100 ml
NR= no result
NNN = nitrate + nitrite, g/m^3N
%Sat = percentage oxygen saturation
NH_4 = ammonia, g/m^3N
Temp = temperature, ˚C
Turb = turbidity, NTU

TBP holds discharge consent 2049. This consent allows for the discharge of treated wastewater from TBP's rendering plant to Inaha Stream. It places specific limits on the combined effect of all discharges from the plant on dissolved oxygen, BOD, total ammonia and pH levels on the receiving waters in the stream, beyond the boundary of a 30 m mixing zone.

The effect that the discharge has on the receiving environment is a function of the relative flow rates of the stream and effluent, the strength of the effluent, and the quality of the stream above the discharge point. The data indicates a minor to moderate decrease in water quality down the length of the stream on each monitoring occasion.

Results for individual parameters of concern are discussed separately below.

It is noted that TBP were not discharging treated wastewater during two of the four monitoring runs in 2016-2017 (January and May 2017), as all wastewater was being discharged to land during relatively low stream flows. This allowed assessment of the effects of leaching from the rendering plants' site, and of the minor discharges, such as cooling water, via the tributary that flows through the site.

Dissolved oxygen

Consent 2049 requires that the discharge shall not reduce the concentration of dissolved oxygen (DO) of the receiving water to below 80% of saturation concentration, that is, about 6-9 g/m^3 in the case of Inaha Stream, depending on the stream temperature. This limit is set for the protection of fish populations. Sampling runs were timed to take place when dissolved oxygen concentration is at its lowest, in early to mid-morning.

DO was monitored on three occasions of four in the 2016-2017 monitoring year, the results were in compliance with the limit on all three occasions.

Monitoring in recent years has shown that, during lower flows, there tends to be a slight increase in dissolved oxygen between Ahipaipa Road and Kohiti Road (between sites INH000334 and INH000400), and a slight decrease below the rendering plants at the second and third sites downstream, 500 m downstream and at Normanby Road. During winter and spring flows, when TBP wastewater is being discharged, there tends to be a slight decrease at the first site downstream.

Biochemical oxygen demand

Consent 2049 requires that the discharge shall not raise the filtered carbonaceous biochemical oxygen demand (filtered cBOD/BODCF) above 2 g/m^3 in the receiving waters of the stream. This limit is set to control excessive bacterial or fungal slime growths. The Council monitored for both total and filtered on four occasions in 2016-2017. Total BOD is also monitored to assess the potential for dissolved oxygen sag.

The limit was complied with on each monitoring occasion; the maximum downstream filtered BODCF value was 0.8 g/m^3 and ranged from 0.6 g/m^3 to 0.8 g/m^3. The highest readings were recorded during January 2017.

BOD determinations with and without nitrifier inhibition (carbonaceous and total BOD) showed that oxygen demand exerted by TBP's effluent was largely nitrogenous. This is supported by the observed conversion of ammonia to nitrate (nitrification) and concurrent slight DO sag in the stream, and is consistent with the discharge of wastewater containing active nitrifying bacteria together with a significant amount of ammonia.

Total ammonia and pH

Consent 2049 requires that the discharge shall not raise the total ammonia concentration (reported as NH_4) in the receiving water above 1.5 g/m^3 if the pH of the receiving water is below 7.75, or above 0.7 g/m^3 if the pH lies between 7.75 and 8.0, or above 0.4 g/m^3 if the pH is above 8.0. The permit also requires that the discharge not cause a fall of more than 0.5 pH units in the receiving water. These limits are set for the protection of fish populations.

During the monitoring period of 2016-2017, there was no exceedance with the ammonia values when compared to the pH level. Of note, the site was only discharging during two of the four monitoring rounds. These were the August 2016 and the August 2017 monitoring rounds. The highest value of NH_4 was observed in the August 2016 sample, at location INH000420 with a value of 0.344 g/m^3 NH_4, with a pH of pH 7.6.

Tributaries in irrigation areas

Physico-chemical monitoring of the two tributaries (the northern and western tributaries) which run through irrigated areas on the western side of Inaha Stream were carried out to determine the effects of wastewater irrigation. The locations and descriptions of the monitoring sites are given in Figure 2, Table 3 and Table 9, respectively.

The water quality of the two tributaries is more mineralised (having higher conductivity) than the main stem, reflecting the closer proximity of their catchment to the sea but also potentially reflecting activities within the sub-catchments. Nitrate concentration is the factor most likely to be affected by irrigation.

2.4.3.1. Northern tributary

The northern tributary joins the Inaha Stream immediately above Kohiti Road. It runs a distance of about 0.64 km through the Kohiti block of TBP's farm, about 0.42 km adjacent to potentially irrigated areas. The tributary is monitored at its confluence with the main stream at Site 4/INH000397. The analysis of the samples collected in this monitoring period are provided in Table 11.

Analysis of the northern tributary detailed a slight increase in the maximum value for nitrate and as result nitrate/nitrite nitrogen (NNN). Whereby the analysis of the August 2017 sample indicated a concentration of 4.5 g/m^3 nitrate and corresponding 4.61 g/m^3 N. The previous high value for NNN, recorded in the previous year (2015-2016) was 4.19 g/m^3 N.

Table 11 Northern tributary 2016-2017 surface water monitoring

SW	Parameter	BOD	CL	CONDY	DO	DRP	FC	NH_3	NH_4	NNN	NO_2	NO_3	PERSAT	PH	TEMP	TURBY
Site ID	Date	g/m^3	g/m^3	mS/m@20°C	g/m^3	g/m^3 P	/100ml	g/m^3	g/m^3 N	g/m^3 N	g/m^3 N	g/m^3 N	%	pH	°C	NTU
INH000397	11/08/2016	1	34.4	25.7	11.7	0.019	380	0.00018	0.026	3.43	0.013	3.417	95.8	7.6	6.8	7.6
INH000397	12/01/2017	<0.5	33.7	26.4	NR	0.022	560	0.00014	0.012	1.1	0.005	1.095	NR	7.5	16.6	2.7
INH000397	16/05/2017	0.9	34.2	27.2	10.15	0.144	760	0.00037	0.029	3.34	0.041	3.299	93.5	7.7	11.6	5
INH000397	03/08/2017	0.6	37.7	27	10.74	0.016	490	0.00026	0.029	4.61	0.018	4.592	95.3	7.6	9.9	10

Western tributary

The western tributary joins the Inaha Stream immediately below Normanby Road. It runs a distance of about 3.5 km through land that is irrigated on both sides with TBP wastewater. The distance of the stream in its valley to the irrigated areas on the plateau above is about 50 to 100 m.

The tributary is monitored at three points: Site 9a (INH000433) which is above the TBP farm; Site 9 (INH000435) which was the original upstream site is situated 2.5 km above the Inaha confluence, before the irrigation area was extended; Site 10 is the downstream site, immediately above Normanby Road, about 0.22 km above the confluence (INH000440).

In the previous monitoring period, 2015-2016, this tributary was monitored on seven occasions as it was observed to detail an increasing NNN trend.

In this monitoring year the tributary was monitored on four occasions, as detailed in Table 12. The highest concentration of NNN observed in this monitoring year was 8.2 g/m^3 N, recorded at the downstream site (INH000440) on the western tributary during the January sampling round. This is comparably lower than the highest concentration observed in the previous monitoring period of 13 g/m^3 N.

Of note, the significantly elevated concentration of fecal coliforms (480,000/100ml) observed in the August 2017 sample of the upper tributary at site INH000433 was attributed to sample handling error.

Table 12 Surface water monitoring of the western tributary of the Inaha Stream 2016-2017

SW	Parameter	BOD	CL	CONDY	DO	DRP	FC	NH_3	NH_4	NNN	NO_2	NO_3	PERSAT	PH	TEMP	TURBY
Site ID	Date	g/m^3	g/m^3	mS/m@20°C	g/m^3	g/m^3 P	/100ml	g/m^3	g/m^3 N	g/m^3 N	g/m^3 N	g/m^3 N	%	pH	˚C	NTU
Surface water 1																
INH000433	11/08/2016	0.7	41.3	30.8	11.1	0.009	110	0.00002	0.004	3.56	0.004	3.55	94.2	7.4	7.2	10
INH000435	11/08/2016	<0.5	47.7	32.3	11.3	0.018	210	0.00007	0.016	5.11	0.006	5.10	93.6	7.4	7.2	1.4
INH000440	11/08/2016	0.6	49.3	33.2	11.5	0.013	150	0.00004	0.009	5.86	0.005	5.85	96.2	7.4	7.5	5.6
Surface water 2																
INH000433	12/01/2017	0.6	38.7	28.9	NR	0.017	300	0.00016	0.014	1.17	0.002	1.17	NR	7.5	16.3	7.6
INH000435	12/01/2017	0.8	45.6	33.4	NR	0.021	740	0.00173	0.085	3.51	0.006	3.50	NR	7.7	18	7.9
INH000440	12/01/2017	1.8	56.6	39.2	NR	0.012	1,300	0.0002	0.02	8.2	0.008	8.19	NR	7.4	17.5	8
Surface water 3																
INH000433	16/05/2017	<0.5	41.3	29.7	9.63	0.01	280	0.00008	0.008	2.93	0.003	2.92	89.9	7.6	12.2	5.6
INH000435	16/05/2017	0.5	42.8	30.5	9.72	0.013	320	0.00005	0.006	3.34	0.004	3.33	90.4	7.5	12	2.7
INH000440	16/05/2017	0.6	48.3	32.8	9.28	0.057	420	0.00005	0.008	5.64	0.003	5.63	86	7.4	11.9	6.4
Surface water 4																
INH000433	03/08/2017	<0.5	40.8	29.1	10.3	0.011	480,000	0.0001	0.011	4.37	0.008	4.36	92.1	7.6	10.3	4.2
INH000435	03/08/2017	<0.5	42.2	29.6	10.2	0.003	330	0.00009	0.012	5.66	0.006	5.65	91.2	7.5	10.2	2.6
INH000440	03/08/2017	<0.5	45.9	31.5	10.7	0.006	410	0.00011	0.012	7.39	0.006	7.38	96.2	7.6	10.3	8.2

2.4.4. Irrigation and groundwater monitoring

TBP holds consent 3941-2; this consent allows for the discharge of up to 1,400 m^3/day of treated wastewater from their rendering operation onto and into the land in the vicinity of the Inaha Stream and its tributaries.

The wastewater is monitored by both TBP and the Council. TBP measures and records wastewater volumes discharged on each paddock daily, and analyses nitrogen constituents of the wastewater at approximately weekly intervals. Some soil testing has been carried out.

Monitoring by the Council included inspection of irrigation areas, effluent analysis, chemical and biological surveys of the Inaha Stream, sampling from groundwater bores drilled around the irrigation areas and of a spring situated near an irrigation area that is used to supply several households.

2.4.4.1. Irrigation area and system

The spray irrigation system employs low-medium pressure travelling irrigators with a 30 m or 50 m swath. Use of a 'Rotorainer' irrigator with a 100 m boom, that requires less maintenance, commenced in May 2008. A second Rotorainer was employed from January 2009.

The area irrigated has progressively increased, as TBP has purchased or leased more land around the rendering plants. Prior to 2006, irrigation occurred on four blocks, three owned by TBP on Kohiti Road (38.83 ha), Normanby Road (37.95 ha) and Katotauru Road (20.15 ha), and a block owned by Mr and Mrs Shearer on Katotauru Road (19.27 ha).

An extension followed the change of consent 3941 in December 2005, which provided for two additional blocks to be irrigated, one leased on Katotauru/Normanby Roads (about 110 ha), the other purchased on Ahipaipa Road (about 48 ha). The blocks were developed in stages by re-fencing and reticulation in 2006 and 2007.

TBP bought or leased further parcels adjacent to the existing irrigation areas, and in November 2009 was granted a change of consent 3941-2 to provide for irrigation on them. Part of this additional land, adjacent to the Katotauru Road block, 17.4 ha area in total, was irrigated from December 2009. Irrigation of "Maori Trust land", 20.6 ha in area beside Upper Inaha Road, started in December 2010. A further area of about 19.1 ha, in the "Kingi Block" to the north, that spans the Inaha Stream tributary between Katotauru and Upper Inaha Roads, was reticulated in December 2010 and irrigated from October 2011, after a groundwater monitoring bore (BH9) was installed down-gradient.

Previous monitoring year loadings

In the 2015-2016 monitoring year, TBP had a total of 183 ha available for applications of wastewater to land, of which 31 ha were utilised for crops. The TBP records detailed that a total mass of wastewater nitrogen discharged to land was 32,255 kg. Thus the average concentration of nitrogen per hectare was 176 kg N/ha. However there are specific loadings per paddock and this is further discussed below.

Recorded loadings on the 82 paddocks available for application ranged from 18-318 kg N/ha. The limit on consent 3941-2 for annual nitrogen loading is 300 kg N/ha, while for the Shearer block it is set at 200 kg N/ha.

In the previous monitoring period there were two exceedances in nitrogen loading with respect to applications of wastewater. Paddock 34 received an additional 135 kg N, which resulted in an exceedance of the loading rate per hectare by 18.5 kg N/ha, giving an overall loading rate of 318 kg N/ha over the year. Paddock S-26, which is limited to 200 kg N/ha, received an additional 8 kg N, which resulted in an exceedance by 11 kg N/ha of the consented loading rate per hectare, with an overall loading rate of 211 kg N/ha.

During the 2015-2016 monitoring period, compliance with the annual nitrogen loading limits was achieved, the average nitrogen loadings for the 300 kg N/ha areas were 31% and 37% for the 200 kg N/ha area. For individual paddocks, compliance was recorded for 97% of the irrigated areas where the limit is 300 kg N/ha and 97% for Shearer block where the limit is 200 kg N/ha.

Current monitoring period wastewater irrigation and Zealgrow

In the current monitoring period the TBP site had 329.50 hectares available for discharges of wastewater and or fertiliser/ Zealgrow. In this period they discharged a combined (wastewater and fertiliser) application of 32,042 kg of nitrogen. This was a combined total application of 97 kg N/ha.

However as the paddocks are of various sizes and are limited to 300 kg N/ha (note the 200 kg N/ha paddocks have not been utilised this monitoring year by TBP) in terms of applications of wastewater. The overall compliance with respect to loadings of wastewater in terms of nitrogen is as follows.

The highest recorded application of wastewater was to paddock 23, which received a total of 264 kg N/ha in the 2016-2017 monitoring year. This was compliant with the stated maximum for wastewater application which is limited strictly to 300 kg N/ha per year, as per consent 3941-2.

Paddock 23 did not receive any additional fertiliser (Zealgrow) this monitoring year. The highest volume of fertiliser applied to land was found to be 61 kg N/ha in paddock 7, this had a combined total of 163 kg N/ha.

When compared to the previous monitoring year's total combined loading, there has been a significant reduction in terms of total nitrogen loading. In the 2015-2016 there were 11 paddocks with a combined application of greater than 300 kg N/ha per annum, of which five contained more than 500 kg N/ha per annum. By comparison, in this monitoring period the highest total loading was found to be paddock 23, with 264 kg N/ha.

Total nitrogen sequestered across both application systems (Inaha Stream and wastewater application area) indicated a reduction in nitrogen in terms of the wastewater and fertiliser.

The reductions were as follows:

Wastewater total nitrogen was reduced from 32,255 kg N total, in 2015-2016, to 27,072 kg N total in 2016-2017. In terms of the applications of the fertiliser Zealgrow, this decreased from 40,069 kg N in 2015-2016 to 4,970 kg N in this period, which is significantly lower than the previous year. A graphical comparison by paddock is provided in the following Figure 9.

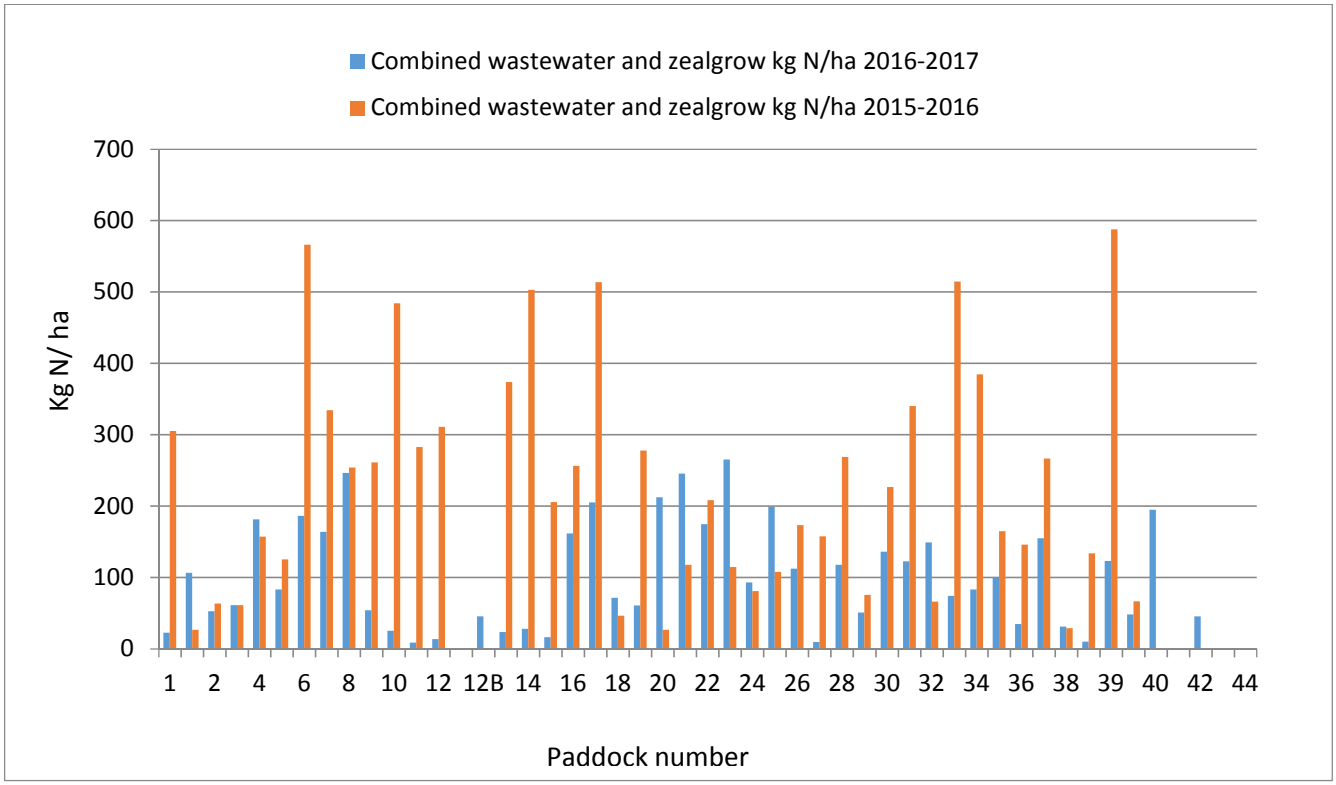

Figure 9 Wastewater and Zealgrow application by paddock comparison 2015-2016 vs 2016-2017

2.4.4.2. Groundwater

Background

Groundwater sampling of the irrigation areas commenced in February 2000 and was undertaken on a monthly basis until June 2006, when the frequency was reduced to two-monthly. Initially, four bores on Kohiti and Normanby Road blocks and a spring on Shearers' property were monitored. In September 2001, two bores were commissioned on Katotauru block, four months before irrigation started there. In January 2005, two bores were drilled in proposed new irrigation areas, at least one year before irrigation commenced, and two existing bores were replaced because of access difficulty. In October 2011, two further bores were drilled, at the downslope boundaries of the "Kingi" and Inaha Road blocks at the northern and western extents, respectively, of the irrigation area. The locations of the groundwater monitoring bores and spring are described in Table 13 and shown in Figure 3.

Table 13 Monitoring bore data

Site name	Site code	Depth m	Grid reference, NZMP	
			Easting	Northing
BH1	GND1054	13.5	1702469	5624829
BH3	GND1056	12.8	1702359	5623913
BH4	GND1057	11.0	1702308	5623294
Shearers' Spring	GND1058		1701770	5623022
BH5B	GND1346	8.6	1701352	5624536
BH6B	GND1347	12.2	1701586	5623914

Site name	Site code	Depth m	Grid reference, NZMP	
			Easting	Northing
BH7	GND1348	13.5	1702671	5624594
BH8	GND1349	13.6	1701013	5623526
BH9	GND2225	11.5	1701186	5624945
BH10	GND2226	10.4	1700548	5623806

Bore 1 and Bore 5 (now obsolete BH5) were installed as control sites, situated at the (then) upslope boundaries of Kohiti and Katotauru blocks, respectively. Bore 5B was placed up-gradient of Bore 5 after a new farm track covered it in September 2004. Bore 2 was on the flat beside an unnamed tributary of Inaha Stream, at the bottom of Kohiti block. Bore 3 is beside Kohiti Road on the south-eastern plateau above TBP's plant. Bore 4 is in the centre of Normanby block. Bore 6 is in a swale beside the road at the downslope boundary of Katotauru block. Bore 6B was emplaced on the flat above Bore 6 after a series of flood events by ponded rainfall and wastewater. Bore 7 is down gradient of the southern side of the Ahipaipa block. Bore 8 is down gradient of the western side of the Katotauru/Normanby Roads block. Bore 9 is down gradient of the eastern side of Kingi block. Bore 10 is down gradient of the "Maori Trustee" block beside Upper Inaha Road.

GND1054: The control bore. Table 14 details the results of the five monitoring rounds undertaken this period. Specifically, NNN concentrations remained quite stable during the year under review, ranging between 6.29-9.45 g/m^3 NNN, prior to increasing in the final monitoring round to 30.3 g/m^3 N. NNN concentrations since June 2015 are graphically provided below in Figure 10.

Table 14 Borehole 1 GND1054 2016-2017 monitoring period

GND1054	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO3	K	LEVEL	MG	NA	NH4	NNN	PH	SO4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m@20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1054	12 Sep 2016	42	20	48	<5	32.6		51.2	3.3	7.32	12.2	28	<0.003	9.45	6.4	16	13.7
GND1054	21 Nov 2016			51		33.2				7.16			<0.003	9.73	6.4		14.2
GND1054	10 Feb 2017			45		30.8	<1			8.13			0.026	6.29	6.4		14.1
GND1054	08 May 2017			47		30.9				8.53			0.011	7.62	6.4		13.8
GND1054	12 Jun 2017			74		55.7				6.68			<0.003	30.3	6.3		13.7

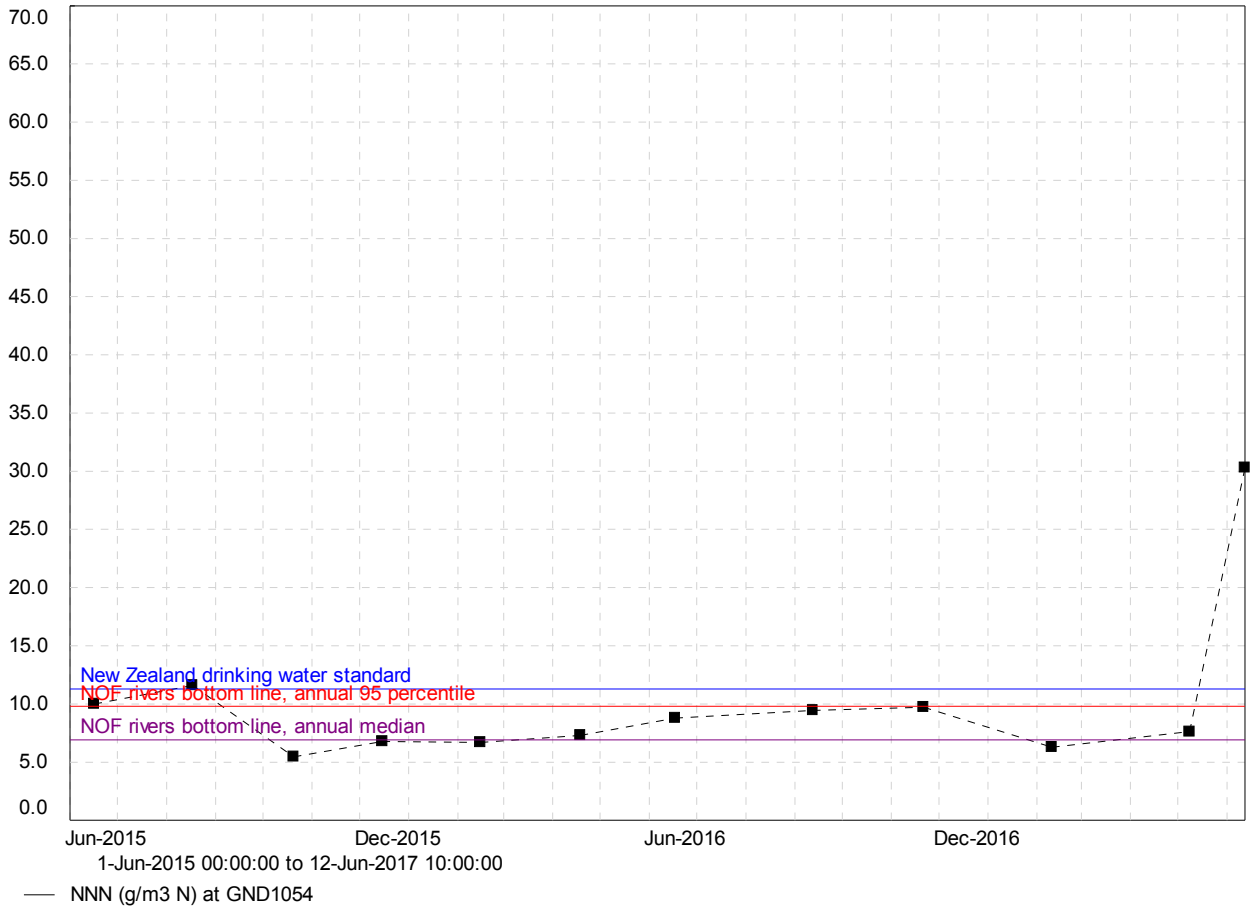

Figure 10 NNN concentration GND1054 June 2015-July2017

GND1056: The monitoring well GND1056 (BH3), in similarity to the previous monitoring period, indicated a stable concentration trend in terms of NNN concentration this monitoring year, Table 15 and Figure 11. NNN concentrations ranged from 6.15-7.02 g/m^3 N. Paddock loading information indicated 13.7 kg/ha N this monitoring year. The paddock was put to crop with maize grown over the summer months, October 2016- April 2017. Figure 11 details the NNN concentration since June 2015.

Table 15 Borehole 3 GND1056 2016-2017 monitoring period

GND1056	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1056	12 Sep 2016	45	14	45	8	28		54.9	2.9	10.64	7.8	31	<0.003	6.15	6.4	7.3	14
GND1056	21 Nov 2016			44		28.3				9.82			<0.003	6.42	6.6		14.4
GND1056	10 Feb 2017			47		28.4	<1			10.12			<0.003	6.36	6.4		14.4
GND1056	08 May 2017			47		28.1				10.32			<0.003	6.25	6.4		14.4
GND1056	12 Jun 2017			47		28.7				9.11			0.011	7.02	6.5		14.7

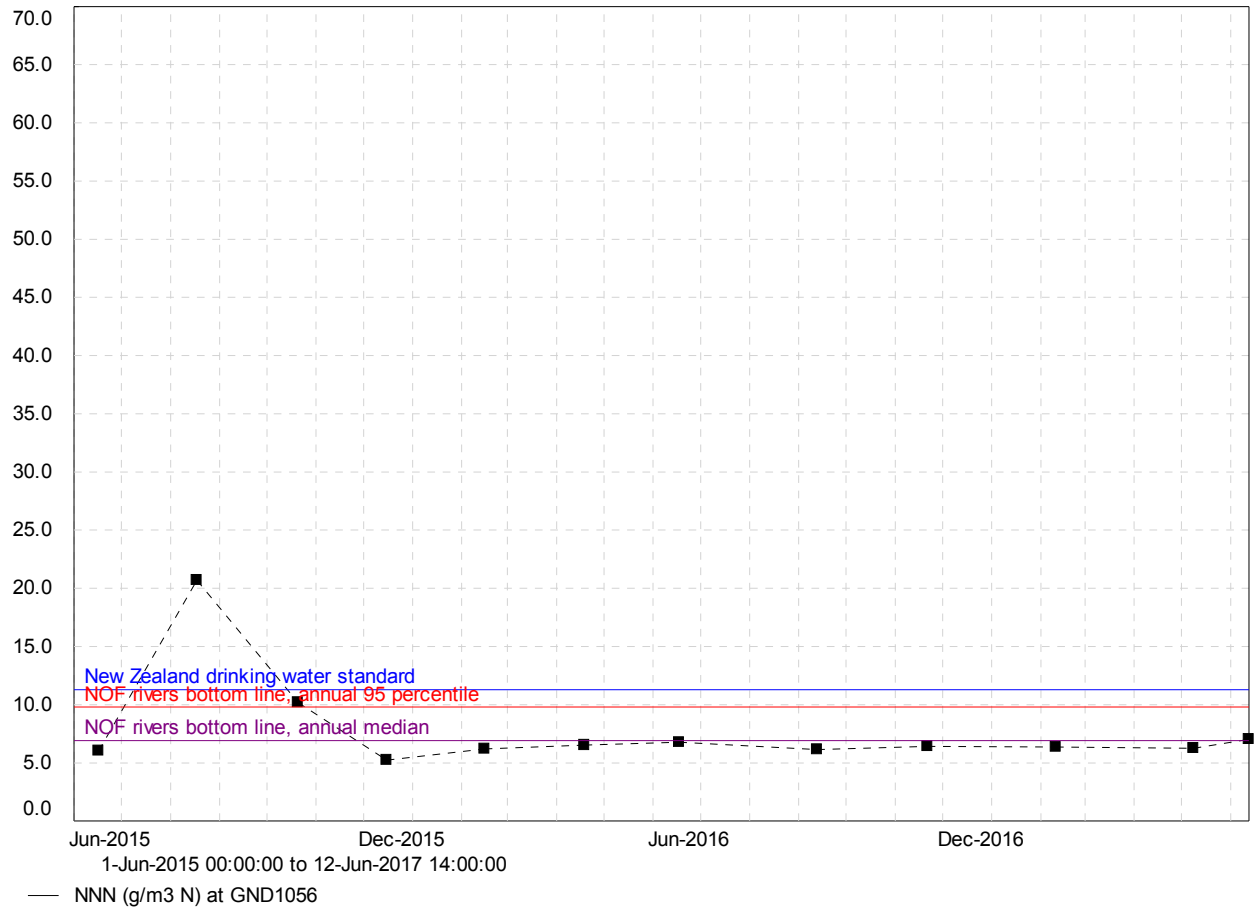

Figure 11 NNN concentration within GND1056 June 2015-July 2017

GND1057: Located on the south eastern edge of the irrigation area. NNN concentrations detailed a decreasing trend this monitoring period, compared to the previous monitoring period (Figure 12). The range for NNN this period was 7.25-17.4 g/m^3 NNN, (Table 16). Paddock loading information indicated that the area received a combined application of wastewater and fertiliser/Zealgrow of 27 kg/ha N. Maize and ryegrass were grown in this area between October 2016 and June 2017.

Table 16 Borehole 4 GND1057 2016-2017 monitoring period

GND1057	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1057	12 Sep 2016	49	19	56	<5	41.1		59.8	4.1	6.29	12.4	44	<0.003	17.4	6.3	13	14.1
GND1057	21 Nov 2016			52		37.4				6.29			<0.003	12.6	6.5		14.5
GND1057	10 Feb 2017			51		34.7	<1			7.12			<0.003	11	6.4		14.6
GND1057	08 May 2017			50		34.2				6.88			0.005	9.9	6.4		14.1
GND1057	12 Jun 2017			45		31.5				5.66			0.01	7.25	6.4		14.1

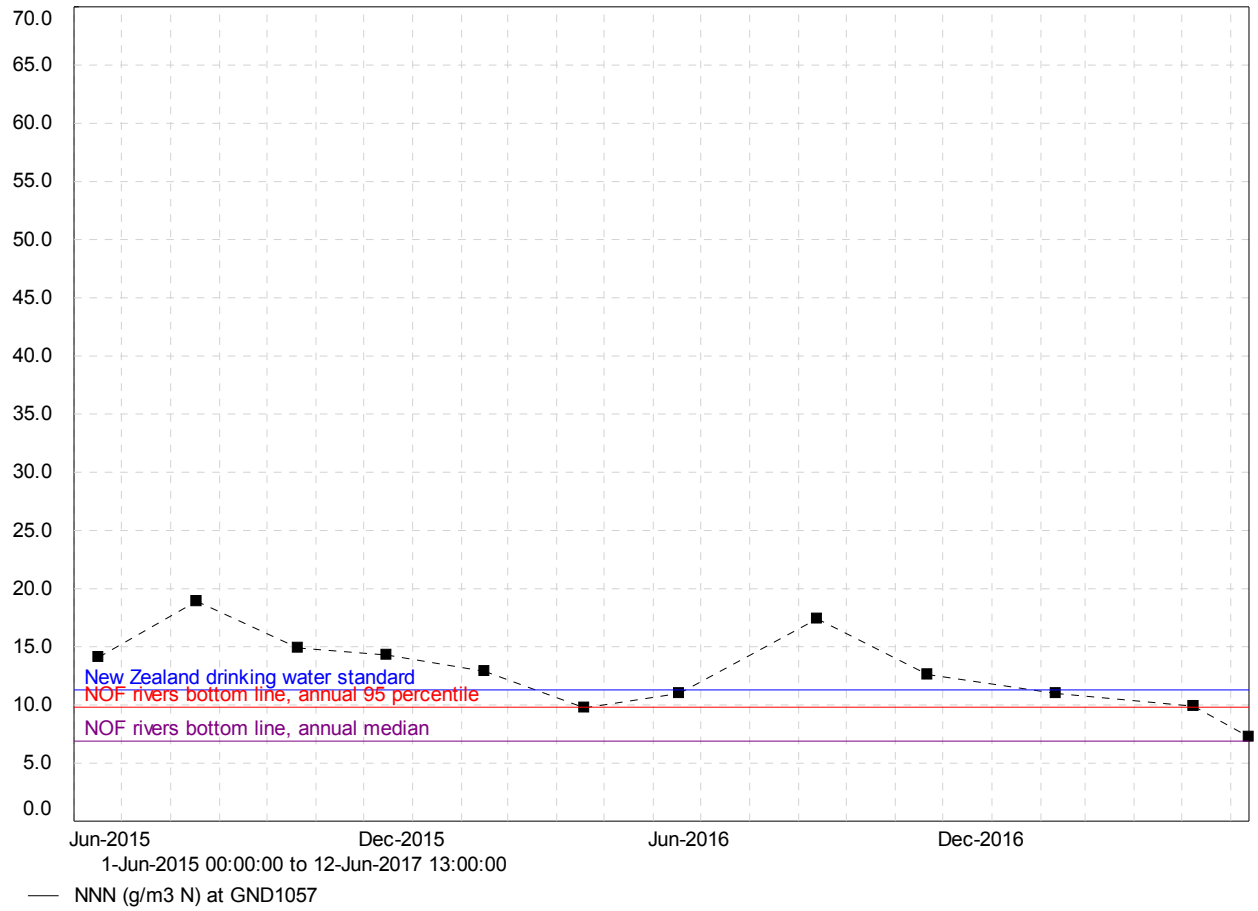

Figure 12 GND1057 NNN concentrations since June 2015

Shearer's spring: GND1058 refers to a spring utilised for drinking water purposes by nearby residents. It is monitored to assess for any off-site effects as a product of the irrigation and fertiliser applied by TBP. This monitoring period indicated a decrease in NNN concentrations observed at this location (Figure 13) when compared to the previous monitoring period. The concentrations ranged from 4.18-5.19 g/m^3 N Table 17.

Table 17 GND1058 2016-2017 monitoring period

GND1058	Parameter	ALKT	CA	CL	COD	CONDY	ECOL	FC	HCO_3	K	MG	NA	NH_4	NNN	PH	SO4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1058	12 Sep 2016	44	18	66	<5	33.3			53.7	2.9	12	30	<0.003	5.06	6.6	9.7	14.5
GND1058	21 Nov 2016					32.9	<1	<1					<0.003	5.19	6.6		15.2
GND1058	10 Feb 2017			65		32.6		<1					<0.003	4.8	6.6		16.4
GND1058	08 May 2017			62		31.9							0.003	4.18	6.6		15.3
GND1058	12 Jun 2017			62		31.7							0.014	4.55	6.6		14.6

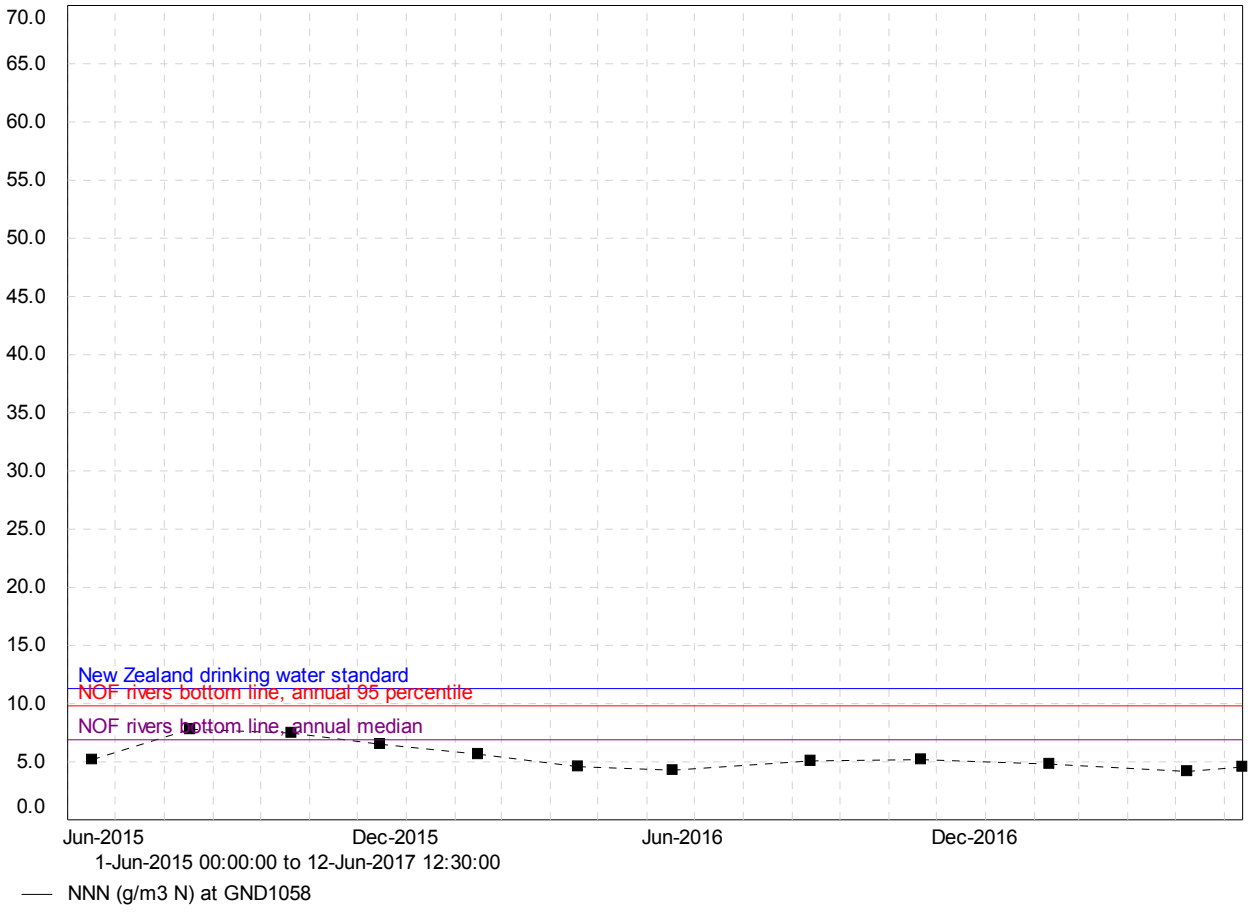

Figure 13 NNN concentrations GND1058 from June 2015

GND1346: Borehole 5B. In similarity to the previous monitoring year, NNN concentrations continued to rise in this monitoring location (Figure 14). 49.5 g/m^3 N in September 2016 to 74.6 g/m^3 in June 2017. The increase (Table 18) of 25 g/m^3 N this monitoring period was lower than the increase found in the previous period which was 31 g/m^3 N. However this concentration of nitrate within the groundwater is not sustainable. Note this is the 8th most elevated NNN concentration observed within this monitoring point and the most elevated since August 2012. Paddock loadings were considerably reduced when compared to the previous monitoring period, whereby paddocks 34, 35 and 36 received a total combined nitrogen application of 82, 99 and 34 kg/N Ha per annum. For comparison the previous year's loading was in excess of 500 kg N/ha.

Table 18 GND1346 monitoring period 2016-2017

GND1346	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO_4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1346	12 Sep 2016	31	46	68	<5	66.3		37.8	6.6	6.41	23.6	46	<0.003	49.6	6.2	13	13.9
GND1346	21 Nov 2016			77		76.1				4.1			0.532	60	6.4		14.2
GND1346	10 Feb 2017			83		79	17			5.13			0.018	64.5	6.2		14.1
GND1346	08 May 2017			91		86.9				3.8			0.012	64.9	6.3		14.4
GND1346	12 Jun 2017			93		87.6				3.43			0.009	74.6	6.2		13.9

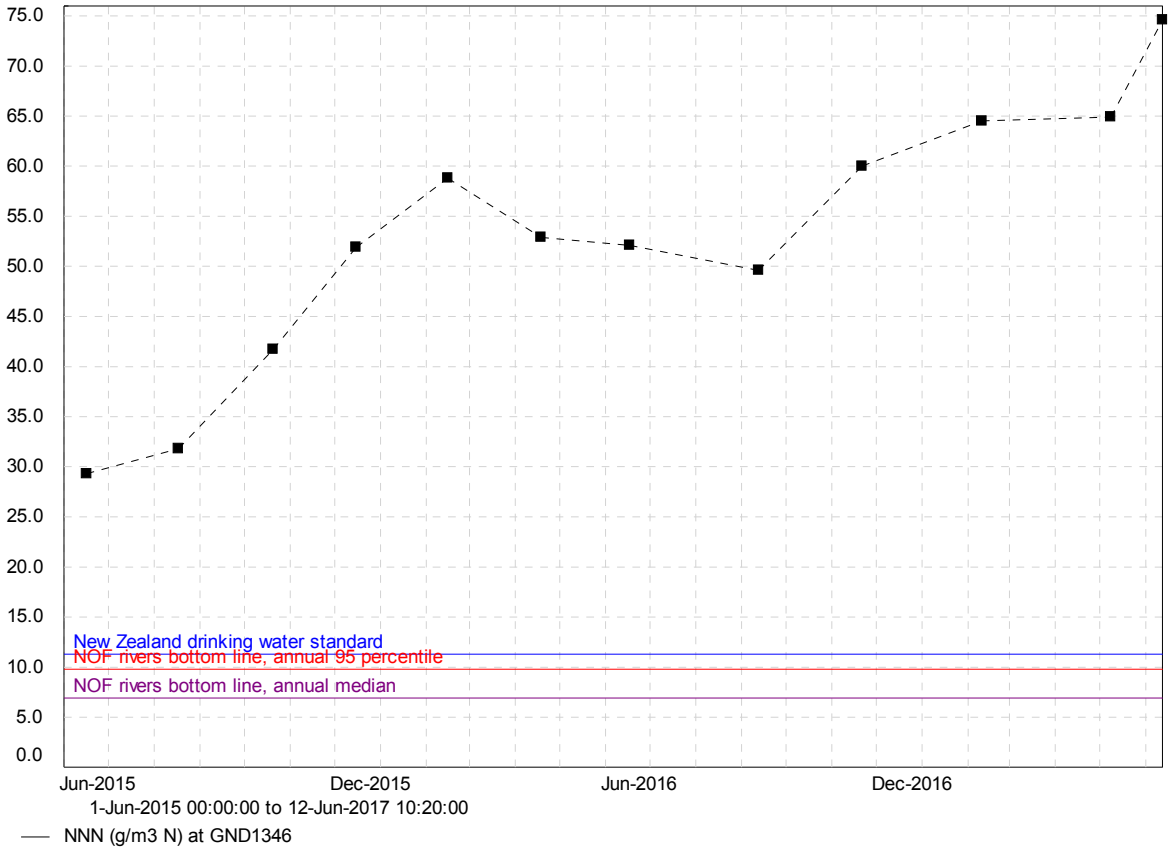

Figure 14 NNN concentrations GND1346 since June 2015

GND1347: Peak nitrate concentrations were observed in this well in the previous monitoring period 75.9 g/m^3 N in October 2015 (Figure 15). In this monitoring period the NNN ranged from 49.6-74.9 g/m^3 N. The elevated (74.9 g/m^3 N) value was marginally below the figure observed in the previous monitoring year. The analysis throughout the monitoring year detailed a decreasing concentration. Paddock loading information indicated that the paddocks in the close proximity, paddocks 20, 21 and 22 received a combined application of wastewater and fertiliser/Zealgrow of 212, 245 and 174 kg N/ha. The loading, while within compliance limits demonstrated the higher end of the paddock loading this year.

Table 19 GND1347 2016-2017 monitoring period

GND1347	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1347	12 Sep 2016	25	63	117	8	94.6		30.5	5.7	7.26	37	59	<0.003	71	6.1	4.8	13.8
GND1347	21 Nov 2016			118		90.5				7.25			<0.003	74.9	6.2		14.2
GND1347	10 Feb 2017			119		92	<3			8.23			0.007	69.4	6.1		14.3
GND1347	08 May 2017			111		87				7.13			0.006	62	6.2		14
GND1347	12 Jun 2017			82		66.8				6.54			0.015	49.6	6.2		13.9

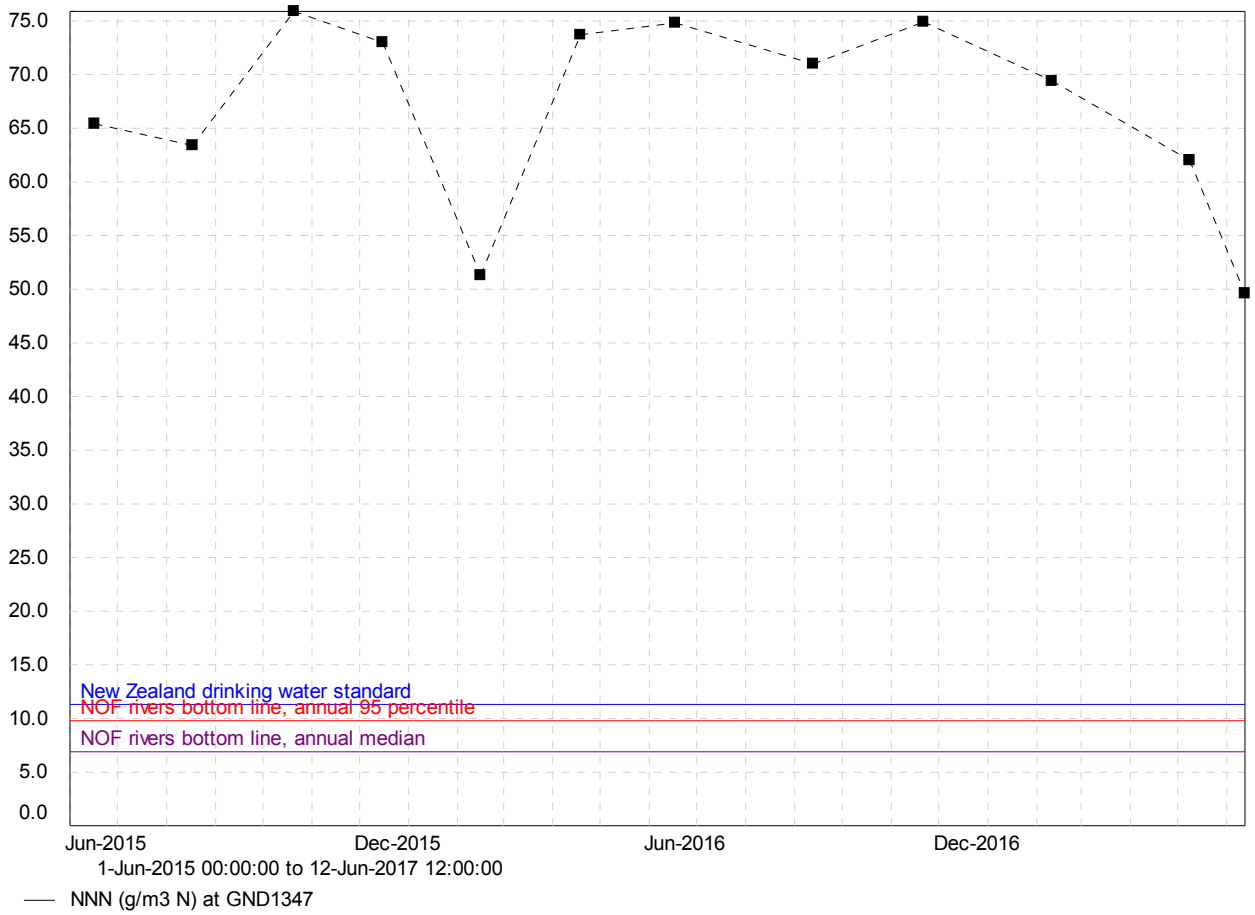

Figure 15 NNN concentration in GND1347 since June 2015

GND1348: NNN concentrations within borehole 7 were quite variable throughout the monitoring year as shown in Figure 16. The range observed was from 20.2-48.7 g/m^3 N (Table 20). In comparison to the previous monitoring period, the observed peak in this monitoring period was considerably lower than the previous period by some 25 g/m^3 N.

Table 20 GND1348 2016-2017 monitoring period

GND1348	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO_4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1348	12 Sep 2016	40	24	53	<5	41.5		48.8	5	11.51	15.4	36	<0.003	20.2	6.4	14	14.3
GND1348	21 Nov 2016			59		47.5				10.86			0.024	27.9	6.5		14.4
GND1348	10 Feb 2017			79		64.8	3			11.27			<0.003	48.7	6.4		14.4
GND1348	08 May 2017			55		42.4				11.42			0.024	24.6	6.5		14.1
GND1348	12 Jun 2017			52		43.6				10.47			<0.003	26.5	6.4		14.1

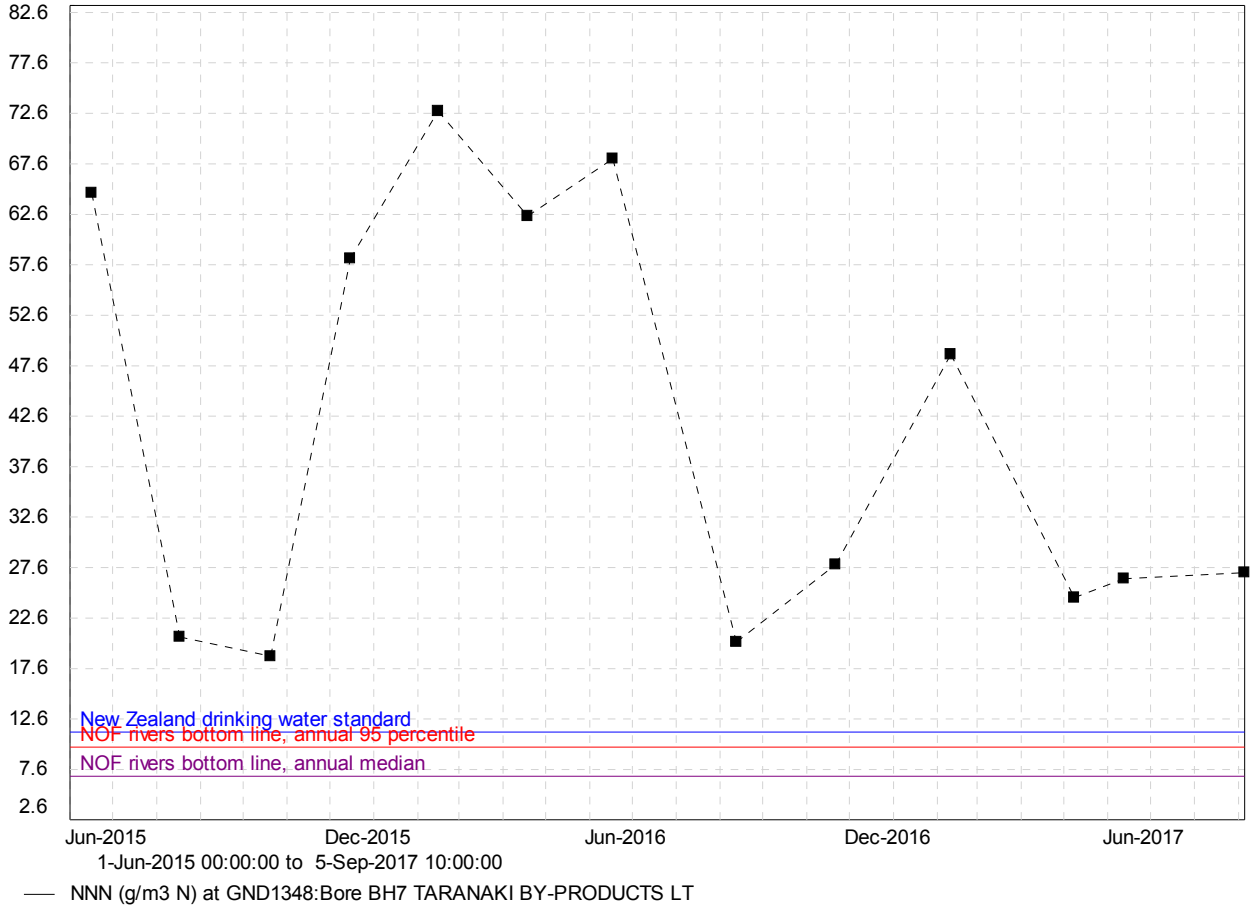

Figure 16 NNN concentrations GND 1348 since June 2015

GND1349: Borehole 8 is located on the western side of the Katotauru/ Normanby block. NNN concentrations remained relatively stable in this monitoring period, ranging between 24.9-31.8 g/m^3 N, (Table 21). In comparison to the previous period, NNN ranged a total of 27 g/m^3 N, (Figure 17). Paddock loading information indicated a combined application of 112 kg N/ha this period.

Table 21 GND1349 2016-2017 monitoring period

GND139	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO_4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND1349	12 Sep 2016	70	44	114	6	67.8		85.4	4.7	10.7	25.6	49	<0.003	24.9	6.2	12	14.1
GND1349	21 Nov 2016			86		58.9				10.57			0.005	26.1	6.3		13.4
GND1349	20 Feb 2017			99		70	<3			11.25			0.005	29.3	6.4		15.9
GND1349	08 May 2017			77		59.9				10.94			0.005	31.8	6.3		14.1
GND1349	12 Jun 2017			83		59.6				10.21			0.007	28.3	6.2		13.9

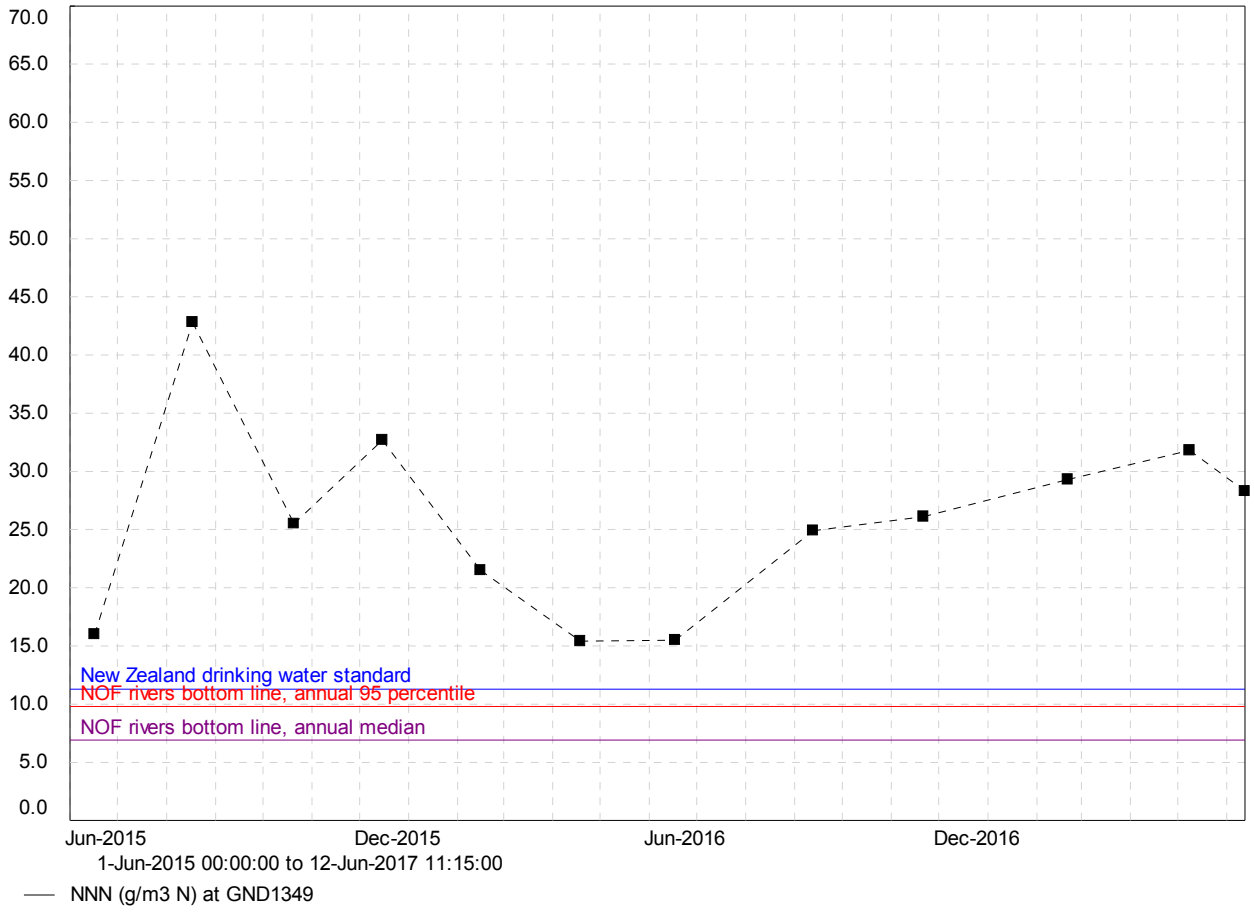

Figure 17 NNN concentrations GND1349 since June 2015

GND2225: Borehole 9 is located down gradient on the eastern side of the Kingi Block. In comparison to the previous year (Figure 18) which had a reported variation of 4.6 g/m^3 N, the NNN concentrations ranged between 17-34.3 g/m^3 N this period (Table 22), which is a range of 17.3 g/m^3 N. Paddock loading information this period indicated a decrease in combined application when compared to the 2015-2016 monitoring year. This years' loading equated to 82 kg N/ha pa.

Table 22 GND2225 2016-2017 monitoring period

GND2225	Parameter	ALKT	CA	CL	COD	CONDY	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO_4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND2225	12 Sep 2016	35	20	48	6	37.6		42.7	2.9	5.53	15	32	<0.003	20.1	6.3	6.7	14
GND2225	21 Nov 2016			47		38.8				5.67			0.038	23.3	6.4		14.3
GND2225	10 Feb 2017			46		36.2	8			6.36			<0.003	17	6.4		14.4
GND2225	08 May 2017			45		35.8				5.39			0.005	19.3	6.4		14.2
GND2225	12 Jun 2017			52		48.4				5.24			<0.003	34.3	6.3		13.9

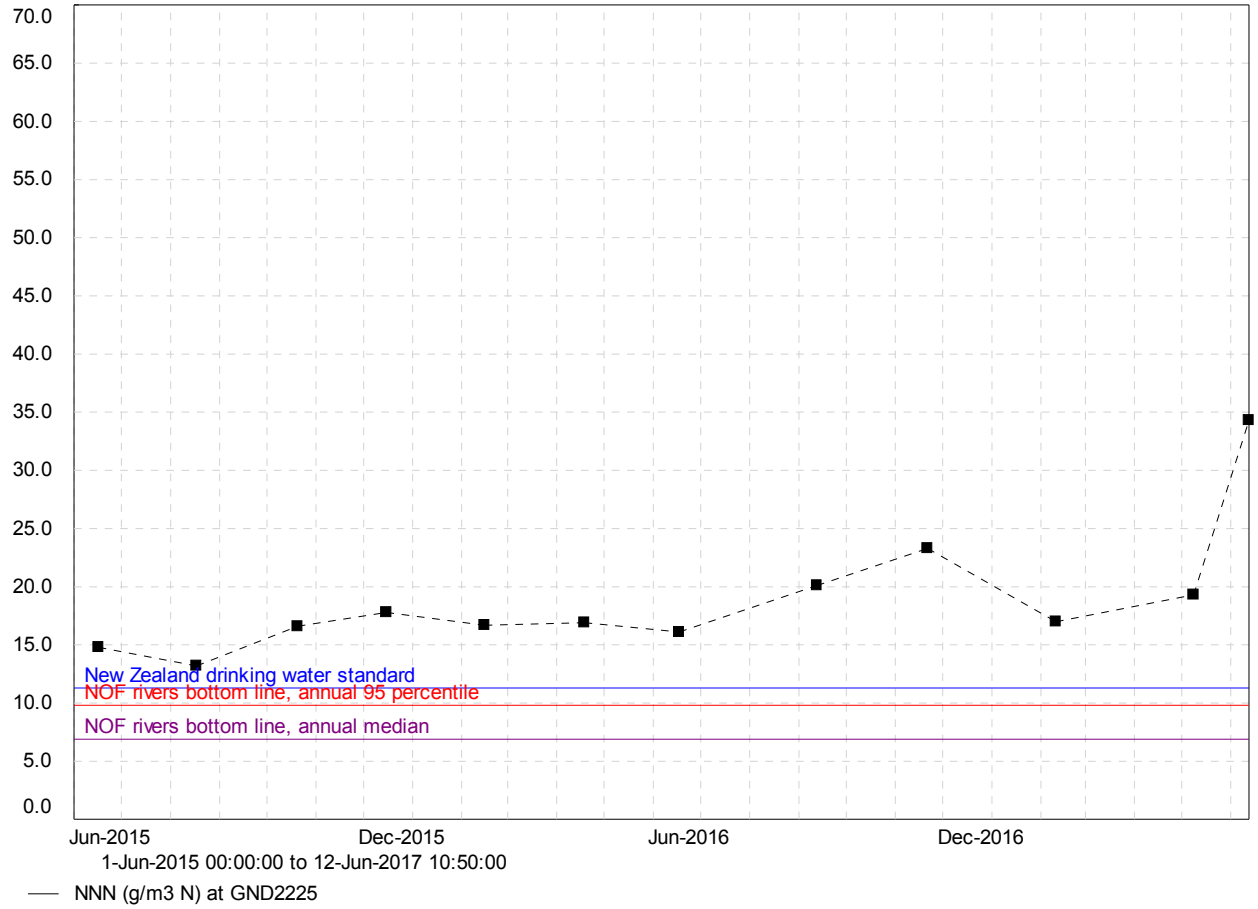

Figure 18 NNN concentrations GND2225 since June 2015

GND2226: Borehole 10 is located on the edge of the 200m buffer zone along Normanby Road and Inaha Road. In the previous monitoring period the NNN concentration remained high, but relatively stable, ranging 55-63 g/m^3 N (Figure 19 and Table 23). In comparison to the previous monitoring period, this year detailed an increasing trend through the monitoring period, 60-69 g/m^3 N. Situated in paddock 29, the annual combined loading in this area was 50 kg N/ha, with the surrounding paddocks, 28 and 30 each receiving 117 and 135 kg N/ha pa.

Table 23 GND2226 2016-2017 monitoring period

GND2226	Parameter	ALKT	CA	CL	COD	COND Y	FC	HCO_3	K	LEVEL	MG	NA	NH_4	NNN	PH	SO_4	TEMP
Location	Date	g/m^3 $CaCO_3$	g/m^3	g/m^3	g/m^3	mS/m @20C	/100ml	g/m^3 HCO_3	g/m^3	m	g/m^3	g/m^3	g/m^3 N	g/m^3 N	pH	g/m^3	˚C
GND2226	12 Sep 2016	32	50	96	6	79.7		39	4.6	5.86	33	52	<0.003	60.4	6.2	4.6	14
GND2226	21 Nov 2016			107		86				6.61			<0.003	67.6	6.2		14.3
GND2226	10 Feb 2017			109		88.5	<3			8.14			0.005	63.7	6.2		14.5
GND2226	08 May 2017			114		89.4				6.76			0.004	67.5	6.2		14.5
GND2226	12 Jun 2017			114		92.1				4.8			0.026	69.9	6.1		14

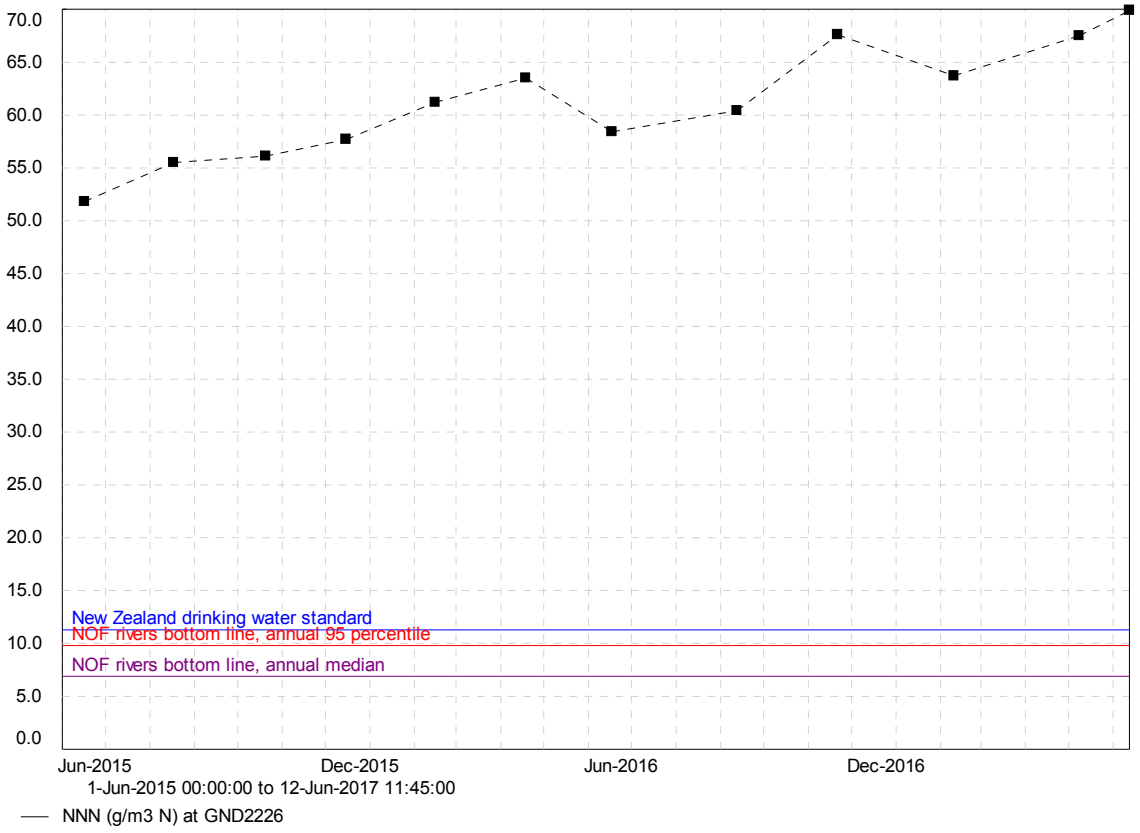

Figure 19 NNN concentrations in GND2226 since June 2015

Irrigation area groundwater monitoring discussion

Groundwater analysis undertaken this monitoring period indicated that three monitoring wells (GND1346, 1347 and 2226) contained a concentration of NNN > 50 g/m^3 N. In comparison to the previous monitoring period, four wells were observed to contain a NNN concentration > 50 g/m^3 N. These three wells are located in the central and western portions of the site.

The elevated NNN concentrations are a direct result of historical and recent, prior to this monitoring period, over applications of nitrogenous wastewater and applications of the fertiliser Zealgrow via injection spreader.

However, in comparison to the previous monitoring period, 2015-2016, this period (2016-2017) denoted a reduction in the total nitrogen loading to land in terms of applications of wastewater and fertiliser (Section 2.4.4.1 and Figure 9).

During the previous monitoring period, TBP were asked to be mindful of not overloading paddocks with excessive applications of combined loading effluent (wastewater and fertiliser). This was included in the previous monitoring year report (2015-2016).

As a consequence TBP contracted a suitably qualified environmental consultant to aid them in managing their wastewater system. The management process is still ongoing and will be reported when it is completed in the upcoming monitoring period 2017-2018.

2.4.5. Solid Waste Burial

Solid waste burial is undertaken under consent 5495-1. Specifically, condition 15 states the following:

The exercise of the consent shall not lead, or be liable to lead, to a direct discharge of contaminates to a surface water body.

The burial pits were utilised this period for the burial of un-processable feather material on three occasions. The product was buried as the facility suffered a mechanical breakdown which resulted in material unable to be processed within a reasonable time. Each feather burial equated to 15 tonnes of feather.

In this monitoring period there was no physical observation or chemical analysis result in the surface water sampling of the Inaha Stream, (Section 2.4.3). Groundwater monitoring (Table 24) indicated elevated ammonia and chemical oxygen demand in two of the groundwater bores located around the burial pit (GND1066/69). It has been requested that TBP maintain close attention to this area and they are meeting this request.

In future, additional mitigation will be required in this specific area. The consent 5495-1 is up for renewal in the 2018-2019 monitoring year.

Table 24 Burial pit specific groundwater monitoring wells 2016-2017

		COD	Conductivity	Faecal Coliforms	Ammonia	Nitrate/Nitrite	pH	GW Level	Temperature
Site	Collected	g/m^3	mS/m@20°C	/100ml	g/m^3 N	g/m^3 N	pH	m	°C
GND1063	19 Sep 2016	<5	28.6		0.003	10.1	6.4	8.35	14.3
GND1063	16 Dec 2016	<5	30.3		0.005	12.1	6.3	8.54	14.4
GND1063	20 Feb 2017	<5	29.8	<2	0.006	11.5	6.4	9.08	14.6
GND1063	17 May 2017	<5	30		<0.003	13.6	6.3	8.77	14.1

		COD	Conductivity	Faecal Coliforms	Ammonia	Nitrate/Nitrite	pH	GW Level	Temperature
Site	Collected	g/m³	mS/m@20°C	/100ml	g/m³ N	g/m³ N	pH	m	°C
GND1066	19 Sep 2016	33	275		146	0.69	6.8	5.6	15
GND1066	16 Dec 2016	28	266		149	0.55	6.8	5.86	14.8
GND1066	20 Feb 2017	36	270	<1	133	1.09	6.8	6.01	15.1
GND1066	17 May 2017	40	253		129	0.12	6.8	5.39	15.2
GND1067	19 Sep 2016	11	65.3		0.526	18.1	6.3	5.62	15.2
GND1067	16 Dec 2016	25	72		0.031	17.6	6.3	6	15
GND1067	Not Sampled								
GND1067	17 May 2017	<5	45.7		0.104	5.66	6.2	5.29	15.2
GND1069	19 Sep 2016	22	117		5.66	0.89	6.3	5.67	15.4
GND1069	16 Dec 2016	52	140		16.9	1.04	6.4	6.2	14.8
GND1069	20 Feb 2017	40	178	2	62	0.5	6.6	6.5	15
GND1069	17 May 2017	22	133		18.7	0.65	6.5	5.15	15.2
GND2506	19 Sep 2016	55	51.3		0.011	26.1	6.4	4.73	14.3
GND2506	16 Dec 2016	43	51.9		0.006	19.6	6.3	6.11	14.4
GND2506	20 Feb 2017	30	54	<3	0.019	23.7	6.4	6.69	14.8
GND2506	17 May 2017	<5	54.4		0.01	26.8	6.4	5.46	14.9

2.4.6. Biological monitoring

The following section relates to biological monitoring assessments which were undertaken in spring and late summer on the Inaha Stream in the 2016-2017 monitoring period. A brief synopsis of both surveys is provided below and the reports in full are appended in Appendix II.

Introduction

Taranaki By-Products holds a number of consents for discharges to land and to water associated with the operation of a rendering plant and a neighbouring farm owned and operated by TBP. The discharge consents most relevant to this biomonitoring survey are summarised in the following Table 25.

Table 25 Summary of discharge consents held by Taranaki By-Products related to this biological survey

Consent no.	Purpose
2049-4	To discharge up to 940 m³/day of treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream
2050-4	To discharge up to 2,160 m³/day of cooling water and backwash water from a rendering operation into an unnamed tributary of the Inaha Stream
3941-2	To discharge up to 1400 m³/day of treated wastewater from a rendering operation and from a farm dairy via spray irrigation onto and into land, and to discharge

Consent no.	Purpose
	emissions into the air, in the vicinity of the Inaha Stream and its tributaries between 1700909E-5625245N, 1700631E-5625092N and 1700921E-5625046N
5426-1	To discharge up 1,095 l/s of stormwater from an animal rendering site into an unnamed tributary of the Inaha Stream

Biomonitoring has been undertaken at some TBP sites in relation to the discharges from the rendering plant and associated activities since the mid-1980s. Some of the sites used for the biomonitoring of these discharges have changed over time and these changes have been documented in previous reports (see report reference section Appendix II).

This spring biological survey was the first of two scheduled in the Inaha Stream catchment in the 2016-2017 monitoring year in relation to discharges from the TBP plant. Results from previous surveys are also referred to in this report (see references).

Methods

A biomonitoring survey was undertaken at eight sites on 11 October 2016 and 1 March 2017 (Table 26 and Figure 20). Five of the eight sites surveyed were in the Inaha Stream and the remaining sites were in an unnamed tributary of the Inaha Stream (Figure 19). The locations of sampling sites in relation to the discharges from the rendering plant are discussed below.

Table 26 Biomonitoring sites in the Inaha Stream and in an unnamed tributary of the Inaha Stream

Stream	Site No.	Site code	Location	Sampling method used
Inaha Stream	U	INH000334	Upstream of irrigation area, near Ahipaipa Road	Streambed kick
	1	INH000400	Upstream of treatment ponds, Kohiti Road	Streambed kick
	2d	INH000420	500 m downstream of cooling water discharge	Streambed kick
	3	INH000430	Upstream of Normanby Road	Streambed kick
	4	INH000450	100 m downstream of 'irrigation' tributary confluence	Streambed kick
Unnamed tributary of Inaha Stream	UT	INH000433	Upstream of irrigation area	Vegetation sweep
	MT	INH000435	Middle site within the new irrigation area	Vegetation sweep
	DT	INH000440	50 m upstream Normanby Road	Streambed kick

Site U (INH000334) was established in the 2003-2004 monitoring period as an appropriate control site on the Inaha Stream above the rendering plant discharges and irrigation areas. Site 1 (INH000400) is located upstream of the wastewater and cooling water discharge points but downstream of part of the treated wastewater irrigation area. Sites 2d and 3 (INH000420 and INH000430) are located downstream of these two discharges and above the confluence with the unnamed tributary of the Inaha Stream which drains land upon which wastewater is irrigated.

The area of land authorised to be irrigated onto under consent 3941-2 has increased on several occasions since the consent was granted in December 1999. Sites UT, MT and DT (INH000433, INH000435 and INH000440) were established to monitor the effects of the expanded irrigation area on an unnamed tributary of the Inaha Stream. Site UT was established as a 'control site' for the expanded irrigation area. Site

MT is located within the authorised irrigation area and site DT is situated downstream of the irrigation area but upstream of the unnamed tributary's confluence with the Inaha Stream.

Site 4 (INH000450) on the Inaha Stream is situated approximately 100 metres downstream of the convergence point between the Inaha Stream and the unnamed tributary.

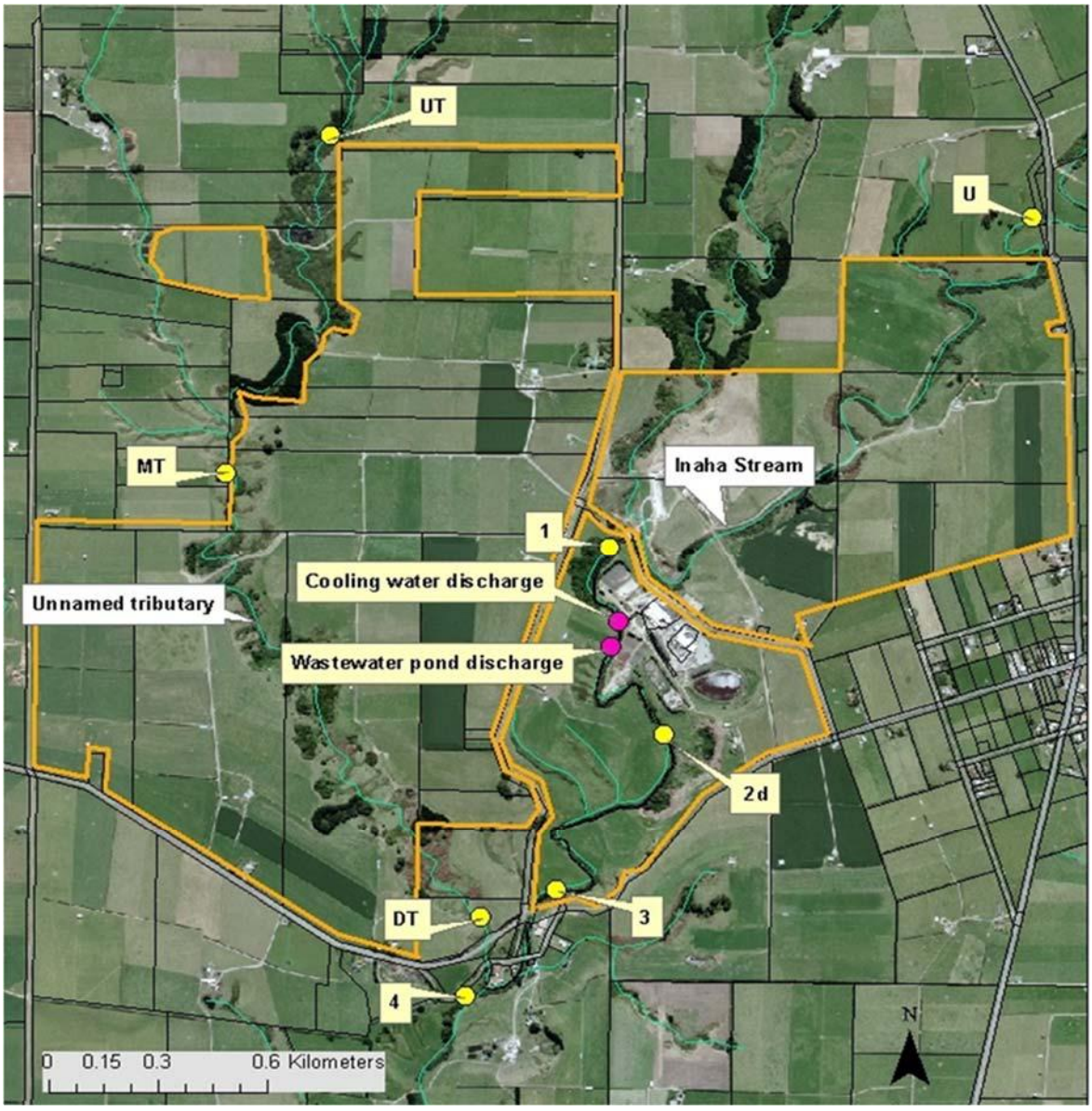

Figure 20 Biological monitoring locations related to TBP 2016-2017

The Councils 'kick-sampling' and 'vegetation sweep' techniques were used at eight sites to collect streambed macroinvertebrates from the Inaha Stream and an unnamed tributary, to assess whether discharges (via point source and irrigation to land) from TBP's rendering plant had had any adverse effects on the macroinvertebrate communities of the streams. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundances as well as sensitivity to pollution. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

Summary of annual biomonitoring of Inaha Stream and associated tributaries 2016-2017

No 'heterotrophic growths' were recorded at any sites monitored in these surveys, which was indicative of reasonably good preceding water quality. The presence of heterotrophic growths on the bed of the Inaha Stream was last recorded in spring 2009 survey, and this shows improved management of the wastewater discharge since that time.

Results from October 2016 spring survey indicated the following:

Overall, there was some evidence that discharges from TBP may have impacted on the freshwater macroinvertebrate communities present in the Inaha Stream. However, changes in habitat and habitat variation between sites make drawing strong conclusions from the data difficult.

Results of the late summer March 2017 survey indicated the following:

Overall, there was no evidence that discharges from Taranaki By-Products have impacted on the freshwater macroinvertebrate communities present in the Inaha Stream.

The full report is provided in Appendix II.

2.5. Air

TBP hold consent 4058-4; to discharge emissions to the air from rendering operations and associated processes including wastewater treatment and burial of material. No direct emission monitoring devices are employed to monitor for fugitive emissions. In its place, a council officer undertakes an odour survey of the facility at approximately monthly intervals. Consent 4058-4 specifically requires the following:

The discharge authorised by the consent shall not give rise to odour at or beyond the boundary of the site that is offensive or objectionable.

Monthly[1] inspections undertaken by the officer are provided in the following section.

2.5.1. Inspections

26 July 2016

At the time of the inspection the following was observed. The wind was variable from the west, approximately 8 m/s. Odour surveys were undertaken beyond the site boundary in response to a complaint received regarding objectionable odour.

Odour surveys undertaken at the complainants' property failed to detect any plant odours. Plant odour was found at the corner or Ahipaipa and Manu Road, the odour was intermittently present and ranged in strength from weak to distinct. It was considered likely that the complainant had been experiencing plant odours earlier in the day. Another neighbour on Manu Road also outlined that odour had been experienced throughout the morning.

The plant was inspected, staff outlined that during the previous night-shift material processing was stopped due to plant steam issues and so the age of the material being processed during the morning shift may have influenced odour detected beyond the site boundary.

Another likely source of odour was thought to be the fugitive steam discharges from the blood room, the roof flashing was recently removed in high wind, as a consequence, builders had measured and ordered a

[1] Additional inspections were also undertaken in response to complaints from the public, see section 2.7

replacement flashing and were expecting to install it within a couple of days, due to the height of the roof the odour escaping the area could not be assessed.

The main load-in doors were frequently opened during the inspection due to traffic movements and load-in activities. The alternative load-in area was observed and not in use. The stormwater catchment around the load-in bay was considered clean. The blood area sump was quite full but very little odour was found around the area.

The biofilters were inspected and found to be in satisfactory condition; the leachate was being directed to pond 3. The last biofilter had the most visible emissions and a 'cooking' type odour was mixed with the usual 'musty bark' odour.

No recent burial of product had occurred. No irrigators were operating during the inspection. Works were occurring to remove a filter at the pump station. Works had also occurred to fix two leaks in the irrigation line. No incidents were reported.

The following action was to be taken: Undertake works to fix the blood room roof flashing in order to contain process emissions. Ensure objectionable odours do not discharge beyond the site boundary.

11 August 2016

At the time of the inspection the following was observed. The wind was variable from the south, approximately 4 m/s. No objectionable odours or visible emissions were found during the inspection. Essentially no site odours were found anywhere beyond the site boundary except the distinct pond odours which were found along Kohiti Road at the Inaha bridge. The main load-in doors were open as fallen stock were being skinned. Approximately 80 cattle were being skinned daily at the time. The fallen stock were observed and found to be reasonably fresh and none appeared excessively bloated. Piles were stored outside the main load-in doors.

No fugitive discharges were observed, the Inaha was found to be turbid throughout the length of the sites influence and no changes to clarity or deleterious effects were observed. Wastewater, stormwater and receiving water samples were collected during the inspection.

Three irrigators were in operation, all pasture was coping with the applications. No run-off or ponding was observed. Staff outlined that approval had been given to introduce flow meters into the irrigation lines to improve application records. The meters will be installed in a staggered approach starting with the biggest irrigator first. Due to cold weather TBP is to wait for the lines to thaw before commencing irrigation.

Resource consent had been granted for the new dairy shed. The irrigation effluent system was being modified to use existing lines rather than install a dedicated line.

Staff outlined that the main factory air extraction fan had been repaired and both systems were operational. The biofilters were inspected and found to be satisfactory. Essentially, no visible emissions were found and very little odour was present around the area. The leachate volume was minor and was being contained in the sump.

The waste management area was satisfactory, drums were found to have lids in place and no hydrocarbon sheen was present on any of the ponded water around the area. Recent burial of feather had occurred, appropriate notifications given to TRC and the product was immediately covered. Staff outlined that recent sampling of the unnamed tributary had found the nitrogen levels to be dropping. No incidents were reported.

14 September 2016

During an inspection the following was observed: The wind was variable from the north west, approximately 8 m/s. Odour surveys were undertaken beyond the site boundary and found noticeable odours at the corner

of Normanby and Ngutu Roads. The odour was found to be intermittent, light and variable, varying with the gusty wind conditions.

Strong pond odours were found down wind of ponds 1 and 2 along Kohiti Road. Due to an issue with the scrubber return line the effluent had recently been pumped into pond 1 rather than 6. Ponds 1 and 2 were found to have high levels.

The pipeline had been fixed at the time of inspection and the system was functioning normally. As the level of pond 6 was low, no irrigation or discharges into the Inaha Stream were occurring. The burial pits were found to be filled in and a digger was at the site. Staff outlined that feather had been buried twice recently due to processing capacity issues. A larger drier had been sought to address the problem but is yet to arrive on-site.

The load-in doors were closed and no fallen stock were outside. The discharge from the fire pond was observed and found to be clear and no deleterious effects were observed within the receiving waters. The biofilters were inspected and found to be satisfactory at the time. Localised musty odours were observed around the area. The leachate channel from the beds required a clean-out to ensure all leachate was directed to the sump and not able to discharge into the adjacent stream.

The waste management area was satisfactory; the fire pit was not in use at the time. Materials were stacked ready to be burnt. No fugitive inputs into the Inaha Stream were found during the inspection, the stream was running clear throughout the length of the sites influence. No incidents were reported.

25 October 2016

During an inspection the following was observed. The wind was from the north, approximately 8 m/s. Odour surveys were undertaken beyond the site boundary and found no odours attributable to rendering plant activities.

Strong/putrid sulphur type odours were noted directly down wind of ponds 1 and 2 within the site boundary. Staff outlined that the throughput had been low recently but things were expected to pick up. Planned upgrades to the feather dryer will mean feather product will have to be buried on 28-29 October.

Two days are programmed for the dryer to be changed. Required burial notifications are to be sent through to Council. No stock or other delivered materials were stored outside, the main doors were closed. The lower rubber door seal was observed to be missing from the left roller door. All sumps and traps were found to be coping with inputs and no overflows were found.

The DAF plant was not operating at the time of the inspection. Works were occurring on the TBE biofilter to replace the pipe between the two beds. A concrete foundation had been poured, contractors were boxing in the area to receive a concrete pour to create a confluence.

No visible emissions were found from any biofilter and essentially no odours were found. The leachate from the system was being pumped to pond 3. The leachate channel around the beds had been excavated to ensure no discharge to the Inaha Stream would occur. The water intake structure was clear of obstructions, one pump was operational, and the second (larger) motor had been disconnected for repairs.

Ponds 1 and 2 were observed and found to be low with visible liner. The cover across the surface was complete. Pond 3 was having the sludge from pond 5 pumped onto the surface which dries to form a crust. At the time staff were assessing whether the material will contain the odours better than the straw. Ponds 1 and 2 were to also receive additional material. The cover across pond 3 was complete. Pond 4 had four aerators in operation, one aerator had been removed for repairs to be undertaken. Ponds 6 had three aerators in operation.

The pumping station had a filter removed and one of the motors will be replaced. The dairy shed effluent was still being pumped to the TBP ponds, both effluent collection areas were satisfactory.

All irrigated areas looked good and pasture was coping with the applications. Staff outlined the nitrate levels in the unnamed tributary are remaining around 5-6 mg/L and appears to fluctuate with rainfall events.

The following action was to be undertaken: Undertake works to install a rubber door seal on the load-in roller door to ensure odour is contained.

23 November 2016

At the time of inspection the following was observed. The wind was from the west, approximately 8 m/s. Odour surveys conducted beyond the site boundary found strong cooking odours at the corner of Normanby and Kohiti Road. Light and intermittent cooking type odours were also found further away from the plant along Ngutu Road. Product cooking was occurring during the odour surveys. Blood and feather deliveries were also occurring. Regurgitated product was stored outside the load-in doors. The fallen stock was inside. The load-in doors were opened frequently and localised offal/blood type odours were present around the area. Works had been completed on the new feather drier. At the time engineers and equipment were arriving on-site to trial the possible stick water recovery pilot, through the TBE plant during December.

Ponds 1 and 2 had liner visible and the crust was complete across all areas. Bubbles were discharging through the crust around the inlet to pond 1. Localised 'Sulphur' type odours were observed immediately down-wind of the ponds. A bore water main line was in the process of being buried around pond's northern perimeter. Pond 3 had sludge material from pond 5 sprayed around the inlet end, pasture die-off appeared to have occurred.

The biofilters were inspected and found to be satisfactory. The works to repair the TBE biofilter were continuing. The concrete boxing had been completed, though at the time, the biofilter pipes remained blocked off at the confluence. Only the newest TBP biofilter had visible emissions escaping, these were described as localised 'earthy musty' type odours.

The waste management area was found to be satisfactory; the fire pit was not in use. Travelling irrigators were in operation in the irrigation area. No ponding or run-off was observed and all pasture appeared to be coping with the applications. Dairy shed effluent still directed to the TBP ponds, the sumps are being managed.

JTL yard had been recently oiled, the ponded water around the area had observable surface hydrocarbons as a consequence of the application. The fire pond was free of hydrocarbons and sorbent booms were in place at the outlet. No effects were observed within the receiving waters. The water intakes were clear of obstructions, one pump was operating at the plant, 58 m^3/hr recorded take. No recent burial of product had occurred and no pit had been excavated. The plant was expected to be operating on Christmas day but closed for two days after. The same pattern would follow with the New Year holiday period. No incidents were reported.

19 December 2016

At the time of inspection the following as observed. The wind was gusty and variable from the west, approximately 6 m/s. No objectionable odours or visible emissions were found during the inspection. Noticeable plant type odours were found at the corner of Kohiti and Normanby Roads. The odour was light and in brief durations.

The main doors were observed to be frequently opened, fallen stock was stored inside and some regurgitated product was stored outside in the bunker. The stormwater catchment was tidy and all sumps were coping with inputs. At the time, no discharges were occurring from pond 6, and no irrigators were in operation.

Localised typical pond type odours were observed downwind of ponds 1 and 2 along Kohiti Road. All leachate from the biofilters were directed to the sump and no fugitive inputs into the stream were found.

The fire pit was not in use at the time of inspection. The waste management areas were found to be satisfactory. All drums were found to have lids in place and were stored away from the stream.

Pond 4 had localised musty odours, minor surface foam remained within the pond. JTL yard was busy with traffic movements; however, no dust was being generated. The ponded water was free of any observable hydrocarbon sheen. The discharge from the fire pond was clear and no deleterious effects were observed within the receiving waters. All pipes across the stream appeared in good repair. Both farm dairy effluent collection areas were satisfactory and all pasture inspected appeared healthy. No incidents were reported.

12 January 2017

At the time of the inspection the following was observed: The wind was variable from the west, approximately 9 m/s. Odour surveys undertaken beyond the site boundary found noticeable 'plant' type odours at the corner of Kohiti and Normanby Roads, the wind was gusty and the odour was intermittent.

The load-in area was busy. The doors were frequently opened but were closed between deliveries. No materials or regurgitated product were stored outside. The lower door rubber on one roller door was missing and the wall adjacent to the door also had a tear in it. Works were occurring to fix the hough at the site entrance. Sorbent material had been applied to a hydraulic oil spill from the machine.

Blood load-in activities were occurring at the time. The area was defined as messy with a forklift tracking through a blood spill. The bund below the pipe-work had lots of blood in it, also strong 'blood' type odours were observed around this area.

The biofilters were observed and found to have good bark cover across all areas. Some vegetation was observed to be growing in places. All leachate was being directed to the sump. The waste management area was satisfactory, and no fire was occurring at the time, though some timber was ready to be burnt.

The discharge from fire-pond was essentially clear, although the pond had a slight turbid appearance. The sorbent sock and steel grate had been removed. The pond was observably free of hydrocarbon sheen at the time of inspection. The stormwater discharge into the fire pond was clear. The JTL yard was busy, though very little dust was being generated during traffic movements.

At the time of inspection, irrigators were operating in paddocks 19 and 2. Stick water application was occurring in paddock 17. No ponding or run-off was observed and all pasture was coping with the application. Discharge and stream samples were collected during the inspection.

The following action was to be taken: In order to comply with special condition 1 of resource consent 4058-4 undertake works to repair the hole in the shed wall and reinstate the door rubber on the roller door. Ensure all spilled blood was recovered where possible or cleaned up in a timely manner to prevent objectionable odour discharges.

28 February 2017

During the inspection the following was observed. The wind was from the south west, approximately 9 m/s. No objectionable odours or visible emissions were found during the inspection and no site odours were found beyond the immediate vicinity. The plant was not operating at the time. The main factory doors were open. An inspection of the roof from inside the facility observed lots of holes where the roof had been recently removed and re-screwed (an equipment malfunction meant the Company were forced to remove the roof to fix the machinery). Staff agreed to plug the holes as soon as possible.

At the time, the load-in doors were open, regurgitated product was stored inside and trucks were delivering also. Localised odours were noticeable were typical of the plant load-in area. The blood bund was being cleaned at the time of the inspection. No blood deliveries were occurring during the inspection.

The discharge from the fire-pond was clear and no effects were observed within the receiving waters. The cooling water was observed discharging into fire-pond. The stormwater discharge into pond was minor and

clear, a slight fragrant odour was noted at the time. The JTL yard was full of parked trucks. All trucks were empty of product and clean, though some dust was generated during wind gusts. The water intake was clear of obstructions.

No leachate discharge from biofilters was occurring at the time. Works were occurring to tidy up the waste management area. A fire-pile had been lit earlier in the day, minor smoke emissions were observed at the time of inspection and the operation was supervised. No recent burial of product had occurred. Farm effluent appeared to be managed. No irrigators were operating during the inspection. The stick water tank and farm dairy effluent tanks were not in use. No incidents were reported.

30 March 2017

At the time of the inspection the following was noted. The wind was variable west, approximately 3-4 m/s. Odour surveys were conducted down wind of the plant and found distinct factory/cooking odours along Manu Road near the rugby club. The same odour was also detected at the corner of Kohiti and Normanby Roads, as well as along Ngutu Road.

The odour was intermittent at each location but at times was considered strong. No similar odour was found upwind of the plant. Typical strong pond type odour was noted along Kohiti Road. No objectionable visible emissions were occurring. Discussions were held with Environmental staff regarding where the tank vented emissions are discharged. Visible emissions were discharging from the top of one tank containing produce. The tank with the open hatch adjacent to the boiler room was water only.

Minor visible emissions were observed coming from several biofilters, these were described as typical musty/bark type odours normally noted around the area. The load-in area was tidy, no product was stored outside and all load-in doors were closed. The lower door rubber had been replaced. Distinct cooking type odours were noted around the area at the time of inspection. The Inaha Stream was running clear throughout the length of the sites influence.

Ponds 1 and 2 had a fatty cover that was complete, minor bubbling was occurring through the pond 1 crust near the inlet. Pond 3 had straw recently applied to the cover around the inlet, pond 4 had five aerators operating and the D.O was 3.99 mg/L. No discharge from pond 6 was occurring and no irrigators were operating at the time of inspection.

The JTL yard was busy. It was noted that washings had remained localised to the wash-bay. The run-off from the yard into the fire-pond was slightly turbid and free from any observable sheen. At the time, the waste management area was being sorted; scrap metal was being removed in preparation to receive more equipment for storage in the area. Farm dairy effluent management was described as satisfactory at the time of inspection, and no changes to irrigation lines have occurred as yet.

Plans are yet to be finalised for installing factory air extraction in the TBE plant. No recent product burial has occurred. No incidents were reported.

27 April 2017

At the time of inspection the following was observed. The wind was from the north east, approximately 8 m/s. Noticeable 'plant and pond' type odours were recorded at the corner of Normanby and Old Normanby Roads. The odour was intermittent and varied in strength with wind gusts. The plant was operating during the inspection. All load-in doors were opened at different stages of the inspection.

A significant amount of material (regurgitated) was stored outside the main door. Meal type odours and offal odours were noted around the area. At the time, product was being delivered, the product appeared fresh and no putrid odours were found. Typical odours were noted around the DAF and tank areas.

The sludge from pond 5 was being irrigated onto pond 1 to try to improve the crust. Bubbles were found to be discharging through the crust across large areas of pond 1. Strong sulphur rich odours were noted

around the area. Pond 3 had a good pasture cover. Pond 4 had 5 aerators operating and the D.O was 2.95 mg/L. Pond 6 had three aerators operating, the level was 0.32. No discharge from pond 6 was occurring at the time. Staff outlined that during recent heavy rain the pond did discharge, and that notifications had been submitted to Council.

Recent burial of sand-trap cleanings had occurred, the area around the burial pit had been worked to level out the area after back-filling the burial pit. The water intake was clear of obstruction, though the pump was cavitating with a potential air bubble.

The biofilters were inspected and found to be in good repair. The TBE concentrated sources bed was the only one found to have visible emissions, barky musty odours remained localised to this area. Discussions were held regarding improving the TBE plant air extraction. Staff outlined that the consultant (Golder Associates) had recommended that the concentrated sources extraction is improved rather than extracting TBE factory air. The final recommendations will be discussed with the Council once the report has been completed.

The blood load-in area was observed and appeared messy. The dried blood was observed to be covering all aspects of the equipment, with spilled blood remaining within the bunded area. The odours were distinct at the time of the inspection. The waste management area had been cleared and levelled out to receive more equipment for storage. The fire pit was not in use, but the area was stacked and ready to be burnt. No prohibited materials were observed within the fire pit at the time. No irrigation was occurring at the time of inspection and no stick-water application was occurring either. Dairy effluent management was described as satisfactory at both locations, with all effluent still directed to the pond system. No incidents were reported.

31 May 2017

At the time of inspection the following as observed. The wind was from the northeast, approximately 8 m/s. Odour surveys were undertaken beyond the site boundary. The survey found essentially constant 'pond 1 and 2' type odours present at the corner of Normanby and Katotauru Roads. The odour was distinct and extended up Katotauru Road.

Ponds 1 and 2 were inspected, both ponds had a complete crust cover. Pond 1 was very active and the crust appeared wet. The odour when directly downwind of the pond and was described as extremely intense. Pond 3 had very little odour. Pond 4 had no aerators operating due to a power outage.

No discharge from pond 6 was occurring at the time. Irrigation to land had stopped due to a power outage. The irrigation had been recently occurring in paddock 27. Minor ponding was observed in the low point in the paddock.

All load-in doors were shut except when in use. Regurgitated product was stored outside. Noted were some holes in the walls around the stored regurgitated material. A wall panel adjacent to the northeast factory door had been torn off. Staff had outlined that contractors had been engaged to undertake repairs. The fire pond discharge was described as clear, though it appeared to be bubbling in places. No observable effects were perceived within the receiving waters.

The leachate from the biofilter was being contained and pumped to pond 3, visible emissions were occurring from the beds, these were described as strong 'damp/musty/bark' odours and were prevalent around the area. Riparian plantings along the Inaha were establishing well and appeared healthy.

One water take was in operation, the intake was clear of obstructions. Farm diary shed effluent (FDE) was still being pumped to factory ponds. All FDE management appeared satisfactory. No recent burial of product had occurred. Some blood had been spilled in the JTL yard and would need to be addressed. Works had been scheduled to replace the factory wall during July 2017. Works to install a new power connection were expected to be completed during June 2017. It was outlined that processing is beginning to slow. No incidents were reported.

19 June 2017

At the time of inspection the following was observed. The wind was from the east, approximately 6 m/s. No objectionable odours or visible emissions were found during the inspection. Noticeable 'plant' type odours were found at the corner of Normanby and Katotauru Roads. The odour was considered to be light. At the time the factory was not processing and all doors were closed. The stormwater catchment was clear of spills and all discharges into the fire-pond appeared clear. The pond had a slight turbid appearance and no deleterious effects were observed within the receiving waters. No fugitive discharges were found.

Ponds 1 and 2 were observed and the crusts appeared complete. No bubbles were noted discharging through the crust. Typical odours were noticed immediately downwind which were not considered strong at the time of inspection. Pond 4 had 7 aerators were in operation, and lots of surface foam was being windblown, although it was noted that it remained localised to the area. Works were occurring on the pond 6 outlet to ensure it would be effectively sealed. At the time of inspection, the fire pit was not in use, though pallets and other untreated timber were awaiting incineration. A sucker truck was onsite as a blocked drain around the tank-farm area had caused ponding of liquid. Two travelling irrigators were operating on flat ground and no ponding or run-off was observed. FDE was found to be satisfactory at both sites, and staff outlined plans to install a solid separator at the old cow shed. All FDE will be directed to the separator before being pumped back to the new shed. The FDE will then be applied to land separately from the factory effluent.

TBP were planning upgrades to the TBP biofilter 2, whereby more bark would be added. Both TBE biofilter beds were to have their bark replaced entirely. This proposed operation was expected to occur in two stages. Plans were also being drawn up to replace the ageing iron conduits for TBP biofilter 2. Concrete pipes would likely be used.

At the time of inspection, works were continuing on the power line upgrades. No recent burial of product had occurred. Staff outlined that processing had been slow of late and wasn't expected to pick-up until October 2017.

Works were planned to replace TBP factory wall during July 2017. No changes to TBE factory air extraction had occurred at that stage. No incidents were reported. Discussions were held regarding removing hazardous wastes from the Hawera site. PCB's were to be disposed of via approved waste disposal agent and the activity was to be discussed with Taranaki medical health officer prior to disposal. Asbestos wastes can be directed to Colson Road landfill, NPDC to be contacted prior to delivery.

2.6. Provision of reports, management plans and certifications

Reports and plans

TBP is required to provide to the Council various management plans, contingency procedures, certifications and monitoring reports under five consents, as summarised in the following Table 27.

Table 27 Requirements for reports and plans imposed by conditions of consent

Requirement	Consent Number (and Condition Numbers)	Dates(s) required	Compliance achieved
Emissions to air			
Certification that works, processes and equipment are operated according to good engineering practice	4058-4 (6)	Biennially from 30 April 2013	Certification received 01 May 2017
Air discharge management plan	4058-4 (7)(9)	2 February 2012, annual review by 31 May, including contingency procedures	Initial plan received 3 July 2012. Annual review received 21 June 2017
Monthly report under section 3.2 of management plan on daily activities log, weather, biofilter performance	4058-4 (7)	Monthly	Reports received, late on the odd occasion
Wastewater to Inaha Stream			
Wastewater disposal management plan	2049-4 (13)(15)	31 December 2000, annual review from 31 May 2007	Plan received and approved Dec 2000. Annual review received 21 June 2017
Monthly report under section 5.2 of management plan on wastewater characteristics, flows and irrigated areas	2049-4 (13)(15)	Monthly	Reports received, late on the odd occasion
Wastewater to Inaha Stream			
Spray irrigation management plan	3941-2 (1)(3)	31 December 2000 annual review from 31 May 2006	Plan received and approved Dec. 2000. Annual review received 21 June 2017
Annual report under section 4.3 of management plan on wastewater characteristics, flows and irrigated areas	3941-2 (1)(3)	Annually	Nitrogen budget supplied monthly
Burial pits			
(Solid) Waste burial management plan	5495-1 (1)(3)	1 November 2000, subject to review on two months notice	Plan received and approved Oct. 2000. Review received 2 May 2014

Requirement	Consent Number (and Condition Numbers)	Dates(s) required	Compliance achieved
Stormwater to Inaha Stream			
Contingency plan for spillage or accidental discharge	5426-1 (4)	31 August 1999	Plan received and approved Nov 2000. Review received 28 May 2014

Management plans (4) are required for the disposal of wastewater to the Inaha Stream and to land by spray irrigation, for the burial of solid wastes, and for the discharge of emissions to air. TBP is required to undertake an annual review of both wastewater management plans and the air management plan, the reviewed plans are to be provided by 31 May each year.

Certification by a suitably qualified independent person that the works, processes and equipment relevant to all discharges to air from the site are operating in accordance with good engineering practice is required biennially. Contingency plans (2) are required that address situations which could result in a discharge to air of odorous emissions that are offensive or objectionable beyond the boundary of the site, and spillage or accidental discharge to the stormwater catchment.

Monthly monitoring reports are required from TBP under the wastewater management plan on various aspects of wastewater quality and disposal, and under the air consent/management plan about weather and biofilter performance. An annual report is required under the spray irrigation management plan.

The required management and contingency plans and certification were all produced in 2000, except the air management plan, which was not required until 2012. For the period from 2000-2001 to 2008-2009, none of the required revision or certification documents were received by Council. The TBE plant was constructed in the interim. It is noted that annual reviews of plans have only been required since wastewater and air discharge consents were changed in 2005 and 2007, respectively upon consent reviews invoked by Council.

2.6.1. Air discharge engineering certification

The third biennial engineering practice audit under permit 4058-4, in respect of the works, processes and equipment relevant to all discharges to air from the site, was undertaken by Golder Associates air quality engineers on 16 and 17th March 2017. The audit focussed on aspects that contribute to the status of existing 'engineering practice':

- Physical condition of equipment: the state of odour control components, including consideration of materials used for construction.
- Instrumentation review: the accuracy of selected instrumentation and the adequacy of instrument for monitoring the odour control system.
- Design aspects: the current engineering design with respect to the air extraction, air cooling and biofilter systems.

The conclusions and recommendations from the report are provided below; the full report is appended in Appendix III.

The existing biofilters and extraction systems are generally working effectively. However, some design and remedial measures are recommended as follows:

- The TBP concentrated source biofilter design is effective but requires deeper coverage of the inlet manifold and improved sealing against air leakage along the western border of the bed (opposite the inlet manifold).

- Measures are required to reduce the extent of air channelling that is currently occurring in the TBP concentrated source biofilter, including investigating air leaks around the Novaflow pipe lateral connections to the main concrete manifold, the addition of bark to cover the inlet manifold and improve the sealing of the western wall of the bed.
- The FA1 biofilter design is appropriate for a building air treatment system. However, given its increasingly important role for treating humid fugitive process emissions it may in time be necessary to consider sealing its western side. Currently this does not appear to be causing an issue, however some further investigations are recommended for the FA1 biofilter. This includes an assessment of pressure drops across the media and the internal condition of inlet manifold and air distribution laterals.
- The geotextile within FA2 biofilter could well be causing its high inlet air duct pressure and it should be removed. Additionally this bed needs additional bark material along its southern side to avoid untreated air by-passing the media and also to lower the bed's air loading rate.
- The TBE biolfilter's bark requires replacement/remediation and that a low fraction (< 10 vol.%) of loamy soil is incorporated into any new bark to ensure effective odour removal at air loading rates that could approach 30 m^3air/hr/m^3 media following an upgrade to the concentrated sources PSES.
- Testing of the TBE biofilter media for size distribution to help establish what fraction of existing media to retain and remix with new bark.
- Upgrading the PSES for concentrated sources is recommended in preference to employing building air extraction at TBE. An optimised configuration of the Duskie and new concentrated source fans should be based on their respective fan specifications and a system curve.
- Ventilation of the TBE raw material bin room to the TBE biofilter is recommended. However, the optimal approach achieving this requires more detailed design consideration than provided in this report (e.g., a dedicated duct connecting down-stream of the scrubber or connecting to the existing concentrated sources dust).
- For all site biofilters, install water tube manometers or tubing that allows for checks upon the media air pressure drop within the biofilter beds.
- The existing cooling systems continue to achieve inlet airstreams to the biofilters that are normally 40°C or lower, which represents good practice. However, installation of new gauges for monitoring the pond water temperature changes across the TBP and TBE scrubber systems will help monitor the ability of the ponds evaporative cooling capacity to meet the required cooling duty that the concentrated sources PSESs require.

The audit undertaken by Golder Associates in March of 2017 concluded that the associated equipment, including ducts, fans, cooling systems and biofilters, continue to be maintained and operated in a sound engineering state.

TBP, post the audit have undertaken to achieve all proposed recommendations for the biolfilters, these proposed recommendations will be implemented throughout the 2017-2018 monitoring period.

2.7. Investigations, interventions, and incidents

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

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the

environment. The incident register includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2016-2017 period, the Council was required to undertake significant additional investigations and interventions, or record incidents, in association with TBP's conditions in resource consents or provisions in Regional Plans.

Incident investigation: 12 October 2016 20:40

An inspection was undertaken on site in response to a complaint from a member of the public regarding odour being emitted beyond the boundary of the property.

At the time of the inspection the weather was fine with approximately 30% cloud cover. A moderate to strong breeze was noted blowing across the factory towards the Okaiawa Village.

The inspection found intermittent odour about the Manu Road area on initial inspection. This odour quickly dissipated however before an odour survey could be initiated.

Further investigation found the odour present near the intersection of Ngutu Road and Barclay Road. The odour was found to be intermittent in nature and not consistent enough to be deemed objectionable.

A phone call was made to the plant manager and the factory to advise of the complaint. They were asked to ensure that all systems were operating as desired to prevent the possibility of offensive or objectionable odours being discharged beyond the boundary of the property. No further action was required in response to this complaint.

Incident investigation: 13 October 2016 20:20

An inspection was undertaken on site in response to a complaint from a member of the public regarding odour being emitted beyond the boundary of the property.

At the time of the inspection the weather was fine with approximately 30% cloud cover. A light northerly breeze was blowing upon arrival, however this quickly weakened in strength resulting in there being no detectable breeze at times during the odour investigation.

The odour investigation did not identify any odours about Okaiawa associated with the activities at TBP.

It was possible that there was odour at the time the complaint was made (1900hrs) which dissipated due to the weather conditions by the time the officer arrived to assess the complaint. No further action was required in response to this complaint.

Incident investigation: 03 December 2016 21:35

A complaint was received concerning an objectionable odour on Manu Road, Okaiawa. The complainant believed that the odour was emanating from the rendering plant on Kohiti Road.

At time of arrival, no odour was detected at the east end of Manu Road. However odour was detected on Manu Road between Ngutu Road and Ahipaipa Road. Two odour surveys were conducted on this stretch of road. During the survey, weather conditions were clear with a moderate north westerly breeze.

An intermittent rendering plant odour was detected at the time. The odour intensity ranged between weak, distinct to strong. Before the second odour survey was completed no odour was detected.

No odour was detected up wind of the rendering plant.

It was noted that during the periods that the rendering plant odour was detected, a transport truck had arrived on site, the odour had dissipated once the truck had left site.

At the completion of the investigation, no odour was detected.

Incident investigation: 19 January 2017 20:55

An inspection was undertaken in response to a complaint regarding odour emanating from TBP on Kohiti Road. Wind was a very light west tending north-west.

An odour survey undertaken in the vicinity of the plant found constant noticeable odour with intermittent objectionable odour beyond the boundary of the property.

Inspection of the site found that the main doors to the factory were closed; however, the small doors were open. Blood and feathers were being processed at the time of inspection. Staff were spoken to onsite and the manager was called and asked to investigate the source of the odour.

No odour was found upwind of the site.

The following action is to be taken: Ensure that no objectionable or offensive odours discharge beyond the boundary of the property.

Infringement and abatement notice issued: EAC-21490

- An infringement and abatement notice were issued to TBP in response the the incident recorded on 19 January 2017. The abatement notice required TBP to undertake works to improve the factory air extraction system in the TBP factory and to undertake works to install an effective factory air extraction system in TBE factory. It was further required that TBP ensure all extracted factory air from both TBP and TBE plants is treated through appropriate and functioning biofilters.

Follow up incident inspection: 20 January 2017 12:15

A site inspection was undertaken with the site manager. At the time of inspection both plants were in operation. Odour was noticed downwind of pond 3 (anaerobic) and close to the TBE building by the weigh-bridge. No other significant site odours were noted. Doors were shut immediately after vehicle egress. The offsite odour survey found only noticeable intermittent odours at the Katotauru/Kohiti Road junction. The site odour sources were the same as those at this point. It was noted that under calm conditions these odours would have the potential to cause a noncompliance situation.

The following action was to be taken:

- Hay bales to be spread on pond 3 to provide cover and reduce odour release. TBE ducting to biofilter under investigation.

Incident investigation: 14 February 2017 14:10

Odour surveys were undertaken in response to a complaint received regarding objectionable odour discharging beyond the site boundary. Odour surveys undertaken at the complainants' property found intermittently noticeable 'general plant' type odours, the odour was not considered objectionable during the surveys due to the intensity and frequency. Inspection found the site to be busy, with doors frequently opened for load-in activities, trucks waiting to load-in and trucks that were being cleaned. Staff outlined that the factory had been operating as normal.

The following action was to be taken: Ensure objectionable odour does not discharge beyond the site boundary.

Incident investigation: 14 February 2017 23:30

In response to complaint an odour survey was carried out in and around Okaiawa township. The survey found intermittent noticeable odour to no odour present. No offensive and or objectionable odour was found. The site found to be compliant at time of the odour survey.

Incident investigation: 25 April 2017 21:10

An inspection was undertaken in response to a complaint received regarding objectionable odour discharging beyond the site boundary. Odour surveys were conducted in the vicinity of the complainant's house and found no odours attributable to site activities at the time. The complainant outlined the odour was considered to be a mix of 'cooking' and 'chemical' emissions.

Odour surveys were undertaken along Normanby Road, the survey found distinct and strong plant odours which were a mix of 'cooking', 'musty-bark' from biofilters and 'sulphur' type odour associated with ponds 1 and 2. The sulphur type odour was considered the most intense/unpleasant.

The air was quite still and the temperature was 9°C at the time of inspection. Visible emissions from the plant and the ponds were described as prevalent and could be seen to be migrating down the valley. The odour was very strong at the corner of Normanby and Old Normanby Road and was essentially constant, had the odour been detected at dwelling it would have been considered objectionable.

3. Discussion

3.1. Discussion of site performance

TBP provide an important service to the meat and poultry industry in Taranaki and the lower North Island by the production of products from the by-products of these industries such as offal, feathers and fallen stock.

The TBP compliance performance in the 2016-2017 monitoring period with respect to the resource consents held by the company were assessed and will be discussed by item.

Water abstraction, from the Inaha Stream and from the groundwater abstraction bore was undertaken this period by the company. No issues were noted and compliance was achieved.

Discharges to the Inaha Stream were as follows. The discharge of treated wastewater was undertaken this period, noted were two occasions where the minimum dilution of 1:300 was less than required, the lowest being 1:276. This was considered a minor noncompliance due to the low frequency of this event and that the deviation from the required dilution ratio was not too significant.

The discharge of cooling water/backwash was undertaken and the temperature differentials were maintained, with no exceedance in total river temperature of 35°C or post discharge difference of greater than 3°C. The discharge of treated wastewater to the Inaha Stream was undertaken on 83 days this monitoring period, for the remaining 282 days, the treated wastewater was either retained or irrigated to land. This was a reduction in Inaha Stream disposal this period in comparison to the previous period where discharges to the Inaha Stream were undertaken on 139 days.

Records pertaining to the discharge of wastewater to land, indicated that the nitrogen loading for this period was significantly reduced compared to the previous monitoring period. No paddock loading exceedances were observed in the consent holder provided data, all loadings were found to be below 300 kgN/ha pa. The Shearer block which is strictly limited to 200 kgN/ha pa was not utilised for applications of wastewater this period.

Wastewater total nitrogen was reduced from 32,255 kgN total, in 2015-2016, to 27,072 kgN total in 2016-2017. In terms of the applications of the fertiliser Zealgrow, this decreased significantly from 40,069 kgN in 2015-2016 to 4,970 kgN in this period.

Discharges to air from burning of pallets, paper and cardboard was undertaken and found to be well managed by the inspecting Council Officer. This is an improvement from the previous period where it was deemed unsatisfactory in terms of control and housekeeping.

Emissions to the air from the rendering operations continued to draw complaints from the public. This period eight complaints were received from the public, of which one complaint (19th January, 2017) was substantiated in finding objectionable odour. In response to the incident, TBP received an infringement fine as well as an abatement notice to take action to mitigate the potential sources of odour. TBP will need to meet the requirements of the abatement notice by 1st November 2017.

The third biennial engineering practice audit as required under consent 4058-4 was undertaken this period. The recommendations with respect to the biofilters and associated increased fan capacity requirements will be carried out by TBP.

Proposed upgrades

The Taranaki Bio-Extracts (TBE) facility which produces the fertiliser Zealgrow, is in the process of installing a VSAP filtration system. The aim of this device will be to remove the need for the facility to dispose of the fertiliser (stickwater/Zealgrow) through the use of an injection spreader. While the installation of the

filtration system is ongoing (to be installed before 2018) TBP will utilise their dryers to aid in reprocessing the stickwater and as a consequence, this will no longer be discharged to land.

TBP are also trialling a similar filtration system on their wastewater stream. The initial programme will seek to reduce the current loading to the wastewater system by a third. It is proposed that the longterm goal will be to have no discharges of wastewater to land or water.

TBP are also looking into a programme aimed at reducing the amount of water utilised around the facility, whereby wastewater will be reprocessed and reutilised. It is anticipated that this will eventuate in less water put through the wastewater system and as a result, a reduction in the groundwater and surface water abstraction usage.

TBP have been considering a project which will encompass the installation of the VSAP filtration system in combination with a reverse osmosis plant, for direct use on the wastewater exiting the TBP plant. The aim will be to reprocess the wastewater stream and make it available and of sufficient quality to be utilised in the boilers of the facility. This will reduce the requirement for additional water in the system and the associated management of high volumes of wastewater.

In terms of odour mitigation, the facility recently undertook the consent required audit in respect of the works, processes and equipment relevant to all discharges to air. All biofilter recommendations of the 2017 Golder Associates Report are being implemented at present and will be on going into 2018. This includes the installation of a larger biofilter fan which will increase the air flow from the concentrated sources system.

Further, downgraded product will no longer be sent to the Okaiawa facility, this will rather be sent to Otorohonga. The aim is to further reduce the potential for odorous trucks travelling through Okaiawa Township.

The community liaison meeting was held at Okaiawa Rugby Club on the 15 March 2017. Minutes of the meeting were created and provided to TBP staff whom shared them amongst the attendees. The meeting was requested to be held at the end of the summer so that the community could discuss odour improvements as a whole.

A meeting was also held between TBP and the representatives of Ngati Manuhiakai Hapu and other interested submitters at Te Aroha Marae on the 13 August 2016 and also on the 10 December 2016.

3.2. Environmental effects of exercise of consents

Environmental effects associated with the exercise of TBP's consents will be discussed on a system basis.

No environmental effects were observed as a result of TBP's abstraction of water from the Inaha and from groundwater. Monitoring of the discharge of cooling waters found that the Inaha Stream had not been adversely affected.

The maximisation of irrigation to land opposed to the Inaha Stream was undertaken this period. The main effect associated with the irrigation of treated wastewater and fertiliser to land is significantly elevated nitrate within the groundwater in certain locations of the irrigation area. This issue has arisen due to historic application of wastewater and fertiliser by the consent holder combined with current practices.

As previously discussed in the groundwater monitoring section, groundwater analysis indicated that three monitoring wells (GND1346, 1347 and 2226) contained a concentration of nitrate nitrogen > 50 g/m^3 N. In comparison to the previous monitoring period, four wells were observed to contain a NNN concentration > 50 g/m^3.

In order to mitigate the elevated nitrate observed in the groundwater and in the surface water of the western tributary, TBP recently engaged a suitably qualified environmental consultant (PDP) to aid them in the better management of their wastewater system. TBP has reported significantly lower figures in terms of

paddock loadings this monitoring period. They have also advised of plans to further reduce the requirement to irrigate treated wastewater to the land in the future. This is proposed to reduce the nitrate impacts observed in the groundwater. The analysis of surface water nitrate concentrations, specifically the western tributary of the Inaha Stream had been observed to be increasing over the last two seasons and this is considered to be as a result of the high nitrate levels in the groundwater.

The spring at Shearer's property continued to exhibit an increasing nitrate concentration within the groundwater. TBP is aware of this elevation and will limit the discharges to the direct vicinity.

Surface water sampling indicated that the TBP's activities were having a minor effect on water quality downstream of their discharges.

The main effect associated with the exercise of the burial pits is found in the groundwater in the immediate vicinity, with significantly elevated ammonia observed in two of the five monitoring wells.

Biological monitoring of the Inaha Stream and associated tributaries was undertaken this period with the biologist concluding overall, there was no evidence that discharges from Taranaki By-Products have impacted on the freshwater macroinvertebrate communities present in the Inaha Stream..

3.3. Evaluation of performance

A tabular summary of TBP's compliance record for the year under review is set out in Tables 28-41.

Table 28 Summary of performance consent 2051-4

Purpose: ***To take water from the Inaha Stream for a rendering operation***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Means of take satisfactory to Council	Inspection and monitoring	Yes
2. Minimum flow of 25 L/s downstream of point of abstraction	Monitoring of flow	Yes
3. Operation of an abstraction measurement device, maintain records	Data provision	Yes
4. Operation of a flow recorder at Kohiti Road, level gauge from Jan 2015	Staff gauge in stream, rated by Council. Daily level record and monthly report by TBP	Yes
5. Report on use of treated wastewater as cooling water by 31 March 2000	Report produced 13 October 2000 and recommendations implemented	N/A
6. Provision for review	Next review date available 1 June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 29 Summary of performance for consent 2049-4

Purpose: *To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Mixing zone 30 m downstream of discharge	Site inspection and monitoring results	Yes
2. Boundaries of mixing zone to be determined by Council	Site inspection	N/A
3. Point of discharge to enter channel directly to ensure mixing	Site inspection	Yes
4. Advise Council before making changes to alter nature of discharge	Site inspection, monitoring results and liaison	Yes
5. TBP to undertake self monitoring	Review and compare results. Some monitoring in management plan undertaken by Council	Yes
6. Minimum discharge dilution rate	Monitoring results	Mostly. On two occasions it dipped to below 1:300. Lowest found was 1:276.
7. No discharge of stickwater, and consult with Council before increasing cow herd	Site inspection, monitoring results and liaison	Yes
8. Discharge to cease when flows in the Inaha Stream drop below 100 L/s	Monitoring of Kohiti Road flow gauge results	Yes
9. Control on effect of discharge in receiving water	Inspection, chemical sampling and bio-monitoring	Yes
10. Limits on receiving water ammonia concentration	Chemical sampling	Yes
11. Recording and reporting of discharge rate	Inspection and review of records	Yes
12. Inaha Stream flow measurement device	Inspection, gaugings by Council	Yes
13. Provision of wastewater disposal plan	Plan received by Council and approved December 2000	Yes
14. Plan to be implemented	Inspections and liaison and receipt of TBP reports	Yes
15. Optional and annual reviews of wastewater plan	Annual review undertaken by TBP, provided	Yes, review provided 21 June 2017
16. Designated staff member	Part of TBP's Environmental Manager's job description, also Plant and Operations Manager's	Yes
17. Training of staff on wastewater disposal	Liaison and inspection	Yes

Purpose: *To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
18. Donation to Taranaki Tree Trust	Confirmation with Council finance department that donation received	Yes
19. Optional review provision	Next review date available June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Good** **High**

Table 30 Summary of performance for consent 2050-4

Purpose: *To discharge cooling water to Inaha tributary*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Activity monitoring by TBP as required	Continuous temperature monitoring taken over by Council in September 2013, at TBP's request	Yes
2. Composition not to be different to Inaha Stream, other than heat and solids	Chemical sampling by Council	Yes
3. Maximum temperature limit on discharge	Continuous temperature recording by Council	Yes
4. Limit on suspended solids in discharge	Sampling by Council	Yes
5. Controls on effect of discharge in receiving water	Continuous temperature monitoring, and chemical and biological sampling, by Council. Refer section 2.1.3.2	Yes
6. Discharge temperature measurement and recording	Monitoring carried out by Council	Yes
7. Optional review provision	Next review date available June 2017	No review required
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 31 Summary of performance for consent 5426-1

Purpose: *To discharge stormwater to Inaha tributary*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to changing processes that may significantly alter discharge	Inspection by Council	Yes
2. Limits on discharge composition	Chemical sampling by Council indicated in the January 2017 sample, the suspended solid concentration was elevated above the conditional limit of 100 g/m^3 with a value of 140 g/m^3	Minor exceedance in suspended solid concentration
3. Controls on effect of discharge in receiving water	Chemical and biological sampling by Council	Yes
4. Provision of spillage contingency plan by 31 August 1999	Plan produced in November 2000	N/A
5. Optional review provision	Next review date available June 2017	No review required
Overall assessment of consent compliance and environmental performance in respect of this consent		**Good**
Overall assessment of administrative performance in respect of this consent		**High**

Table 32 Summary of performance for consent 4058-4

Purpose: *To discharge emissions to air*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practicable option (bpo) to prevent or minimise adverse effects	Checking that standard operating procedures to achieve compliance with consent conditions are followed. Liaison with TBP and inspection by Council. Recent audit undertaken in March 2017, recommendations to be implemented	No – Infringement and abatement notice issued following confirmed incident
2. No offensive or objectionable odour beyond boundary	Odour surveys undertaken by Council during inspections and by TBP. Further investigation was undertaken in respect of complaints received from the public. Eight odour complaints were received in this monitoring period, of which one resulted in the issuance of an infringement fine and an abatement notice.	No, objectionable odour observed. Infringement and abatement notice issued
3. Definition of noxious, offensive or objectionable odour		N/A

Purpose: *To discharge emissions to air*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
4. Designated staff member for emissions management	Part of TBP Environmental Manager's job description. Also Plant and Operations Manager's responsibility	Yes
5. Prohibition of fish rendering	Inspection by Council, no fish rendering undertaken	Yes
6. Certification processes and equipment operated according to good engineering practice biennially from 30 April 2013	Biennial certification by suitably qualified independent person. Undertaken 16 & 17 March 2017, report appended in Appendix III	Yes
7. Preparation of Air Discharge Management Plan	Submission of Plan, on 3 July 2012, reviewed plan received 21 June 2017	Yes
8. Operation in accordance with Air Discharge Management Plan	Inspection by Council	Yes
9. Annual review of Air Discharge Management Plan by 31 May	Liaison. Reviewed by TBP and submitted to Council, 21 June 2017	Yes
10. Limits on dust deposition rate	Inspection	Yes
11. Newsletter production, and community liaison meetings	Newsletter produced. Community liaison meeting held 15 March 2017	Yes
12. Optional review provision to deal with significant adverse effects	Recent audit undertaken in March 2017. Recommendations to be implemented. Abatement notice issued on observation of objectionable odour. If additional objectionable odour confirmed in future monitoring period the option for the review will be enacted	Not required at present, although it is under consideration
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Improvement required** **Good**

Table 33 Summary of performance of consent 3941-2

Purpose: *To discharge treated wastewater to land*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Irrigation to defined area	Inspection by Council	Yes

Purpose: *To discharge treated wastewater to land*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
2. Provision and maintenance of spray irrigation management plan	Plan received by Council and approved in October 2000	Yes
3. Plan to be followed	Liaison, inspection and provision of monitoring reports	Yes
4. Optional, and mandatory annual reviews of management plan	Revision submitted 21 June 2017	Yes
5. Designated staff member	Part of TBP Environmental Manager's job description. Also Plant and Operations Manager's responsibility	Yes
6. Adopt best practicable option to minimise adverse effects, including total nitrogen minimisation	Significant developments planned	Significant reduction in nitrogen loading undertaken by TBP this period
7. Seek permission for Inaha Stream discharge when cannot irrigate, and Inaha Stream in low flow	Liaison and inspection. Not required this period	N/A
8. Limit on dissolved oxygen in final pond	Chemical sampling of pond 6 indicated compliance with limit	Yes
9. No offensive or objectionable odour beyond boundary	Inspection and complaint register	Yes
10. No spray drift beyond boundary	Inspection and complaint register	Yes
11. Limit on sodium absorption ratio	Chemical sampling indicated compliance with this limit	Yes
12. Prohibition of ponding and run-off	Inspection and complaint register	Yes
13. Spray buffer zones	Inspection and complaint register	Yes
14. Limit on nitrogen application rate	Monitoring by TBP and review of irrigation records. Record also kept of fertiliser application to establish total nitrogen loading	No exceedance in nitrogen loading
15. Report on reducing ammonia concentration by 15 December 2000	Report received by Council on 2 April 2001	N/A
16. Limit on application rate	Inspection and field measurement	Yes
17. Limit on return period	Inspection and provision of records	Yes
18. Installation and maintenance of monitoring bores	Liaison and inspection. Environmental consultant have installed additional bores recently	Yes

Purpose: *To discharge treated wastewater to land*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
19. Baseline and operational monitoring by TBP	Results of wastewater, irrigation and soil monitoring by/for TBP reviewed by Council	Yes
20. Consultation meetings with interested parties	Imposed by review of 21 December 2005. Meeting held at Te Aroha marae on 10 December 2016	Yes
21. Notification prior to Inaha discharge	Imposed by review of 21 December 2005. Liaison with TBP and Ngati Manuhiakai	Yes
22. Provisions for contamination of groundwater or water supply	Significant nitrate impacts in groundwater identified and communicated to TBP in previous monitoring periods. Remedial actions undertaken by TBP. Suitably qualified Environmental Consultant engaged and aiding in wastewater management. Ongoing for one year. Still on going.	Remedial actions implemented and under development
23. Optional review provision for operational requirements	Not sought by TBP	N/A
24. Optional review provision upon receipt of ammonia reduction report	The engagement of a suitably qualified environmental consultant will seek to mitigate elevated nitrogen in groundwater	Not required
25. Optional review provision for nitrogen treatment and disposal	Review not required at this stage, consent set for renewal in 2018-2019 period	Not required
26. Optional review provision for environmental effects	Current proposed plans preferred to the review option. The review option will not be exercised this period	Not required
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Improvement required** **High**

Table 34 Summary of performance for consent 5495-1

Purpose: *To discharge wastes from meat rendering by burial*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Provision of waste burial management plan by 1 November 2000	Plan received by Council and approved in October 2000	N/A

Purpose: *To discharge wastes from meat rendering by burial*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
2. Waste burial management plan to be followed	Inspection by Council, and review of TBP records	Yes
3. Optional provision for review of waste burial management plan	Not sought by TBP or Council. Revision undertaken by TBP in May 2014	N/A
4. Designated staff member	Part of TBP Environmental Manager's job description. Also Plant and Operations Managers' responsibility	Yes
5. Disposal pits not to intercept groundwater	Inspection by Council	Yes
6. Disposal pits to be constructed as undertaken in consent application	Inspection by Council	Yes
7. Notification of commencement of pit construction outside nominated area	Inspection by Council, no notification received	N/A
8. All constructed disposal pits to be inspected by Council prior to use	Inspection by Council	Yes
9. Conditions 1-4 to apply to new disposal pits	Inspection by Council	Yes
10. Discharged material to be covered within 4 hours	Inspection by Council	Yes
11. Soil cover requirements upon completion of each disposal operation	Inspection by Council	Yes
12. Cover material and surrounding land to be contoured to direct stormwater away	Inspection by Council	Yes
13. Site rehabilitation and pasture re-establishment	Inspection by Council	Yes
14. No irrigation of effluent onto disposal area	Inspection by Council	Yes
15. No direct discharge of contaminants to surface water	Inspection and chemical/biological survey by Council	Yes
16. Installation of monitoring bores	Inspection and sampling by Council. New bore installed 11 May 2015, replacing two bores damaged	Yes
17. Optional review provision for operational requirements	Not sought by TBP	N/A
18. Optional review provision for environmental effects	Next review date available 1 June 2017	Not required
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 35 Summary of performance for consent 6431-1

Purpose: *To place culverts in Inaha Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse environmental effects	Liaison, and inspection by Council	Yes
2. Consent to be exercised in accordance with documentation submitted	Inspection by Council	N/A
3. Notification prior to commencement and upon completion of works	Liaison with Council. No work undertaken	N/A
4. Subsequent works prohibited between May and October, without permission	Inspection by Council. Permission for dead willow removal given 4 June 2015	Yes
5. Adoption of best practicable option to minimise discharges, bed disturbance and water quality effects	Liaison, inspection and bio-monitoring by Council	Yes
6. Minimisation of bed disturbance	Inspection by Council	Yes
7. Structure removal and area reinstatement upon redundancy		N/A
8. Fish passage not to be restricted	Inspection by Council	Yes
9. Erection of stock-proof riparian fences on consent holders property above Kohiti Road	Implementation of riparian plan RMP938 and inspection by Council	Yes fencing completed June 2009
10. Planting of riparian margins within 4 years from 4 October 2004	Implementation of riparian plan RMP938 and inspection by Council. Some replanting/ blanking undertaken in winter 2011 and 2015	Yes planting completed June 2009
11. Placement of culvert inverts and headwall protection structures	Inspection by Council	Yes
12. Lapse of consent if not exercised	Consent was exercised	N/A
13. Optional review provision for environmental effects	Next review date available 1 June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 36 Summary of performance for consent 7234-1

Purpose: *To disturb and realign Inaha Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Consent to be exercised in accordance with documentation submitted	Inspection by Council	N/A
2. Notification prior to commencement of works	Notification given 17 March 2008	N/A
3. Placement and design of rock wall for bank protection	Inspection by Council	N/A
4. Works prohibited between May and October, without permission	Inspection by Council	N/A
5. Riverbed disturbance to be minimised	Inspection by Council	N/A
6. Sediment discharge and effects to be minimised	Inspection by Council	N/A
7. Fish salvage from old channel immediately upon diversion	Council carried out fish salvage on 18 April 2008	N/A
8. Fish passage not be obstructed	Inspection by Council	N/A
9. Vegetation removed not to be buried near stream	Inspection by Council	N/A
10. Lapse of consent if not exercised	Consent was exercised	N/A
11. Optional review provision for environmental effects	Next review date available June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Not exercised** **Not exercised**

Table 37 Summary of performance for consent 7329-1

Purpose: *To discharge stormwater and sediment from re-contouring land and realigning Inaha Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Consent to be exercised in accordance with documentation	Inspection by Council. An erosion and sediment control management plan was provided with the application. (Sediment controls initially inadequate)	N/A
2. Limit on maximum soil area disturbed	Inspection by Council	N/A

Purpose: *To discharge stormwater and sediment from re-contouring land and realigning Inaha Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
3. Limit on maximum soil volume disturbed	Inspection by Council	N/A
4. Design criteria for run-off sediments traps to be followed	Inspection by Council	N/A
5. Sediment discharge and effects to be minimised	Inspection by Council	N/A
6. Provision of programme of works prior to exercise of consent	An erosion and sediment control management plan was provided with the application	N/A
7. Stabilisation of earthwork areas upon completion of soil disturbance activities	Inspection by Council	N/A
8. Procedure to be followed upon discovery of archaeological site	Liaison with Council (Retrospective)	N/A
9. Lapse of consent if not exercised	Consent was exercised	N/A
10. Optional review provision for environmental effects	Next review date available June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Not exercised** **Not exercised**

Table 38 Summary of performance for consent 9756-1

Purpose: *To take and use groundwater for industrial water supply*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Limit on maximum take	Water measuring and recording required by consent conditions	Yes
2. Labelling of bore	Inspection by Council	Yes
3. Access to bore for manual measurement of water levels	Inspection by Council	Yes
4. Installation of metering and logging equipment	Inspection by Council and certification under condition 5	Yes
5. Certification of water measuring equipment	Provision of certificate. Supplied 29 May 2014.	Yes

Purpose: *To take and use groundwater for industrial water supply*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. Installation of water level measuring equipment	Inspection by Council	Yes
7. Telemetry of monitoring data to Council	Inspection by Council and receipt of data. Water take from 27 March 2014; water level from 6 June 2014	Yes
8. Access to monitoring equipment	Inspection by Council	Yes
9. Notification of equipment failure	Inspection by Council and checking of records	N/A
10. Adoption of best practicable option	Liaison and inspection	Yes
11. Lapse of consent if not exercised	Consent was exercised	N/A
12. Optional review provision for environmental effects	Next review date available June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 39 Summary of performance for consent 10054-1

Purpose: *To discharge emissions into the air from the burning of pallets, paper and cardboard*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse environmental effects	Liaison, and inspection by Council	Yes
2. Restrict on materials combusted	Inspection by Council	Yes
3. Prohibition of objectionable odour	Inspection by Council	Yes
4. Supervision of burning	Inspection by Council	Yes
5. Limit on dust deposition rate	Inspection by Council	N/A
6. Control of airborne dust components and particulate concentration	Inspection by Council	Yes
7. Prohibition of toxic components beyond boundary	Inspection by Council	Yes

Purpose: *To discharge emissions into the air from the burning of pallets, paper and cardboard*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
8. Lapse of consent if not exercised	Consent was exercised	N/A
9. Optional review provision for environmental effects	Next review date available June 2017, no review required	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 40 Consent compliance table

Consent Number	Description	Environmental compliance	Administrative performance
2051-4	To take water from the Inaha Stream for a rendering operation	High	High
2049-4	To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream	Good	High
2050-4	To discharge cooling water to Inaha tributary	High	High
5426-1	To discharge stormwater to Inaha tributary	Good	High
4058-4	To discharge emissions to air	Improvement required	Good
3941-2	To discharge treated wastewater to land	Improvement required	High
5495-1	To discharge wastes from meat rendering by burial	High	High
6431-1	To place culverts in Inaha Stream	High	High
7234-1	To disturb and realign Inaha Stream	Not exercised	
7239-1	To discharge stormwater and sediment from re-contouring land and realigning Inaha Stream	Not exercised	
9756-1	To take and use groundwater for industrial water supply	High	High
10054-1	To discharge emissions into the air from the burning of pallets, paper and cardboard	High	High

Table 41 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2009-2010	2051-4			1	
	2049-4		1		
	2050-4	1			
	5426-1			1	
	4058-3			1	
	3941-2		1		
	5495-1	1			
	6431-1		1		
	7234-1	1			
	7329-1	1			
2010-2012	2051-4			1	
	2049-4	1			
	2050-4	1			
	5426-1			1	
	4058-3/4			1	
	3941-2		1		
	5495-1	1			
	6431-1		1		
	7234-1	1			
	7239-1	1			
2012-2013	2051-4		1		
	2049-4	1			
	2050-4				1
	5426-1			1	
	4058-4				1
	3941-2			1	
	5495-1		1		
	6431-1		1		
	7234-1	1			
	7239-1	1			
2013-2015	2051-4	1			
	2049-4			1	
	2050-4		1		
	5426-1			1	
	4058-4			1	

Year	Consent no	High	Good	Improvement req	Poor
	3941-2			1	
	5495-1		1		
	6431-1		1		
	9756-1	1			
2015-2016	2051-4		1		
	2049-4		1		
	2050-4	1			
	5426-1	1			
	4058-4			1	
	39412			1	
	5495-1		1		
	6431-1	1			
	9756-1	1			
	10054-1		1		
Totals		18	15	14	2

During the year, TBP demonstrated an overall Good level of environmental and High level of administrative performance with the resource consents as defined in Section 1.1.4.

3.4. Recommendations from the 2015-2016 Annual Report

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

1. THAT monitoring of consented activities at Taranaki By-Products in the 2016-2017 year continues at the same level as in 2015-2016.

2. THAT TBP engage a suitably qualified environmental consultant to help them better manage their wastewater system.

   This has been undertaken with a suitably qualified Environmental Consultant engaged to aid with wastewater system management.

   As recommendation 2 has been put to effect by the Company, the recommendation below has not been undertaken.

3. THAT the option for a review of resource consent 3941-2 in June 2017, as set out in condition 26 of the consent, be exercised, on the grounds that the exercise of the consent is resulting in highly elevated nitrate in the groundwater in certain areas.

3.5. Alterations to monitoring programmes for 2017-2018

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

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

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki exercising resource consents.

It is proposed that for 2017-2018 monitoring period that the monitoring of consented activities at Taranaki By-Products Ltd remains unchanged.

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

4. Recommendations

1. THAT in the first instance, monitoring of consented activities at Taranaki By-Products in the 2017-2018 year continues at the same level as in 2016-2017.
2. THAT should there be issues with environmental or administrative performance in 2017-2018, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

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

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

m^2	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
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	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
Zn*	Zinc.

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

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

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Appendix I

Resource consents held by Taranaki By-Products Ltd

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

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 By-Products Limited P O Box 172 HAWERA
Change to Conditions/Review Completed Date:	4 October 2006 [Granted: 31 May 1999]

Conditions of Consent

Consent Granted:	To discharge up to 940 cubic metres/day of treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream at or about GR: Q21:118-858
Expiry Date:	1 June 2019
Review Date(s):	June 2001, June 2003, June 2005, June 2007, June 2011, June 2017
Site Location:	Kohiti Road, Okaiawa
Legal Description:	Lots 1 & 2 DP 6457 Blk IV Waimate SD
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

Special conditions 1 – 5 (unchanged]

1. The mixing zone in each condition of this consent shall extend for a distance of 30 metres downstream of the point of discharge of treated wastewater.

2. The boundaries of the mixing zone and site of discharge shall be as physically determined by the Chief Executive, Taranaki Regional Council.

3. The point of discharge into the Inaha Stream shall be such that the discharge enters directly into a channel of the Inaha Stream in order to ensure that complete mixing occurs.

4. The consent holder shall advise the Taranaki Regional Council prior to making any change in the processes undertaken at the site which could significantly alter the nature of the discharge.

5. The consent holder shall undertake such monitoring of the activities licensed by this consent, as deemed reasonably necessary by the Chief Executive, Taranaki Regional Council, subject to section 35(2)(d) and section 36 of the Resource Management Act 1991. This monitoring information is to be forwarded to the Chief Executive, Taranaki Regional Council, upon request.

Special condition 6 [amended]

6. A minimum dilution rate of 1:300 shall be maintained at the point of discharge to the Inaha Stream at all times.

Special condition 7 [replaced]

7. a) No stick-water shall be discharged under this consent. Stick-water is defined as juices squeezed out of products that are rendered.

   b) This consent allows the discharge of wastewater from up to 1,200 cows. Prior to this number being increased the consent holder must demonstrate, in writing, to the satisfaction of the Chief Executive Officer, Taranaki Regional Council, that the wastewater treatment system can treat the wastewater without breaching condition 9 of this consent.

Special conditions 8- 12 [unchanged]

8. The discharge shall cease when flows decrease in the Inaha Stream, as measured at the Kohiti Road gauging site, to below 100 litres/second.

9. The discharge [in conjunction with any other discharges pertaining to the same property], shall not cause or give rise to any of the following effects, at any point in the receiving waters below the mixing zone:

   (a) a fall of more than 0.5 pH units;
   (b) an increase in filtered carbonaceous biochemical oxygen demand [20 degrees Celsius, 5-day test] to above 2.00 gm^{-3};
   (c) a temperature rise of more than 3.0 degrees Celsius;
   (d) a reduction in the dissolved oxygen concentration to below 80% of saturation concentration;
   (e) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   (f) any conspicuous change in the colour or visual clarity;
   (g) any emission of objectionable odour;
   (h) the rendering of fresh water unsuitable for consumption by farm animals;
   (i) any significant adverse effects on aquatic life, habitats or ecology;
   (j) any visible bacterial and/or fungal growths in the receiving water.

10. The discharge, in conjunction with any other discharges pertaining to the same property, shall not raise the total ammonia concentration [expressed as NH_3] in the receiving waters at any point below the mixing zone above 1.5 gm^{-3} if the pH of the receiving water is below 7.75, or above 0.7 gm^{-3} if the pH of the receiving water lies between 7.75 and 8.00, or above 0.4 gm^{-3} if the pH of the receiving water is above 8.00.

11. The consent holder shall install a metal control gate on the discharge outlet, and install and operate a v-notch weir and stage board on the outlet, to the satisfaction of the Chief Executive, Taranaki Regional Council; and shall keep records of the discharge rate during the exercise of this consent; such records to be made available to the Chief Executive, Taranaki Regional Council, upon request.

12. The consent holder shall install and maintain a stage board on the Kohiti Road Bridge and shall gauge the site for the purpose of providing a stream flow monitoring site, to the satisfaction of the Chief Executive, Taranaki Regional Council.

Special condition 13 [amended)

13. The consent holder shall maintain a wastewater disposal management plan [the management plan] for the wastewater treatment system, to the approval of the Chief Executive, Taranaki Regional Council, outlining the management of the system, particularly the use of the spray irrigation system in combination with the pond discharge, which shall demonstrate the ability to comply with consent conditions and shall address the following matters:

    (a) monitoring of the discharge wastewater;
    (b) monitoring of the receiving water;
    (c) management of the wastewater treatment system;
    (d) minimisation of nutrients in the discharge wastewater;
    (e) treatment and disposal of stickwater;
    (f) mitigation of the effects of the discharge;
    (g) guidelines for use of spray irrigation or discharge to surface water; and
    (h) reporting on the exercise of the consent.

    An objective of the plan shall be to minimise discharges to surface water and to maximise discharges to land under consent 3941.

Special condition 14 [unchanged]

14. The consent shall be exercised in accordance with the procedures set out in the wastewater disposal management plan, and the consent holder shall subsequently adhere to and comply with the procedures, requirements, obligations and all other matters specified in the management plan, except by the specific agreement of the Chief Executive, Taranaki Regional Council. In case of any contradiction between the management plan and the conditions of this resource consent, the conditions of this resource consent shall prevail.

Special condition 15 [amended]

15. The consent holder shall advise the Taranaki Regional Council two months prior to any changes being made to the wastewater disposal management plan. Should the Taranaki Regional Council wish to review the wastewater disposal management plan, two months notice shall be provided to the consent holder. The consent holder shall review the plan annually and shall provide the reviewed plan to the Chief Executive, Taranaki Regional Council, by 31 May each year.

Special conditions 16-18 [unchanged]

16. The consent holder shall designate an officer with the necessary qualifications and/or experience to manage the wastewater treatment system.

17. The consent holder shall ensure that:

    (a) the operation of the wastewater treatment system shall be carried out at all times in accordance with the requirements of the wastewater disposal management plan prepared as required in condition (13) above or subsequent version of that document which does not lessen environmental protection standards;

    (b) all relevant site staff are to be regularly trained on the content and implementation of the wastewater disposal management plan, the maximum period between training sessions being 12 months. New staff are to be trained on recruitment and the training record made available to the Chief Executive, Taranaki Regional Council, upon request; and

    (c) all relevant site staff are advised immediately of any revision or additions to the wastewater disposal management plan.

18. By the agreement of the consent holder, the consent holder shall mitigate the effects of the discharge by donating annually to the Taranaki Tree Trust $2100 [goods and services tax exclusive] for the purpose of providing riparian planting and management in the Inaha Stream catchment. The amount shall be adjusted annually according to the consumer price index, or similar index, to account for the effects of inflation.

Special condition 19 [amended]

19. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2007, June 2011, and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which 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 4 October 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

TRK992050

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 BY-PRODUCTS LIMITED PO BOX 172 HAWERA
Renewal Granted Date:	31 May 1999

CONDITIONS OF CONSENT

Consent Granted:	TO DISCHARGE UP TO 2,160 CUBIC METRES/DAY OF COOLING WATER AND BACKWASH WATER FROM A RENDERING OPERATION INTO AN UNNAMED TRIBUTARY OF THE INAHA STREAM AT OR ABOUT GR: Q21:118-858
Expiry Date:	1 June 2019
Review Date[s]:	June 2001, June 2003, June 2005, June 2011 and June 2017
Site Location:	KOHITI ROAD OKAIAWA
Legal Description:	LOTS 1 & 2 DP6457 BLK IV WAIMATE SD
Catchment:	INAHA 351.000
Tributary:	UNNAMED TRIBUTARY

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

TRK992050

General conditions

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

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

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

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

Special Conditions

1. THAT the consent holder shall undertake such monitoring of the activities licensed by this consent, as deemed reasonably necessary by the General Manager, Taranaki Regional Council, subject to section 35(2)(d) and section 36 of the Resource Management Act 1991. This monitoring information is to be forwarded to the General Manager, Taranaki Regional Council, upon request.

2. THAT the discharge shall not contain concentrations of any chemical, biological or physical contaminant [other than heat and suspended solids] greater than those found in the water abstracted from the Inaha Stream.

3. THAT the cooling water discharge to the Inaha Stream shall not exceed 35.0 degrees Celsius in temperature at the point of the discharge to the unnamed tributary of the Inaha Stream.

4. THAT the cooling water discharge to the Inaha Stream shall not contain a concentration of suspended solids in excess of 100 gm^{-3}

5. THAT after allowing for a mixing zone of 45 metres extending downstream of the confluence of the unnamed tributary with the Inaha Stream, the discharge [in conjunction with any other discharge pertaining to the same property], shall not give rise to any of the following effects in the receiving waters:

(a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
(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, habitats or ecology;
(f) any visible bacterial and/or fungal growths; and
(g) an increase in temperature of more than 3.0 degrees Celsius.

6. THAT the consent holder shall operate and maintain, to the satisfaction of the General Manager, Taranaki Regional Council, a discharge temperature measuring device and shall keep records of the discharge temperature during the exercise of this consent; such records to be made available to the General Manager, Taranaki Regional Council, upon request.

7. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2001, June 2003, June 2005, June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 31 May 1999

For and on behalf of
TARANAKI REGIONAL COUNCIL

_____
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:	Taranaki By-Products Limited PO Box 172 Hawera 4640
Decision Date (Change):	21 January 2015
Commencement Date (Change):	21 January 2015 (Granted: 31 May 1999)

Conditions of Consent

Consent Granted:	To take up to 2,160 cubic metres/day (50 litres/second) of water from the Inaha Stream for a rendering operation
Expiry Date:	1 June 2019
Review Date(s):	June 2017
Site Location:	Kohiti Road, Okaiawa
Legal Description:	Lot 3 DP 378038 Lot 2 DP 410593 Lots 2-3 DP 6457 (Site of take)
Grid Reference (NZTM)	1701884E-5624101E
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

1. That the means of taking water shall be maintained to the satisfaction of the Chief Executive, Taranaki Regional Council.

2. That a minimum flow of at least 25 litres/second shall be maintained in the stream at all times downstream of the point of abstraction.

3. That the consent holder shall install and operate to the satisfaction of the Chief Executive, Taranaki Regional Council, an abstraction rate measuring device and shall keep records of the dates and daily quantities of water abstracted during the exercise of this consent; such records to he made available to the Chief Executive, Taranaki Regional Council, upon request.

4. That the consent holder shall to the satisfaction of the Chief Executive, Taranaki Regional Council, monitor and keep daily records of the flows in the lnaha Stream at the Kohiti Road Bridge; such records to be made available to the Chief Executive, Taranaki Regional Council, upon request.

5. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2017, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which 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 21 January 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:	Taranaki By-Products Limited P O Box 172 HAWERA 4640
Change To Conditions Date:	9 November 2009 [Granted: 15 December 1999]

Conditions of Consent

Consent Granted:	To discharge up to 1400 cubic metres/day of treated wastewater from a rendering operation and from a farm dairy via spray irrigation onto and into land, and to discharge emissions into the air, in the vicinity of the Inaha Stream and its tributaries
Expiry Date:	1 June 2019
Review Date(s):	June 2011, June 2014, June 2017
Site Location:	Kohiti Road, Okaiawa
Legal Description:	Existing areas: Lot 1 DP 6457 Pt Sec 93 Blk IV Waimate SD [factory site], Lot 1 DP 378038, Pt Sec 93 Lots 2 & 3 DP 6457 Ngatimanuhiakai 17B2 17A2 17A3 Sec 88 Pt Sec 90 Lot 1 DP 10174 Lot 1 DP 11864 Pt Secs 90 & 94 DP SO219 Pt Sec 8 Sec 9 Pt Sec 154 Pt Sec 87 & Sec 89 Lot 2 DP 10412 Sec 92 Ngatimanuhiakai 3B Pt Sec 149 Ngatimanuhiakai 17B1 Lots 1 & 2 DP 4415 Sec 151 Blk IV Waimate SD New areas: Ngatimanuhiakai 3A Blk IV Waimate SD, Ngatimanuhiakai 2A & 2B Blk, Ngatimanuhiakai 4A Blk IV Waimate SD, Ngatimanuhiakai 10A2 Blk IV Waimate SD, Lot 1 DP 5153 Sec 86 Blk Waimate SD, Lot 1 DP 10412 Lot 2 DP 11864 Pt Sec 94 Blk IV Waimate SD, Ngatimanuhiakai 7C1 Blk IV Waimate SD [between the following points; NW (1700589E-5625245N), NE (1700909E-5625245N), SW (1700631E-5625092N), SE (1700921E-5625046N)
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

Condition 1 – new

1. The discharge authorised by this consent shall only occur on the land shown in the map labelled Figure 1 attached.

Conditions 2 to 12 [previously conditions 1 to 11] – unchanged

Management plan

2. Prior to the exercise of the consent, the consent holder shall provide, and subsequently shall maintain, a spray irrigation management plan, to the approval of the Chief Executive, Taranaki Regional Council, outlining the management of the system, which shall demonstrate ability to comply with consent conditions and shall address the following matters:

a) designated application areas;
b) selection of appropriate irrigation methods for different types of terrain;
c) application rate and duration;
d) application frequency;
e) farm management and operator training;
f) soil and herbage management;
g) prevention of runoff and ponding;
h) minimisation and control of odour effects offsite;
i) operational control and maintenance of the spray irrigation system;
j) monitoring of the effluent [physicochemical];
k) monitoring of soils and herbage [physicochemical];
l) monitoring of groundwater beneath the irrigated area [physicochemical];
m) monitoring of drainage water downslope of the irrigated area [physicochemical];
n) monitoring of Inaha Stream and relevant tributaries;
o) remediation measures;
p) liaison with submitters to the consent, and interested parties;
q) reporting monitoring data;
r) procedures for responding to complaints; and
s) notification to the Council of non-compliance with the conditions of this consent.

An objective of the plan shall be to maximise discharges to land and to minimise discharges to surface water under consent 2049.

3. The consent shall be exercised in accordance with the procedures set out in the spray irrigation management plan, and the consent holder shall subsequently adhere to and comply with the procedures, requirements, obligations and other matters specified in the management plan, except by the specific agreement of the Chief Executive, Taranaki Regional Council. In case of any contradiction between the management plan and the conditions of this resource consent, the conditions of this resource consent shall prevail.

4. The spray irrigation management plan described in special condition 2 of this consent shall be subject to review upon two months notice by either the consent holder or the Taranaki Regional Council. Further, the consent holder shall review the spray irrigation management plan annually and shall provide the reviewed plan to the Chief Executive, Taranaki Regional Council, by 31 May each year.

5. The consent holder shall designate an officer with the necessary qualifications and/or experience to manage the spray irrigation system. The officer shall be regularly trained on the content and implementation of the spray irrigation management plan, and shall be advised immediately of any revision or additions to the spray irrigation management plan.

6. The consent holder shall at all times adopt the best practicable option or options, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise the adverse effects of the discharges on the environment. This shall include, but not be limited to the minimisation of total nitrogen concentration in the treated effluent.

7. In circumstances where spray irrigation of wastewater is not possible, and where a dilution rate of 1:200 in the Inaha Stream cannot be maintained, the consent holder shall seek the permission of the Chief Executive, Taranaki Regional Council, prior to discharging wastewater to the Inaha Stream.

Odour and spray effects

8. The level of dissolved oxygen within the wastewater pond from which irrigation water is drawn shall be maintained above 1.0 gm^{-3} at all times.

9. There shall be no offensive or objectionable odour as a result of the irrigation of treated wastewater at or beyond the boundary of the property or properties on which spray irrigation is occurring.

10. There shall be no spray drift as a result of the irrigation of treated wastewater at or beyond the boundary of the property or properties on which spray irrigation is occurring.

Land effects

11. The sodium adsorption ratio [SAR] of the wastewater shall not exceed 15.

12. There shall be no ponding of wastewater, and/or any direct discharge to a watercourse due to the exercise of this consent.

Condition 13 [previously condition 12 - changed]

13. The edge of the spray zone shall be at least:

    a) 25 metres from the banks of any watercourse;
    b) 50 metres from any bore, well or spring used for water supply purposes;
    c) 20 metres from any public road, except as detailed in f) and g) of this condition;
    d) 20 metres from any property boundary;
    e) 150 metres from any dwellinghouse or place of public assembly unless the written approval of the occupier has been obtained to allow the discharge at a lesser distance;
    f) 200 metres from Normanby Road adjacent to the property described as Lots 3 & 4, Pt Lot 1 DP 2707, Lot 1 DP 3731, Blk IV, Waimate SD, unless the written approval of the occupier has been obtained to allow the discharge at a lesser distance; and
    g) 50 metres from Ahipaipa Road adjacent to the properties described as Pt Lot 1 and Lot 2 DP 3322, Lot 2 DP12129, Blk IV, Waimate SD.

Conditions 14 to 26 [previously conditions 13 to 25] – unchanged

14. The effluent application rate shall not exceed 300 kg nitrogen/hectare/year except on land described as Pt Sec 154 Blk IV Waimate SD, where the effluent application rate shall not exceed 200 kg/nitrogen/hectare/year.

15. The consent holder shall investigate, and report in writing on, options for upgrading the wastewater treatment system to reduce the concentration of ammonia in the wastewater prior to discharge; the report to be received by the Chief Executive, Taranaki Regional Council, not later than twelve months from the date the consent is granted. Any necessary works associated with the report on reduction of ammonia concentrations shall be completed within twelve months after the receipt of the report.

16. The average application rate shall not exceed 5 mm/hour.

17. The return period between applications shall be at least seven days and the application depth shall not exceed 25 mm at each application.

Monitoring and liaison

18. The consent holder shall site, install and maintain to the satisfaction of the Chief Executive, Taranaki Regional Council, a minimum of nine monitoring bores for the purpose of determining groundwater quality in the vicinity of the discharge. The bores are to be sited in the following locations: upslope of the Kohiti Road and Katotauru Road irrigation areas (2), at the southern boundary of the western Normanby Road irrigation area (2), within the Normanby Road, Kohiti Road and Katotauru Road irrigation areas (3), at the southern boundary of the Katotauru irrigation area, and at the southern boundary of the Ahipaipa Road irrigation area. The spring downslope of the Normanby Road irrigation area, and three bores in the vicinity of Inuawai Road shall also be monitored.

19. The consent holder shall undertake such baseline and operational monitoring of the activities licensed by this consent, as deemed reasonably necessary by the Chief Executive, Taranaki Regional Council.

20. The consent holder and staff of the Regional Council shall meet as appropriate, quarterly or at such other frequency as the parties may agree, with representatives of Ngati Manuhiakai Hapu and other interested submitters to the consent, and any other interested party at the discretion of the Chief Executive, Taranaki Regional Council, to discuss any matter relating to the exercise of the resource consent, in order to facilitate ongoing consultation.

21. The consent holder shall, where practicable, advise the Chief Executive, Taranaki Regional Council, and representatives of Ngati Manuhiakai Hapu, prior to discharge to Inaha Stream under consent 2049.

Mitigation

22. Should monitoring of the discharge under conditions 14 and 18 indicate contamination of local groundwater as a result of the exercise of this consent, the consent holder shall:

    a) undertake appropriate remedial action as soon as practicable as described in the spray irrigation management plan prepared under condition 2, or such action reasonably required by the Chief Executive, Taranaki Regional Council;
    b) shall review the spray irrigation management plan and incorporate such reasonable modifications as are considered necessary by the Chief Executive, Taranaki Regional Council; and
    c) where water supplies are significantly affected, immediately provide alternative supplies as reasonably required by the Chief Executive, Taranaki Regional Council.

Review

23. The consent holder may apply to the Council for a change or cancellation of any of the conditions of this consent in accordance with section 127(1)(a) of the Resource Management Act 1991 to take account of operational requirements or the results of monitoring.

24. The Taranaki Regional Council may review conditions 7 and 14 of this consent within two weeks after the completion of works to be investigated under condition 15 of this consent, for the purpose of evaluating the appropriateness of the required dilution rate and application rate, and the effects of the discharge on the Inaha Stream and soil.

25. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2001, and/or June 2007, for the purpose of assessing the need to increase the land area for wastewater disposal, reduce nitrogen loading to land and/or increase treatment at the wastewater treatment system to reduce the nitrogen concentration of the effluent.

26. The Taranaki Regional Council may, pursuant to section 128 of the Resource Management Act 1991, review any or all of the conditions of this consent by giving notice of review during June 2001, June 2003, June 2005, June 2007, June 2009, June 2011, June 2014 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which either were not foreseen at the time the application was considered or which it was not appropriate to deal with at that time.

Signed at Stratford on 9 November 2009

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

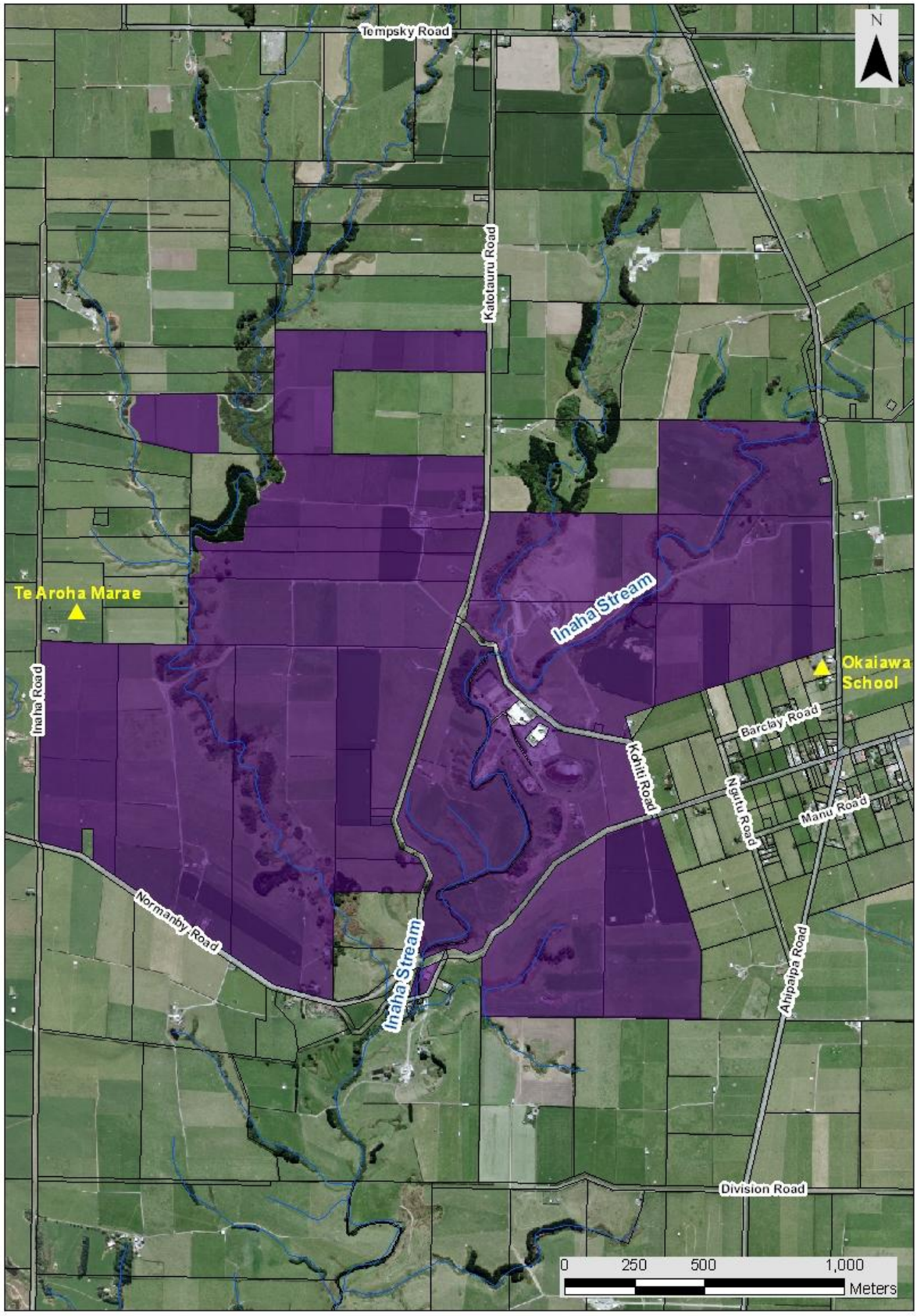

Figure 1 Location of the authorised area to receive wastewater, via spray irrigation, onto and into land

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 By-Products Limited P O Box 172 HAWERA 4640
Decision Date:	11 October 2011
Commencement Date:	11 October 2011

Conditions of Consent

Consent Granted:	To discharge emissions into the air from rendering operations and associated processes including wastewater treatment at or about (NZTM) 1701965E-5624119N and burial of material at or about (NZTM) 1702416E-5624339N
Expiry Date:	1 June 2024
Review Date(s):	June 2013, June 2015, June 2017, June 2019, June 2021, June 2023
Site Location:	Kohiti Road, Okaiawa
Legal Description:	Lot 3 DP 378038 Lot 2 DP 410593 Lots 2-3 DP 6457, Lot 1 DP 6457 Blk IV Waimate SD, Lot 1 DP 410593 [TBE], Lot 1 DP 10174 Lot 1 DP 11864 Sec 88 Pt Sec 90 Blk IV Waimate 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 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 actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

2. The discharge authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that is offensive or objectionable.

   Note: With respect to this condition, the consent holder's site is defined as the areas shown in the map attached.

3. For the purposes of condition 2, an odour shall be deemed to be offensive or objectionable if:

   a. it is held to be so in the opinion of an enforcement officer of the Taranaki Regional Council, having regard to the duration, frequency, intensity and nature of the odour; and/or
   b. an officer of the Taranaki Regional Council observes that an odour is noticeable, and either it lasts longer than two (2) hours continuously, or it occurs frequently during a single period of more than four (4) hours; and/or
   c. no less than two individuals from at least two different properties, each declare in writing that an objectionable or offensive odour was detected beyond the boundary of the site, provided the Council is satisfied that the declarations are not vexatious and that the objectionable or offensive odour was emitted from the site at the frequency and duration specified in (b). Each declaration shall be signed and dated and include:

      1. the individuals' names and addresses;
      2. the date and time the objectionable or offensive odour was detected;
      3. details of the duration, frequency, intensity and nature of the odour that cause it to be considered offensive or objectionable;
      4. the location of the individual when it was detected; and
      5. the prevailing weather conditions during the event.

4. The consent holder shall continue to employ a suitably qualified and experienced person in the role of Environmental Manager, whose responsibilities shall include ensuring compliance with the conditions of this consent.

5. No fish or fish parts shall be received or processed on the premises.

6. By 30 April 2013, and every two years thereafter, the consent holder shall provide certification by a suitably qualified independent person that the works , processes and equipment relevant to all discharges to air from the site are operational in accordance with good engineering practice.

7. Before 2 February 2012, 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 of this consent. The plan shall include but not necessarily be limited to;

    a. A description of the air quality objectives sought by the plan;

    b. The identification of key personnel responsible for managing air discharges and implementing the Management Plan;

    c. A description of the activities on the site and 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 situations, 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 or 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.

8. Operations on site shall be undertaken in accordance with the Air Discharge Management Plan, required by condition 7 above.

9. The Air Discharge Management Plan described in special condition 7 of this consent shall be subject to review upon two months notice by either the consent holder or the Taranaki Regional Council. Further, the consent holder shall review the management plan annually and provide the reviewed plan to the Taranaki Regional Council, by 31 May each year.

10. 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^2/day; and/or

    b. suspended dust level 3 mg/m^3.

11. The consent holder shall consult and inform the local community about activities on the site, specifically those relating to the exercise of this consent, by:

    a. Four times per year, providing a newsletter to all landowners and/or occupiers of properties within 3 kilometres of the site; and

    b. Convening a meeting with the Director - Resource Management, Taranaki Regional Council (or their delegate), and the local community annually or at such other frequency as the parties may agree.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2013 and/or every two years thereafter. The purpose of any review would be to ensure 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. When determining if any review is required the Council will take into account any expressed views of the Okaiawa community.

Signed at Stratford on 11 October 2011

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

TRK995426

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 BY-PRODUCTS LIMITED PO BOX 172 HAWERA
Consent Granted Date:	31 May 1999

CONDITIONS OF CONSENT

Consent Granted:	TO DISCHARGE UP TO 1,095 LITRES/SECOND OF STORMWATER FROM AN ANIMAL RENDERING SITE INTO AN UNNAMED TRIBUTARY OF THE INAHA STREAM AT OR ABOUT GR: Q21:119-858, Q21:120-858 AND Q21:121-858
Expiry Date:	1 June 2019
Review Date[s]:	June 2001, June 2003, June 2005, June 2011 and June 2017
Site Location:	KOHITI ROAD OKAIAWA
Legal Description:	LOTS 1 & 2 DP6457 BLK IV WAIMATE SD
Catchment:	INAHA 351.000
Tributary:	UNNAMED TRIBUTARY

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

TRK995426

General conditions

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

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

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

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

Special conditions

1. THAT the consent holder shall advise the Taranaki Regional Council prior to making any change in the processes undertaken at the site which could significantly alter the nature of the discharge.

2. THAT the discharge shall not exceed the following parameters:

Component	Concentration
pH range	6-9
oil and grease	15 gm^{-3}
suspended solids	100 gm^{-3}

This condition shall apply prior to the entry of the discharge into the receiving water at designated sampling point[s] approved by the General Manager, Taranaki Regional Council.

3. THAT after allowing for reasonable mixing, within a mixing zone extending 45 metres from the confluence of the unnamed tributary with the Inaha Stream, the discharge [in conjunction with any other discharges pertaining to the same property], shall not give rise to any of the following effects in the receiving waters:

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

(b) any conspicuous change in the colour or visual clarity;

(c) any emission of objectionable odour;

(d) the rendering of freshwater unsuitable for consumption by farm animals;

(e) any significant adverse effects on aquatic life, habitats or ecology; and

(f) any visible bacterial and/or fungal growths.

4. THAT within three months of the granting of this consent, the consent holder shall prepare a contingency plan outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.

5. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2001, June 2003, June 2005, June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 31 May 1999

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 By-Products Limited P O Box 172 HAWERA
Change To Conditions Date:	4 August 2000 [Granted: 30 March 2000]

Conditions of Consent

Consent Granted:	To discharge up to 200 tonnes/day of wastes from meat rendering operations by burial into land in the vicinity of the Inaha Stream at or about GR: Q21:121-859
Expiry Date:	1 June 2019
Review Date(s):	June 2001, June 2003, June 2005, June 2011, June 2017
Site Location:	Kohiti Road, Okaiawa
Legal Description:	Lot 1 DP 10174 Lot 1 DP 11864 Sec 88 Pt Sec 90 SO 268 Blk IV Waimate SD
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

special condition 1 [amended]

1. THAT by 1 November 2000, the consent holder shall provide a waste burial management plan, to the approval of the General Manager, Taranaki Regional Council, outlining the management of the system, which shall demonstrate ability to comply with consent conditions and shall address the following matters:

a) nature of wastes discharged;
b) discharge control;
c) waste cover;
d) addition of hydrated lime to stabilise the wastes;
e) minimisation and control of odour effects offsite;
f) stormwater control;
g) leachate management;
h) monitoring of groundwater beneath the burial area [physicochemical];
i) site re-instatement and after care (including maintaining the integrity of the cover material);
j) site contouring;
k) reporting monitoring data;
l) procedures for responding to complaints; and
m) notification to the Council of non-compliance with the conditions of this consent.

special conditions 2-5 [unchanged]

2. THAT the consent shall be exercised in accordance with the procedures set out in the waste burial management plan, and the consent holder shall subsequently adhere to and comply with the procedures, requirements, obligations and other matters specified in the management plan, except by the specific agreement of the General Manager, Taranaki Regional Council. In case of any contradiction between the management plan and the conditions of this resource consent, the conditions of this resource consent shall prevail.

3. THAT the waste burial management plan described in special condition 1 of this consent shall be subject to review upon two months notice by either holder the Taranaki Regional Council.

4. THAT the consent holder shall designate an officer with the necessary qualifications and/or experience to manage the waste burial site. The officer shall be regularly trained on the content and implementation of the burial management plan, and shall be advised immediately of any revision or additions to the burial management plan.

5. THAT the disposal pit[s] shall not intercept shallow groundwater.

special conditions 6 – 7 [amended]

6. THAT the disposal pits shall be constructed when required in general accordance with the information supplied by the applicant in support of application 1084.

7. THAT the consent holder shall notify the Council of the commencement to construct additional disposal pits outside of the disposal area indicated in the map supporting the application.

special condition 8 [unchanged]

8. THAT an officer of the Council is to inspect all constructed disposal pits prior to disposal operations.

special condition 9 [amended]

9. THAT special conditions 1 to 4 shall apply after 1 November 2000 when the disposal pit required by special condition 6 is constructed and also for all subsequent disposal pits.

special conditions 10 – 15 [unchanged]

10. THAT the discharged material shall be covered within a period of four hours or less so as to avoid the generation of offensive offsite odours.

11. THAT at the completion of the disposal operation a low permeability, clean, compacted soil cover with a minimum thickness of 1.0m be placed over the discharged wastes.

12. THAT the cover material and surrounding land shall be contoured such that all stormwater is directed away from the disposal area to the satisfaction of the General Manager, Taranaki Regional Council.

13. THAT the disposal site shall be rehabilitated and pasture re-established to the satisfaction of the General Manager, Taranaki Regional Council.

14. THAT there shall not be any irrigation of effluent under resource consent 3941 or resource consent 2466 onto the disposal area.

15. THAT the exercise of this consent shall not lead, or be liable to lead, to a direct discharge of contaminants to a surface water body.

special condition 16 [amended]

16. THAT the consent holder shall install and maintain, to the satisfaction of the General Manager, Taranaki Regional Council, a minimum of eight monitoring bores for the purpose of determining groundwater quality in the vicinity of the discharge.

special condition 17-18 [unchanged]

17. THAT the consent holder may apply to the Council for a change or cancellation of any of the conditions of this consent in accordance with section 127(1)(a) of the Resource Management Act 1991 to take account of operational requirements or the resources of monitoring.

18. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2001, June 2003, June 2005, June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent, which was 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 4 August 2000

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Consent 6431-1

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:	Taranaki By-Products Limited P O Box 172 HAWERA
Consent Granted Date:	4 October 2004

Conditions of Consent

Consent Granted:	To erect, place and maintain two culverts in the Inaha Stream for farm access purposes at or about GR: Q21:121-860 and Q21:125-863
Expiry Date:	1 June 2023
Review Date(s):	June 2011, June 2017
Site Location:	Kohiti Road, Hawera
Legal Description:	Secs 89 & 90 Blk IV Waimate SD
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this resource consent.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3271. In the case of any contradiction between the documentation submitted in support of application 3271 and the conditions of this consent, the conditions of this consent shall prevail.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the commencement and upon completion of the initial installation and again at least 48 hours prior to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the river bed or discharges to water.

4. Once initial work is complete, any further instream works shall take place only between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

5. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.

6. The consent holder shall ensure the area and volume of riverbed disturbance shall, so far as practicable, be minimised and any areas which are disturbed shall, so far as practicable, be reinstated.

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

8. The structures which are the subject of this consent shall not restrict the passage of fish.

9. The consent holder shall prevent stock at all times from accessing all water bodies, including wetlands, on or bordering the consent holder's property, upstream of Kohete Road bridge, by constructing and maintaining fences or other controls, located to provide for the establishment of riparian margins; such means of prevention to be established within four years of the granting of this consent.

10. The consent holder shall undertake planting and subsequent maintenance of the riparian margins of the water bodies within the fenced or controlled area(s) as required by special condition 9, to the satisfaction of the Chief Executive, Taranaki Regional Council, within four years of the granting of this consent, for the purpose of enhancing water quality and aquatic habitat.

11. The invert of the culverts shall be not less than 50 mm below the bed of the stream. Appropriate headwall structures shall be constructed to protect the intake and outlet of the culverts from erosion.

12. This consent shall lapse on the expiry of five years after the date of issue of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and / or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 4 October 2004

For and on behalf of
Taranaki Regional Council

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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:	Taranaki By-Products Limited P O Box 172 HAWERA
Consent Granted Date:	12 March 2008

Conditions of Consent

Consent Granted:	To realign a section of approximately 350 metres of the Inaha Stream for land improvement purposes at or about 2612637E-6186381N
Expiry Date:	1 June 2023
Review Date(s):	June 2011, June 2017
Site Location:	533 Ahipaipa Road, Okaiawa
Legal Description:	Sec 89 Blk IV Waimate SD Lot 2 DP 10412 Pt Sec 87 Blk IV Waimate SD
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

1. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4881. In the case of any contradiction between the documentation submitted in support of application 4881 and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

3. A rock wall consisting of interlocking boulders of an average diameter of at least 1 metre shall be constructed on the outside of the bend at the downstream end of the realignment to protect that bank from erosion. The rock wall and bank over this reach shall be no steeper than 2 horizontal to 1 vertical.

4. Any instream works shall take place only between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

5. The consent holder shall ensure that the area and volume of riverbed disturbance shall, so far is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.

6. The consent holder shall take all reasonable steps to:

a. minimise the amount of sediment discharged to the stream;
b. minimise the amount of sediment that becomes suspended in the stream; and
c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region,* by the Taranaki Regional Council, will achieve compliance with this condition.

7. Immediately before water is diverted away from the existing stream channel the consent holder shall ensure that fish are removed from the channel to be dewatered and released to a reach with suitable habitat. Fish to be removed shall be captured using electric fishing, or other accepted fish capture techniques that achieve similar results.

8. The stream realignment shall not obstruct fish passage.

9. Any vegetation removed during the realignment shall not be buried within 25 metres of the Inaha Stream.

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

11. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 12 March 2008

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 By-Products Limited P O Box 172 HAWERA
Consent Granted Date:	30 June 2008

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks associated with the re-contouring of land and the re-aligning of a section of the Inaha Stream onto and into land and into the Inaha Stream at or about (NZTM) 1702455E-5624812N
Expiry Date:	1 June 2023
Review Date(s):	June 2011, June 2017
Site Location:	533 Ahipaipa Road, Okaiawa
Legal Description:	Sec 89 & Lot 2 DP 10412 Pt Sec 87 Blk IV Waimate SD
Catchment:	Inaha

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

General conditions

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

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

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

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

Special conditions

1. The exercise of this consent shall be undertaken in accordance with the documentation submitted in support of application 6022. If there is any conflict between the documentation submitted in support of application 6022 and the conditions of this consent, the conditions of this consent shall prevail.

2. The discharge shall not derive from an area of soil disturbance greater than 8 hectares.

3. The discharge shall not derive from a volume of soil disturbance greater than 24, 000 cubic metres.

4. While any area of soil is exposed, all run off from that area shall pass through settlement ponds or sediment traps with a minimum total capacity of 200 cubic metres for every hectare of exposed, unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.

5. The consent holder shall take all reasonable steps to:
   a. minimise the amount of sediment discharged to the stream;
   b. minimise the amount of sediment that becomes suspended in the stream; and
   c. mitigate the effects of any sediment in the stream.

   Subject to condition 2, undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region,* by the Taranaki Regional Council, will achieve compliance with this condition.

6. At least 7 working days prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the proposed works, including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager. The programme shall be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.

7. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.

8. In the event of any archaeological site or koiwi being encountered during the exercise of this consent, activities in the vicinity of the discovery shall cease. The consent holder shall contact the Chief Executive, Taranaki Regional Council, to obtain details of the relevant iwi authority. The consent holder shall then consult with the relevant local iwi, the New Zealand Historic Places Trust and the New Zealand Police and shall not recommence works in the area of the discovery until the relevant Historic Places Trust approvals or other approvals to damage, destroy or modify such sites have been obtained, where necessary.

9. This consent shall lapse five years after the date of issue of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 30 June 2008

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:	Taranaki By-Products Limited P O Box 172 HAWERA 4640
Decision Date:	3 February 2014
Commencement Date:	3 February 2014

Conditions of Consent

Consent Granted:	To take and use groundwater for industrial water supply purposes
Expiry Date:	1 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	179 Katotauru Road, Okaiawa
Legal Description:	Ngatimanuhiakai 2B (Site of take & use)
Grid Reference (NZTM)	1701636E-5624804N
Catchment:	Inaha

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 to section 36 of the Resource Management Act 1991.

Special conditions

1. The total volume of water taken from the 'Bore 3' (GND2380) at a rate not exceeding 22.8 litres per second (1,970 cubic metres per day)

2. The bore shall be easily identifiable by a permanent label, which may be welded or engraved on the casing, or on the equivalent fixed part of the well construction or associated building. The bore shall be labelled with the bore number assigned by Taranaki Regional Council - GND2380.

3. The consent holder shall ensure that there is access into the well that enables the manual measurement of static and pumping water levels.

4. Before exercising this consent the consent holder shall install, and thereafter maintain a water meter and a datalogger at the site of taking (or a nearby site in accordance with Regulation 10 of the *Resource Management (Measurement and Reporting of Water Takes) Regulations 2010*. The water meter and datalogger shall be tamper-proof and shall measure and record the rate and volume of water taken to an accuracy of ± 5%. Records of the date, the time (in New Zealand Standard Time) and the rate and volume of water taken at intervals not exceeding 15 minutes, shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

   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 ± 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.

6. Before exercising this consent, the consent holder shall install and subsequently maintain equipment to measure and record the water level within Bore 3 to an accuracy of ± 0.05 metres at intervals not exceeding 15 minutes.

7. The measurements made in accordance with condition 4 and 6 of this consent, shall be transmitted to the Taranaki Regional Council's computer system, in a format to be advised by the Chief Executive, Taranaki Regional Council, to maintain a 'real time' record of the water taken and bore water levels.The records of water taken and the water level within each bore shall:

   (a) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing; and

   (b) specifically record the water taken as 'zero' when no water is taken.

8. The water meter, level monitoring device and datalogger shall be accessible to Taranaki Regional Council officer's at all reasonable times for inspection and/or data retrieval. The data logger shall be designed and installed so that Council officers can readily verify that it is accurately recording the required information.

9. 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.

10. At all times the consent holder shall adopt the best practicable option (BPO) to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of groundwater, including, but not limited to, the efficient and conservative use of water.

11. This consent shall lapse on 31 March 2019, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2017 and/or June 2023 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 3 February 2014

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 By-Products Limited PO Box 172 Hawera 4640
Decision Date:	21 January 2015
Commencement Date:	21 January 2015

Conditions of Consent

Consent Granted:	To discharge emissions into the air from the burning of pallets, paper and cardboard
Expiry Date:	01 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	Kohiti Road, Okaiawa
Legal Description:	Lot 3 DP 378038 Lot 2 DP 410593 Lots 2-3 DP 6457 (Discharge source & site)
Grid Reference (NZTM)	1701917E-5623971N

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 and shall include as a minimum:
    - having regard to the prevailing and predicted wind speed and direction at the time of burning in order to minimise offsite effects;
    - allowing the waste material to dry before burning;
    - starting a small fire with the driest material and adding further material once it is blazing, as opposed to igniting a large stack and leaving it unattended.

2. The materials for combustion are restricted to untreated wood or sawdust, paper and cardboard.

3. 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 site is defined as Lot 3 DP 378038 Lot 2 DP 410593 Lots 2-3 DP 6457; 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.*

4. The consent holder, or an authorised agent, shall supervise burning at all times.

5. The dust deposition rate beyond the property boundary arising from the discharge shall be less than 0.13 $g/m^2/day$ or 4.0 $g/m^2/30$ days.

6. Any discharge to air from the site shall not give rise to any offensive, objectionable, noxious or toxic levels of dust at or beyond the boundary of the property, and in any case, suspended particulate matter shall not exceed 3 mg/m^3 (measured under ambient conditions) beyond the boundary of the site.

7. The discharges authorised by this consent shall not give rise to a level of a contaminant or contaminants at or beyond the boundary of the site that is noxious or toxic.

8. This consent shall lapse on 31 March 2020, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

9. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2017 and/or June 2023, 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 21 January 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Appendix II

Biomonitoring reports

To	Nathan Crook, Job Manager
From	Brooke Thomas, Scientific Officer
Document	1900159
Date	22 August 2017

Biomonitoring of the Inaha Stream and an unnamed tributary above and below the Taranaki By-Products plant, Okaiawa, March 2017

Introduction

Taranaki By-Products Limited holds a number of consents for discharges to land and to water associated with the operation of a rendering plant and a neighbouring farm owned and operated by the Company. The discharge consents most relevant to this biomonitoring survey are summarised in Table 1 below:

Table 1 Summary of discharge consents held by Taranaki By-Products Limited which are of most relevance to this biological survey.

Consent no.	Purpose
2049-4	To discharge up to 940 cubic metres/day of treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream
2050-4	To discharge up to 2,160 cubic metres/day of cooling water and backwash water from a rendering operation into an unnamed tributary of the Inaha Stream
3941-2	To discharge up to 1400 cubic metres/day of treated wastewater from a rendering operation and from a farm dairy via spray irrigation onto and into land, and to discharge emissions into the air, in the vicinity of the Inaha Stream and its tributaries between 1700909E-5625245N, 1700631E-5625092N and 1700921E-5625046N
5426-1	To discharge up 1,095 litres/second of stormwater from an animal rendering site into an unnamed tributary of the Inaha Stream

Biomonitoring has been undertaken at some sites in relation to the discharges from the rendering plant and associated activities since the mid-1980s. Some of the sites used for the biomonitoring of these discharges have changed over time and these changes have been documented in previous reports (Jansma, 2012 a, b, c).

This summer biological survey was the second of two scheduled in the Inaha Stream catchment in the 2016-2017 monitoring year in relation to discharges from the Taranaki By-Products plant. Results from previous surveys are also referred to in this report (see references).

Methods

This biomonitoring survey was undertaken at eight sites on 01 March 2017 (Table 2 and Figure 1). Five of the eight sites surveyed were in the Inaha Stream and the remaining sites were in an unnamed tributary of the Inaha Stream (Figure 1). The locations of sampling sites in relation to the discharges from the rendering plant are discussed below.

Site U (INH000334) was established in the 2003-2004 monitoring period as an appropriate control site on the Inaha Stream above the rendering plant discharges and irrigation areas. Site 1 (INH000400) is located upstream of the wastewater and cooling water discharge points but downstream of part of the treated wastewater irrigation area. Sites 2d and 3 (INH000420 and INH000430) are located downstream of these two discharges and above the confluence with the unnamed tributary of the Inaha Stream which drains land upon which wastewater is irrigated.

The area of land authorised to be irrigated onto under consent 3941-2 has increased on several occasions since the consent was granted in December 1999. Sites UT, MT and DT (INH000433, INH000435 and INH000440) were established to monitor the effects of the expanded irrigation area on an unnamed tributary of the Inaha Stream. Site UT was established as a 'control site' for the expanded irrigation area. Site MT is located within the authorised irrigation area and site DT is situated downstream of the irrigation area but upstream of the unnamed tributary's confluence with the Inaha Stream.

Site 4 (INH000450) on the Inaha Stream is situated approximately 100 metres downstream of the convergence point between the Inaha Stream and the unnamed tributary.

Table 2 Biomonitoring sites in the Inaha Stream and in an unnamed tributary relating to the Taranaki By-Products plant.

Stream	Site No.	Site code	Location	Sampling method used
Inaha Stream	U	INH000334	Upstream of irrigation area, near Ahipaipa Road	Streambed kick
	1	INH000400	Upstream of treatment ponds, Kohiti Road	Streambed kick
	2d	INH000420	500 m downstream of cooling water discharge	Streambed kick
	3	INH000430	Upstream of Normanby Road	Streambed kick
	4	INH000450	100 m downstream of 'irrigation' tributary confluence	Kick/sweep
Unnamed tributary of Inaha Stream	UT	INH000433	Upstream of irrigation area	Kick/sweep
	MT	INH000435	Middle site within the new irrigation area	Vegetation sweep
	DT	INH000440	50m upstream Normanby Road	Vegetation sweep

Two different sampling techniques were used to collect streambed macroinvertebrates in this survey. The Council's standard '400ml kick-sampling' technique was used at sites U, 1, 2d and 3 and the 'vegetation sweep' technique was used at sites MT and DT. A combination of these two techniques was used at sites 4 and UT (Table 2). The 'kick-sampling' and 'vegetation sweep' techniques are very similar to Protocol C1 (hard-bottomed, semi-quantitative) and C2 (soft-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark *et al*, 2001).

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling

macroinvertebrates in wadeable streams (Stark *et al.* 2001). Macroinvertebrate taxa found in each sample were recorded as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= 20-99 individuals;
VA (very abundant)	= 100-499 individuals;
XA (extremely abundant)	= 500 individuals or more.

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. Averaging the scores from a list of taxa taken from one site and multiplying by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value. A difference of 11 units or more in MCI values is considered significantly different (Stark 1998).

A semi-quantitative MCI value ($SQMCI_s$) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the $SQMCI_s$ is not multiplied by a scaling factor of 20, therefore $SQMCI_s$ values range from 1 to 10, while MCI values range from 20 to 200.

Where necessary, sub-samples of algal and detrital material taken from the macroinvertebrate samples were scanned under 40-400x magnification to determine the presence or absence of any mats, plumes or dense growths of bacteria, fungi or protozoa ('undesirable biological growths') at a microscopic level. The presence of these organisms is an indicator of organic enrichment within a stream. Such heterotrophic growths have been recorded on numerous past occasions at sites downstream of the Taranaki By-Products plant as a result of organic nutrient enrichment from the wastewater discharge.

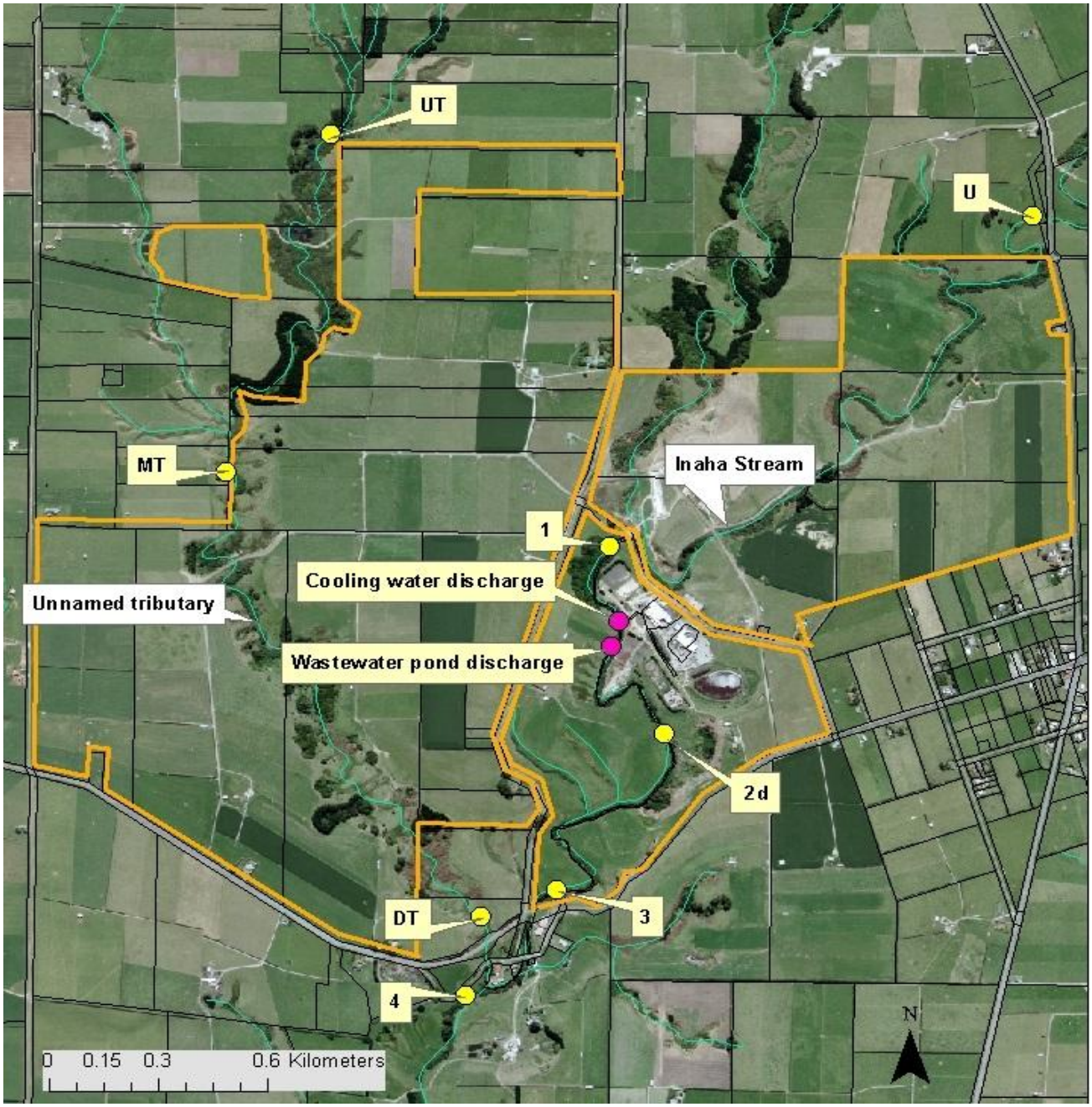

Figure 1 Aerial photo showing biomonitoring sites in the Inaha Stream and an unnamed tributary stream relating to discharges from the Taranaki By-Products plant. The orange line outlines the irrigation areas around the rendering plant.

Results

Site habitat characteristics and hydrology

This March 2017 survey followed a period of 174 days since a fresh in excess of three times median flow in the nearby Waiokura Stream at No. 3 Fairway (the nearest appropriate water level recorder) and 207 days since a fresh in excess of seven times median flow. In the month prior to this survey flow remained steady and slightly below the median level throughout the month. An absence of significant freshes would likely result in increased levels of fine sediment and periphyton accumulating on the streambed.

The Company's records showed that treated wastewater was not discharging to the Inaha stream at the time of this biological survey. The discharge of treated wastewater began on the 27th May 2016, followed by a period of cessation beginning 25th November 2016. The Company briefly discharged again on the 5th April. Cooling water was discharged to the stream throughout this period. The record shows that the minimum dilution of wastewater of 1:300 that is required under consent 2049-4 was maintained throughout the period.

At all of the Inaha Stream sites (U, 1, 2d, 3 and 4) the flow conditions were low and water speeds slow to steady. The flow was uncoloured and clear at sites U, 1 and 2d, and cloudy and uncoloured at sites 3 and 4. Water temperatures in the Inaha Stream ranged between 17.1°C and 24.0°C. In the unnamed tributary of the Inaha Stream, there was an uncoloured, clear and very slow flow at sites MT and DT, and a stagnant brown, dirty pool of very shallow water at site DT. Stream temperatures ranged from 14.3 °C to 18.7 °C during this survey.

Excluding site 4, all of the Inaha Stream sites had predominantly cobble and gravel substrates with varying amounts of silt, sand and boulder. The substrate at site 4 was predominantly sand and bedrock. Substrate in the unnamed tributary of the Inaha Stream comprised predominantly silt at all sites. Site UT also recorded some wood/root, while site MT recorded sand, hard clay and wood/root. Site DT recorded equal amounts of silt and sand with some cobbles and gravels.

Patchy periphyton mats and widespread filaments were recorded at sites U and 1, while slippery mats and patchy filaments were recorded at sites 2d, 3 and 4. Macrophytes were recorded growing at the edges of the stream at sites U, 1 and 2d, while no macrophytes were recorded growing at sites 3 and 4. Site 4 was completely shaded and site U was partially shaded, while all other Inaha Stream sites were unshaded.

In the unnamed tributary of the Inaha Stream, no periphyton was recorded at any of the sites. Macrophytes were recorded growing at the edges and on the bed of the stream at all sites. Site UT was completely shaded, site MT was partially shaded and site DT was completely unshaded.

Streambed microflora

A microscopic inspection of material collected from the bed of the Inaha Stream found no evidence of 'heterotrophic growths '(protozoa or fungi) at any of the sites sampled. This was the sixteenth consecutive survey to record a lack of such growths, continuing the improvement following the late summer 2008 and spring 2009 surveys, which both recorded such growths. This is an important result; as such growth is often associated with 'sewage fungus' which is an indication of high levels of organic matter and nutrient enrichment in the stream. Such growths have been recorded on many previous sampling occasions, often in abundance, particularly downstream of the plant discharges at site 2d. The absence of such growths is evidence that the degree of enrichment is not as severe as that recorded previously.

Macroinvertebrate communities

Results of previous macroinvertebrate surveys performed in the Inaha Stream and the unnamed tributary are summarised and presented together with current results in Table 3.

Table 3 Summary of previous numbers of macroinvertebrate taxa and MCI and $SQMCI_S$ values for surveys between September 1987 and October 2016 together with current results recorded in the Inaha Stream and an unnamed tributary in relation to Taranaki By-Products.

	Number of taxa				MCI values			$SQMCI_s$ values			
	No. samples	Range	Median	Current survey	Range	Median	Current Survey	No. of samples	Range	Median	Current survey
U	32	18-34	23	25	83-102	94	89	32	4.3-6.9	5.3	5.1
1	72	12-31	22	31	82-104	95	85	48	3.6-6.3	5.1	5.5
2d	60	10-30	22	19	52-106	81	102	49	1.2-6.5	2.1	6.2
3	73	6-35	21	21	43-99	81	102	49	1.3-6.4	2.6	6.5
4	29	17-31	26	24	77-104	90	87	29	2.0-6.6	4.2	4.9
UT	12	13-23	19	9	77-109	98	64	12	3.5-6.3	5.4	1.6
MT	25	12-29	20	19	70-94	82	84	25	3.1-5.7	4.4	4.7
DT	26	12-25	21	18	80-105	89	89	26	3.5-5.3	4.6	5.2

Table 4 provides a summary of various macroinvertebrate indices within a specific altitudinal band for 'control' sites situated in Taranaki ring plain streams arising outside of Egmont National Park. The full results from this current survey are given in Table 5 and Table 6.

Table 4 Range and median number of taxa, MCI values and SQMCIs scores for 'control' sites (Taranaki ring plain rivers/streams with sources outside Egmont National Park) at altitudes 80-124 m asl (TRC, 2015).

	No. of taxa	MCI value	$SQMCI_s$ value
No. Samples	248	248	192
Range	12-34	66-112	1.3-6.9
Median	22	92	5.0

Table 5 Macroinvertebrate fauna of the Inaha Stream in relation to Taranaki By-Products wastes discharges sampled on 01 March 2017.

Taxa List	Site Number	MCI score	U	1	2d	3	4
	Site Code		INH000334	INH000400	INH000420	INH000430	INH000450
	Sample Number		FWB17155	FWB17156	FWB17157	FWB17158	FWB17159
COELENTERATA	Coelenterata	3	-	R	-	-	-
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	-	-	-	-	R
NEMERTEA	Nemertea	3	R	R	-	R	-
ANNELIDA (WORMS)	Oligochaeta	1	C	C	A	VA	A
	Lumbricidae	5	-	R	-	C	-
MOLLUSCA	*Latia*	5	R	R	-	-	-
	Physa	3	R	C	-	-	R
	Potamopyrgus	4	VA	A	C	A	VA
CRUSTACEA	Ostracoda	1	-	C	A	-	A
	Paracalliope	5	XA	VA	R	-	VA
	Talitridae	5	-	-	-	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	VA	A	C	VA
	Deleatidium	8	A	VA	XA	XA	A
	Nesameletus	9	-	-	R	R	-
	Zephlebia group	7	R	C	R	-	R
PLECOPTERA (STONEFLIES)	*Zelandobius*	5	-	R	R	R	R
COLEOPTERA (BEETLES)	Elmidae	6	VA	A	VA	VA	C
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	C	R	A	R	-
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	A	A	A	C	R
	Hydrobiosis	5	C	C	C	C	R
	Polyplectropus	6	R	-	-	-	-
	Hudsonema	6	R	A	C	R	R
	Oecetis	4	-	-	R	-	R
	Olinga	9	-	-	-	R	-
	Oxyethira	2	C	A	-	-	-
	Pycnocentria	7	VA	C	C	R	C
	Pycnocentrodes	5	A	VA	XA	C	-
	Triplectides	5	-	-	-	R	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	-	R	-	-	-
	Chironomus	1	-	R	-	-	-
	Maoridiamesa	3	A	C	-	R	-
	Orthocladiinae	2	A	A	-	R	C
	Polypedilum	3	C	C	R	-	R
	Tanytarsini	3	C	C	-	C	C
	Empididae	3	R	-	-	-	R
	Ephydridae	4	-	R	-	-	-
	Muscidae	3	C	-	-	-	-
	Austrosimulium	3	C	R	R	R	C
	Tanyderidae	4	-	R	-	-	R
ACARINA (MITES)	Acarina	5	-	R	-	-	-
	No of taxa		25	31	19	21	24
	MCI		89	85	102	102	87
	SQMCIs		5.1	5.5	6.2	6.5	4.9
	EPT (taxa)		9	9	11	11	10
	%EPT (taxa)		36	29	58	52	42

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

Table 6 Macroinvertebrate fauna of the unnamed tributary of the Inaha Stream in relation to Taranaki By-Products wastes discharges sampled on 01 March 2017.

Taxa List	Site Number	MCI score	UT	MT	DT
	Site Code		INH000433	INH000435	INH000440
	Sample Number		FWB17152	FWB17153	FWB17154
NEMERTEA	Nemertea	3	-	-	R
ANNELIDA (WORMS)	Oligochaeta	1	VA	C	-
	Lumbricidae	5	-	-	R
MOLLUSCA	*Physa*	3	-	R	-
	Potamopyrgus	4	-	XA	VA
	Sphaeriidae	3	A	-	-
CRUSTACEA	Ostracoda	1	VA	A	-
	Isopoda	5	-	R	C
	Paracalliope	5	A	XA	A
	Talitridae	5	C	VA	A
	Paranephrops	5	-	R	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	-	A	-
	Zephlebia group	7	-	VA	VA
ODONATA (DRAGONFLIES)	*Xanthocnemis*	4	-	R	-
HEMIPTERA (BUGS)	*Microvelia*	3	R	-	R
COLEOPTERA (BEETLES)	Staphylinidae	5	-	-	R
TRICHOPTERA (CADDISFLIES)	*Hydrobiosis*	5	-	-	R
	Polyplectropus	6	-	A	R
	Triplectides	5	-	R	R
DIPTERA (TRUE FLIES)	*Chironomus*	1	-	C	-
	Polypedilum	3	R	-	-
	Tanypodinae	5	R	R	-
	Culicidae	3	C	-	-
	Paradixa	4	-	C	C
	Ephydridae	4	-	R	C
	Psychodidae	1	-	-	C
	Sciomyzidae	3	-	-	R
	Austrosimulium	3	-	A	-
ACARINA (MITES)	Acarina	5	-	R	C
		No of taxa	9	19	18
		MCI	64	84	89
		SQMCIs	1.6	4.7	5.2
		EPT (taxa)	0	4	4
		%EPT (taxa)	0	21	22

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

Inaha Stream

Site U

A moderate taxa richness of 25 taxa was found at site U (the 'control' site for the Inaha Stream) at the time of the survey which was two taxa more than the median number recorded for the site (median taxa richness 23; Table 3) and seven taxa more than the previous sample (taxa richness 18; Figure 2).

The MCI score of 89 units indicated a community of 'fair' biological health which was lower than the median value calculated from previous surveys at the same site (median MCI score 94 units; Table 3) but was the same as the previous survey score (MCI score 89 units; Figure 2). The $SQMCI_S$ score of 5.1 units was slightly lower than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 5.3 units; Table 3) but slightly higher than the previous survey score ($SQMCI_S$ score 4.6 units).

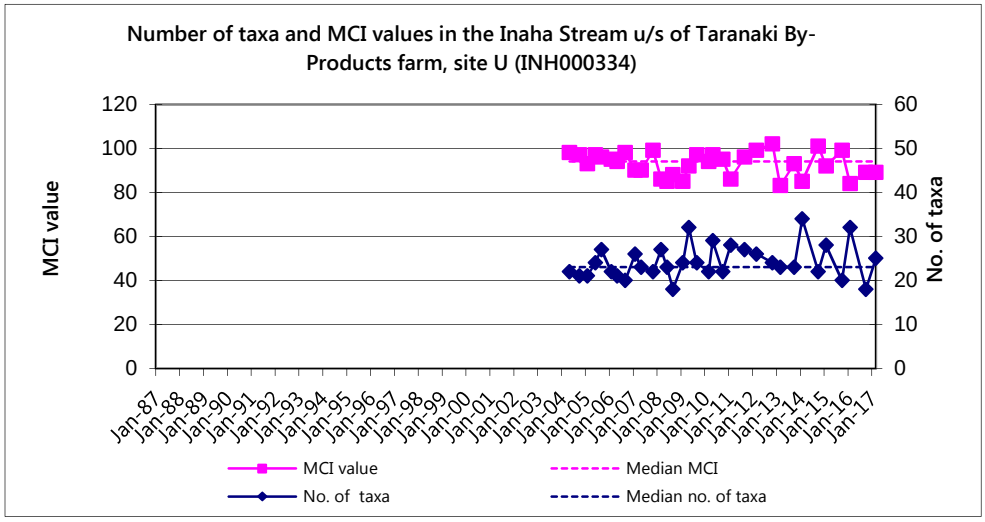

Figure 2 Numbers of macroinvertebrate taxa and MCI values recorded at site U in the Inaha Stream since May 2004.

The community was characterised by four 'tolerant' taxa [snail (*Potamopyrgus*), caddisfly (*Hydropsyche-Aoteapsyche*), orthoclad midges and chironomid midge (*Maoridiamesa*)], five 'moderately sensitive' taxa [amphipod (*Paracalliope*), mayfly (*Austroclima*), elmid beetles and caddisflies (*Pycnocentria* and *Pycnocentrodes*), and one 'highly sensitive' taxon [mayfly (*Deleatidium*)] (Table 5).

Site 1

A high taxa richness of 31 taxa was found at site 1 at the time of the survey which was nine taxa more than the median number recorded for the site (median taxa richness 22; Table 3) and 19 taxa more than the previous survey (taxa richness 12; Figure 3).

The MCI score of 85 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median value calculated from previous surveys at the same site (median MCI score 95 units; Table 3), however it was significantly lower than the previous survey score (MCI score 100 units; Figure 3). The $SQMCI_S$ score of 5.5 units was similar to the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 5.1 units; Table 3) and was higher than the previous survey score ($SQMCI_S$ score 4.9 units).

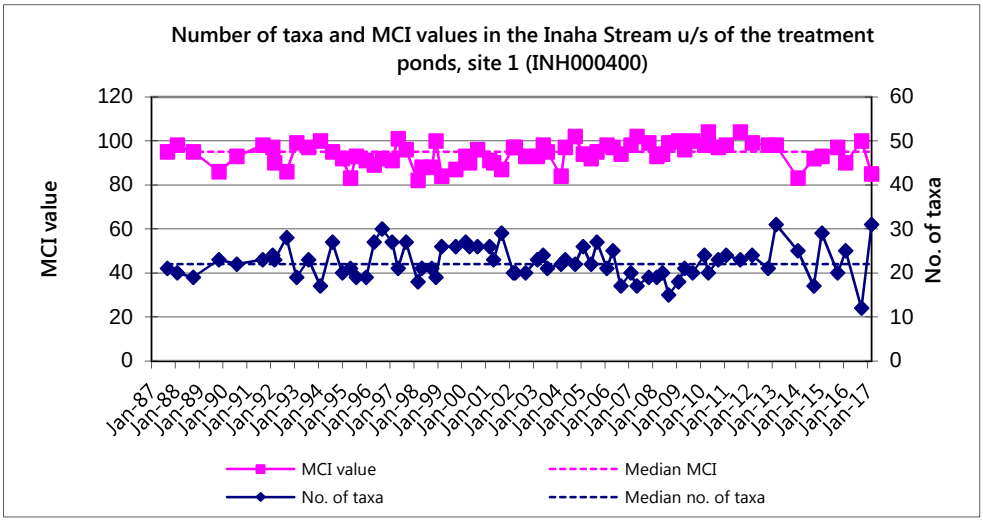

Figure 3 Numbers of macroinvertebrate taxa and MCI values recorded at site 1 in the Inaha Stream since September 1987.

The community was characterised by four 'tolerant' taxa [snail (*Potamopyrgus*), caddisflies (*Hydropsyche-Aoteapsyche*) and *Oxyethira*) and orthoclad midges], five 'moderately sensitive' taxa [amphipod (*Paracalliope*), mayfly (*Austroclima*), elmid beetles and caddisflies (*Pycnocentrodes*) and (*Hudsonema*)], and one 'highly sensitive' taxon [mayfly (*Deleatidium*) (Table 5).

Site 2d

A moderate macroinvertebrate community richness of 19 taxa was found at site 2d at the time of the survey which was three taxa less than the median number recorded for the site (Table 3) but the same as that recorded by the previous survey (Figure 4).

The MCI score of 102 units indicated a community of 'good' biological health which was significantly (Stark, 1998) higher than the median value calculated from previous surveys at the same site (median MCI score 81 units; Table 3) and was slightly higher than the previous survey score (MCI score 99 units; Figure 4). The $SQMCI_S$ score of 6.2 units was markedly higher than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 2.1 units; Table 3) and was substantially higher than the previous survey score.

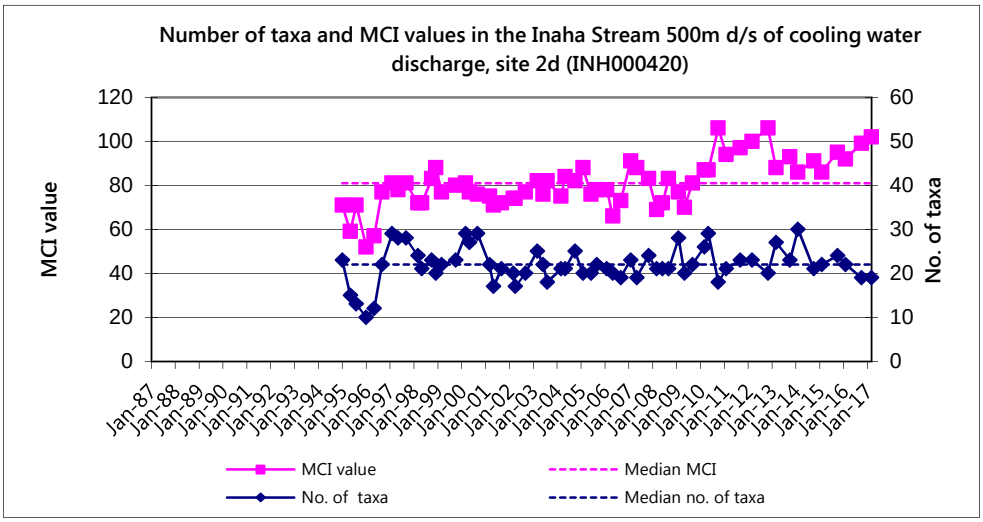

Figure 4 Numbers of taxa and MCI values recorded at site 2d in the Inaha Stream since 1995.

The community was characterised by three 'tolerant' taxa [oligochaete worms, ostracod seed shrimp, and caddisfly (*Hydropsyche- Aoteapsyche*)], four 'moderately sensitive' taxa [mayfly (*Austroclima*), elmid beetles, dobsonfly larvae (*Archichauloides*) and caddisfly (*Pycnocentrodes*)], and one 'highly sensitive' taxon [mayfly (*Deleatidium*)] (Table 5).

Site 3

A moderate taxa richness of 21 taxa was found at site 3 at the time of the survey which was the same as the median number recorded for the site (median taxa richness 21; Table 3) and 8 taxa more than the previous survey (taxa richness 13; Figure 5).

The MCI score of 102 units indicated a community of 'good' biological health which was significantly higher (Stark, 1998) than the median value calculated from previous surveys at the same site (median MCI score 81 units; Table 3) and substantially higher than the previous survey score (MCI score 92 units; Figure 5) by 10 MCI units. In addition, it was the highest MCI recorded by this site to date. The $SQMCI_S$ score of 6.5 units was substantially higher than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 2.6 units; Table 3) and substantially higher than the previous survey score ($SQMCI_S$ score 3.4 units). I was also the highest $SQMCI_S$ score recorded at this site to date.

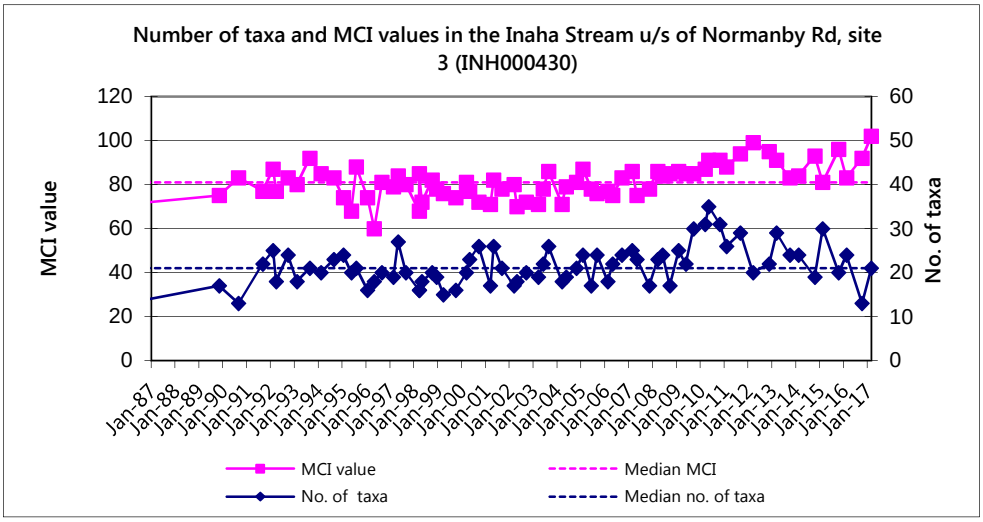

Figure 5 Numbers of taxa and MCI values recorded at site 3 in the Inaha Stream since 1989.

The community was characterised by two 'tolerant' taxa [snail (*Potamopyrgus*) and oligochaete worms], one 'moderately sensitive' taxon [elmid beetles] and one 'highly sensitive' taxon [mayfly (*Deleatidium*)] (Table 5).

Site 4

A moderate macroinvertebrate community richness of 24 taxa was found at site 4 at the time of the survey which was two taxa less than the median number recorded for the site (median taxa richness 26; Table 3) but higher than the previous survey (taxa richness 17; Figure 6).

The MCI score of 87 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median value calculated from previous surveys at the same site (median MCI score 90 units; Table 3), although was lower than that recorded by the previous survey (MCI score 96 units; Figure 6). The $SQMCI_S$ score of 4.9 units was slightly higher than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 4.2 units; Table 3) and markedly higher than the previous survey score ($SQMCI_S$ score 2.6 units).

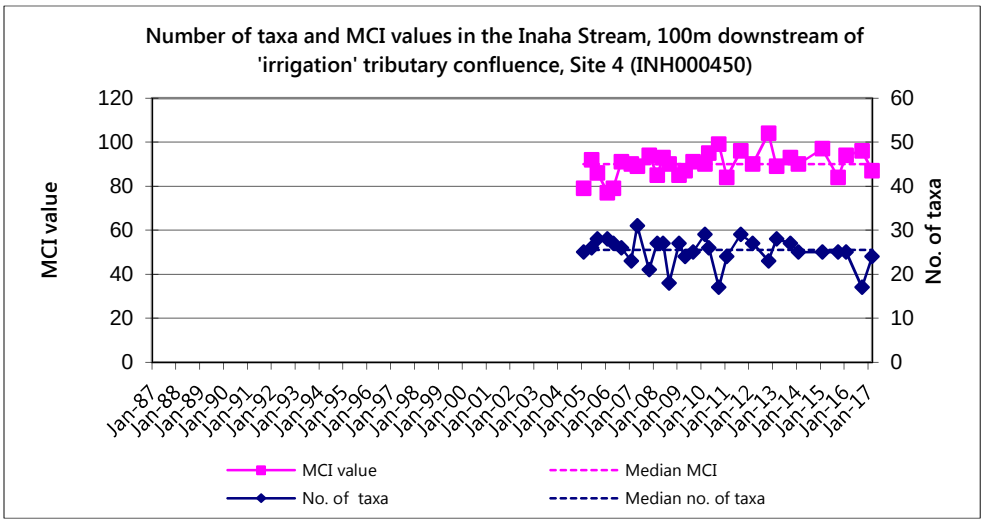

Figure 6 Numbers of taxa and MCI values recorded at site 4 in the Inaha Stream.

The community was characterised by three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*) and ostracod seed shrimp] two 'moderately sensitive' taxa [mayfly (*Austroclima*) and amphipod (*Paracalliope*)] and one 'highly sensitive' taxon [mayfly (*Deleatidium*)] (Table 5).

Unnamed tributary of the Inaha Stream

Site UT

A low macroinvertebrate community richness of nine taxa was found at site UT (the 'control' site for the unnamed tributary of the Inaha Stream) at the time of the survey which was ten taxa less than the median number recorded for the site (median taxa richness 19; Table 3) and 13 taxa less than that recorded by the previous survey (Figure 7). This taxa richness was the lowest recorded for this site to date.

The MCI score of 64 units indicated a community of 'poor' biological health which was significantly lower (Stark, 1998) than the median value calculated from previous surveys at the same site (median MCI score 98 units; Table 3) and significantly (Stark, 1998) lower than the previous survey score (MCI score 77 units; Figure 7). The $SQMCI_S$ score of 1.6 units was substantially lower than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 5.4 units; Table 3) and was substantially lower than the previous survey score ($SQMCI_S$ score 4.4 units). It was also the lowest $SQMCI_S$ score recorded by this site to date (Table 3).

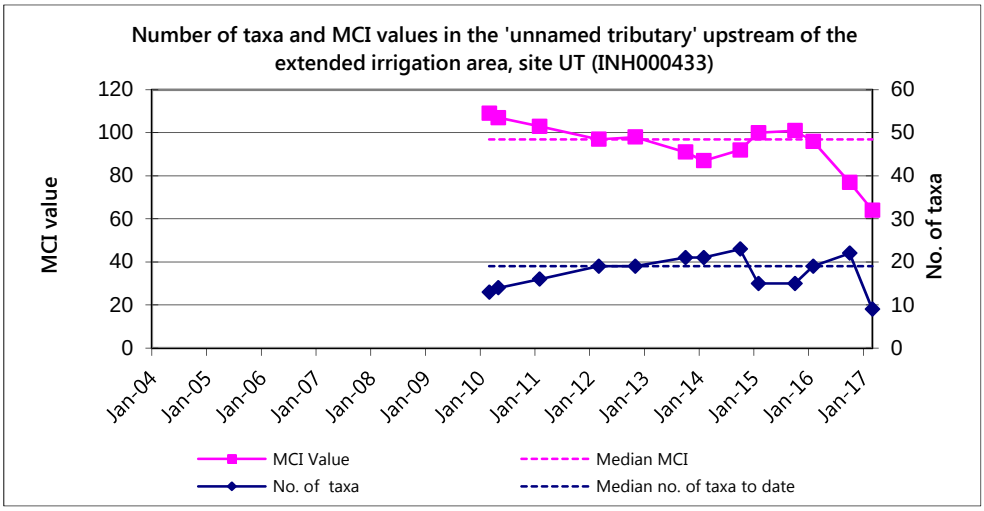

Figure 7 Numbers of taxa and MCI values recorded at site UT in the unnamed tributary of the Inaha Stream.

The community was characterised by three 'tolerant' taxa [oligochaete worms, fingernail clam (Sphaeriidae) and ostracod seed shrimp] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] (Table 6).

Site MT

A moderate macroinvertebrate community richness of 19 taxa was recorded at site MT which was similar to the median number recorded for the site (median taxa richness 20; Table 3) and seven taxa more than the previous survey (taxa richness 12; Figure 8).

The MCI score of 84 units indicated a community of 'fair' biological health, which was slightly higher than the median value calculated from previous surveys at the same site (median MCI score 82 units; Table 3). This MCI score was significantly higher than the previous survey score (MCI score 70 units; Figure 8). The $SQMCI_S$ score of 4.7 units was slightly higher than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 4.4 units; Table 3) and slightly higher than the previous survey score ($SQMCI_S$ score 4.1 units).

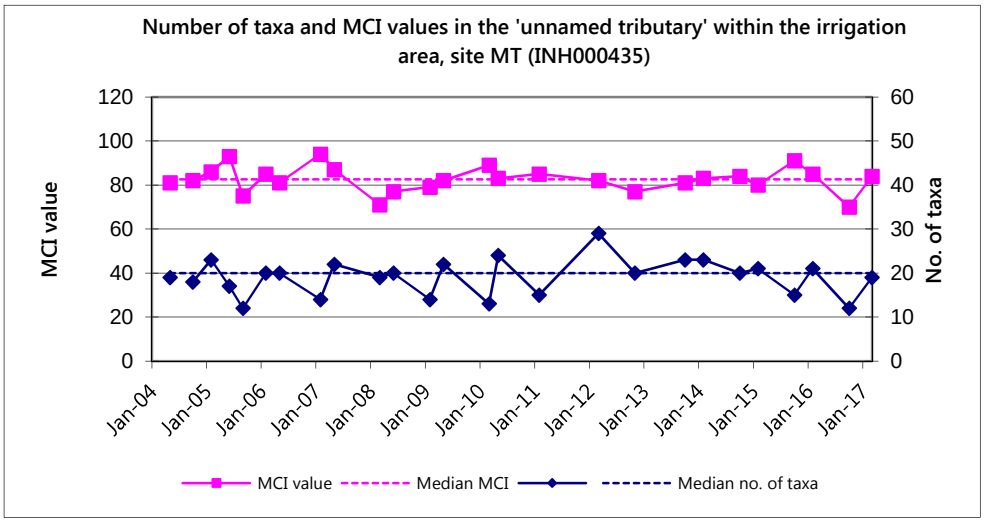

Figure 8 Numbers of taxa and MCI values recorded at site MT in the unnamed tributary of the Inaha Stream since 2004.

The community was characterised by three 'tolerant' taxa [snail (*Potamopyrgus*), ostracod seed shrimp and black fly larvae (*Austrosimulium*)] and five 'moderately sensitive' taxa [caddisfly (*Polyplectropus*), mayflies (*Austroclima*) and (*Zephlebia group*) and amphipods (*Paracalliope*) and (Talitridae)] (Table 6).

Site DT

A moderate macroinvertebrate community richness of 18 taxa was recorded at site DT which was three taxa less than the median number recorded for the site (median taxa richness 21;Table 3) and one taxon less than that recorded by the previous survey (taxa richness 19; Figure 9).

The MCI score of 89 units indicated a community of 'fair' biological health which was the same as the median value calculated from previous surveys at the same site (Table 3) and not significantly different (Stark, 1998) to the previous survey score (MCI score 87 units; Figure 9). The $SQMCI_S$ score of 5.2 units was higher than the median value calculated from previous surveys at the same site (median $SQMCI_S$ score 4.6 units; Table 3) and slightly higher than the previous survey score ($SQMCI_S$ score 4.9 units).

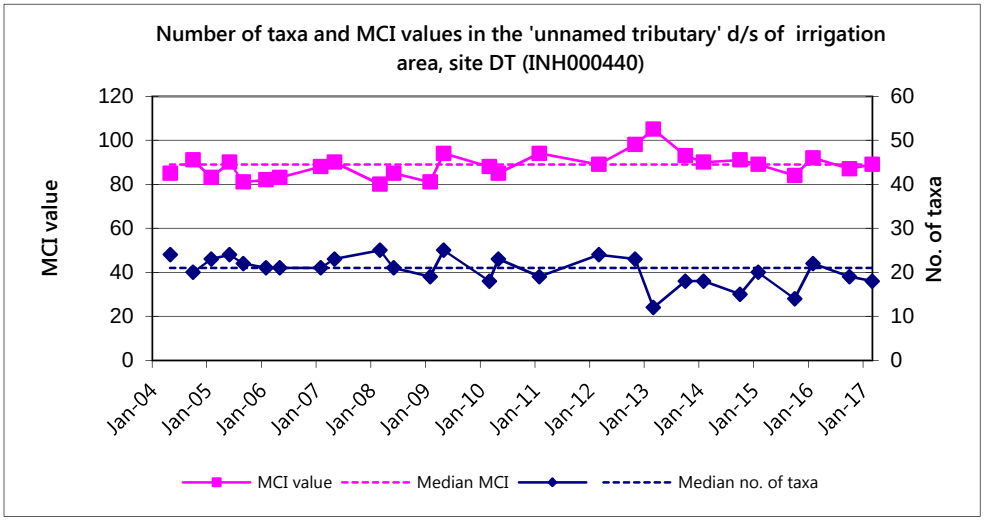

Figure 9 Numbers of taxa and MCI values recorded at site DT in the unnamed tributary of the Inaha Stream since 2004.

The community was characterised by one 'tolerant' taxon [snail (*Potamopyrgus*)] and three 'moderately sensitive' taxa [mayfly (*Zephlebia group*) and amphipods (*Paracalliope*) and (Talitridae)] (Table 6).

Discussion and conclusions

In the past, heterotrophic growths such as 'sewage fungus' have occurred in the Inaha Stream downstream of the rendering plant which were most likely the result of the discharges from the plant. However, no 'heterotrophic growths' were recorded at any sites monitored in this survey, which was indicative of reasonably good preceding water quality. The presence of heterotrophic growths on the bed of the Inaha Stream was last recorded in the spring 2009 survey, and this shows an improved management of the wastewater discharge since that time.

Inaha Stream

There were no substantial differences between site U (the 'control' site) and site 1 for MCI or $SQMCI_S$ scores; however taxa richness was slightly higher at site 1. These results indicate that leaching of nutrients into the Inaha Stream from the north-eastern block of land under irrigation (Figure 1) was unlikely affecting the health of the macroinvertebrate communities present in the Inaha Stream at the time of the survey.

There were no significant differences between sites U, 1 and 4 for MCI and $SQMCI_S$ scores. However the MCI scores recorded at sites 2d and 3 were significantly (Stark, 1998) higher than those recorded at the remaining three sites. $SQMCI_S$ scores were also highest at sites 2d and 3. Site 3 recorded a $SQMCI_S$ score substantially higher than all of the other Inaha Stream sites and site 2d recorded a $SQMCI_S$ score substantially higher than that recorded at sites 1 and 4. In comparison to the previous spring survey (October 2016) MCI scores for the current survey at all of the Inaha Stream sites (excluding site 1) were not significantly different (Stark, 1998) to the current survey results. Site 1 recorded an MCI score a significant (Stark, 1998) 15 units lower than that recorded by the spring (October 2016) survey. However taxa richnesses and $SQMCI_S$ scores were either higher or the same as those recorded by the previous survey at all sites.

In the previous spring (October 2016) survey the MCI recorded by site U was significantly (Stark, 1998) lower than that recorded at site 1, however no other significant differences between sites were recorded. Taxa richnesses were moderately low at sites 1 and 3 and moderate at the remaining three sites. $SQMCI_S$ scores were similar between sites U, 1 and 2d but substantially lower at sites 3 and 4. This was attributed

mainly to a significant increase in one 'tolerant' taxon (oligochaete worms) and a significant decrease of three to four 'sensitive' taxa. It was thought that wastewater discharges from Taranaki By-Products that were discharging at the time of the spring survey might have negatively affected the macroinvertebrate communities present in the Inaha Stream at site 3 and 4, as indicated by the $SQMCI_S$ results for these sites. However, the MCI scores for these sites did not support this, and as such, it was difficult to deduce whether the reduced $SQMCI_S$ scores at sites 3 and 4 was due to the discharge, or related to habitat variation. It was suggested a discharge may be occurring between sites 2d and 3, and consideration should be given to increasing the monitoring of this reach. The current survey results show no significant differences in MCI and $SQMCI_S$ scores between sites 2d and 3, and the decrease in scores at site 4 is thought to be mainly habitat related. If a return to more 'unhealthy' conditions were to be recorded at sites 3 and 4 then it would again be recommended that consideration be given to increasing the monitoring of this reach.

On examination of all of the Inaha Stream sites, the trends suggests improvements began to appear in 2009 (Figure 10 and

Figure 11) but since 2012 large fluctuations in macroinvertebrate indices have occurred. The best result for this type of survey is that MCI scores and $SQMCI_S$ scores in the Inaha Stream are not significantly different to each other within each survey. Occasionally differences in habitat between sites can result in different scores, although this can often be explained when the community assemblage is assessed. The $SQMCI_S$ is more sensitive to changes in habitat, and this is evident in Figure 10. Figure 10 shows $SQMCI_S$ scores were similar between sites, with the exception being sites 2d and 3, which recorded $SQMCI_S$ scores substantially higher than the remaining Inaha Stream sites.

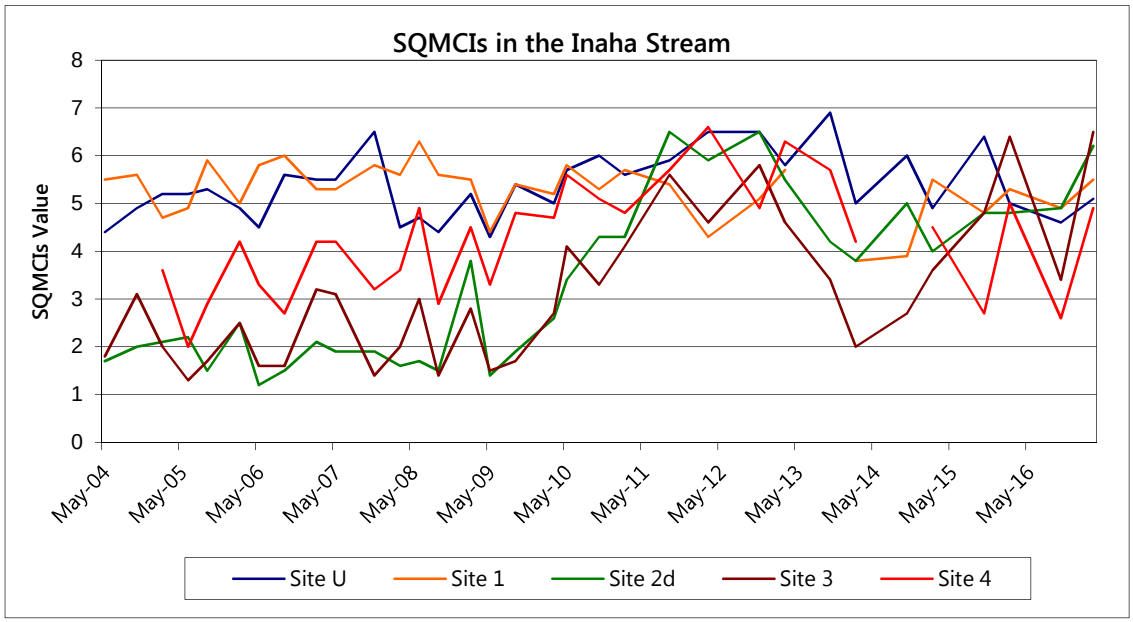

Figure 10 SQMCIs values for the Inaha Stream sampled in relation to Taranaki By-Products discharges since May 2004.

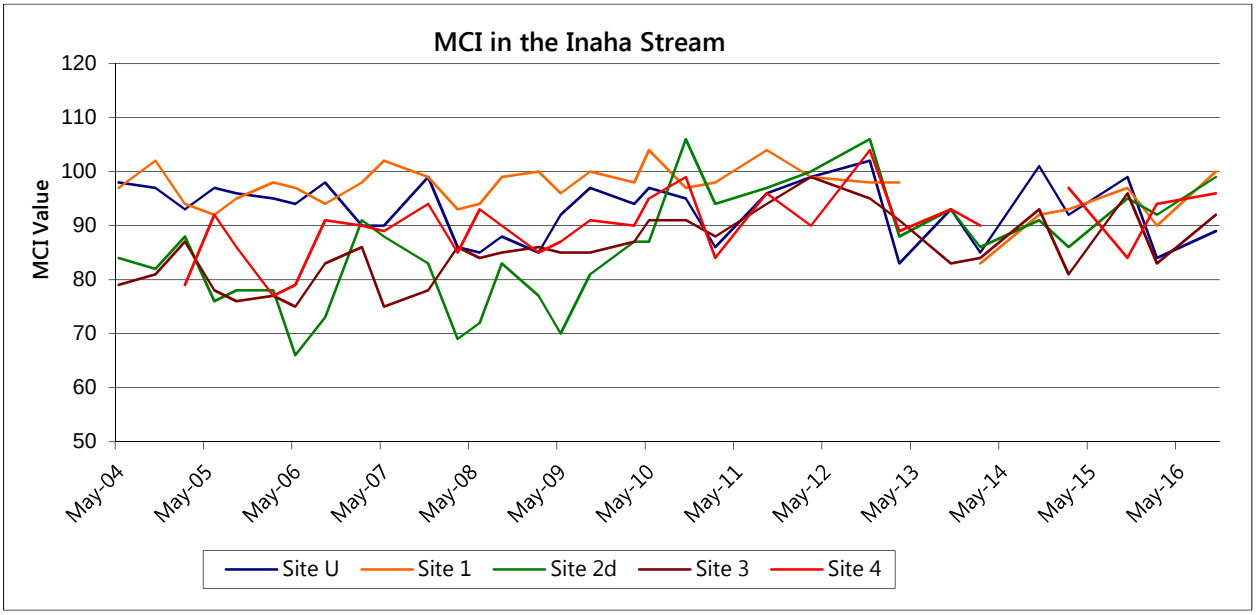

Figure 11 MCI values for the Inaha Stream sampled in relation to Taranaki By-Products discharges since May 2004.

Unnamed tributary of the Inaha Stream

The upstream 'control' site UT recorded a substantially lower taxa richness, MCI score and $SQMCI_S$ score compared with the two downstream sites. The 'control' site UT had 10 and 9 fewer taxa than that recorded at the 'potentially impacted' sites MT and DT respectively. The MCI score (64 units) recorded at site UT was a significant (Stark, 1998) 20 and 25 units lower than sites MT and DT respectively. It was also the lowest MCI score recorded by this site to date. The $SQMCI_S$ score of 1.6 was also the lowest recorded for the site to date and was a substantial 3.1 units lower than that recorded by site MT and 3.6 units lower than that recorded by site DT. Sites MT and DT recorded taxa richnesses and MCI and $SQMCI_S$ scores similar to those recorded by comparative sites in the Taranaki ring plain (Table 4). Site UT however, recorded substantially lower macroinvertebrate indices than those recorded by comparative sites in the Taranaki ring plain (Table 4).

The MCI scores recorded at sites MT and DT in the unnamed tributary were indicative of 'fair' macroinvertebrate health, whereas the MCI score recorded at site UT was indicative of 'poor' macroinvertebrate health and was well below the median value for this site. Community composition varied between sites, with none of the abundant taxa common to all three sites. The differences in macroinvertebrate community composition between sites reflected differences in the instream habitat, with proportions of roots and/or fine sediment and instream macrophytes varying at all three sites. Poor habitat quality at site UT can explain the very low macroinvertebrate indices recorded at this site at the time of the survey. At the time of this survey, the habitat quality at site UT was poor; there was no flow and the area sampled was a shallow pool of stagnant, dirty water. Overall the MCI and $SQMCI_S$ scores recorded in the unnamed tributary of the Inaha Stream indicated no affect on the macroinvertebrate communities in the unnamed tributary of the Inaha Stream as a result of irrigation to land by Taranaki By-Products.

Summary

The Councils 'kick-sampling' and 'vegetation sweep' techniques (and a combination of the two) were used at eight sites to collect streambed macroinvertebrates from the Inaha Stream and an unnamed tributary, to assess whether discharges (via point source and irrigation to land) from Taranaki By-Products Limited's rendering plant had had any adverse effects on the macroinvertebrate communities of the streams. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundances as well as sensitivity to pollution. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

On March 1st 2017, a summer macroinvertebrate survey was performed at five sites in the Inaha Stream and at three sites in an unnamed tributary of the Inaha Stream in relation to discharges by Taranaki By-Products. Taxa richnesses were generally similar to the median values calculated from all previous surveys (excluding site UT that recorded substantially lower taxa richness).

MCI scores showed that macroinvertebrate communities were in 'fair' to 'good' health in the Inaha Stream. MCI scores were similar between sites U, 1 and 4, however sites 2d and 3 both recorded MCI scores significantly (Stark, 1998) higher than the other three sites. This difference is likely a reflection of habitat differences between the sites, in particular to the increase in nuisance green filamentous algae at sites U and 1 and an increase in fine substrate (namely sand) at site 4. $SQMCI_S$ scores recorded at sites 2d and 3 were substantially higher than that recorded upstream at 'control' site U. This can mainly be attributed to decreases in numerous 'tolerant' taxa and an increase in the 'highly sensitive' mayfly taxon (*Deleatidium*) at the two downstream sites.

In the previous spring survey (October 2016) it was thought that wastewater discharges from Taranaki By-Products may have negatively affected the macroinvertebrate communities present in the Inaha Stream at site 3 and 4, as indicated by the $SQMCI_S$ results. However, the MCI scores for these sites did not support this, and as such, it was difficult to conclude whether the reduced $SQMCI_S$ scores at sites 3 and 4 was due to a discharge or related to habitat variation. It was acknowledged that the results suggested that there may have been a discharge occurring between sites 2d and 3, and it was recommended consideration be given to increasing the monitoring of this reach. In the current survey, there were no significant differences in MCI and $SQMCI_S$ scores between sites 2d and 3 and the decrease in scores at site 4 is thought to be mainly habitat related. If a return to more 'unhealthy' conditions were to be recorded at sites 3 and 4 then it would again be recommended that consideration be given to increasing the monitoring of this reach.

The unnamed tributary of the Inaha Stream recorded MCI scores reflective of 'poor' to 'fair' stream health. MCI and $SQMCI_S$ scores were similar between the downstream sites MT and DT, however the 'control' site U recorded scores significantly (Stark, 1998) lower than those recorded at the two downstream sites. Both the MCI and $SQMCI_S$ scores recorded at site U were substantially lower than the historical medians for the site, and were both the lowest recorded for this site to date. At the time of this survey the habitat quality at site UT was poor; there was no flow and the area sampled was a shallow pool of stagnant, dirty water. Both the MCI and $SQMCI_S$ scores recorded at sites MT and DT were higher (or the same as) medians for the site, and previous survey results. The current survey results indicate no significant negative impact to the macroinvertebrate communities present in the unnamed tributary of the Inaha Stream from irrigation to land by Taranaki By-Products.

No 'heterotrophic growths' were recorded at any sites monitored in this survey, which was indicative of reasonably good preceding water quality. The presence of heterotrophic growths on the bed of the Inaha Stream was last recorded in the spring 2009 survey, and this shows improved management of the wastewater discharge since that time.

Overall, there was no evidence that discharges from Taranaki By-Products have impacted on the freshwater macroinvertebrate communities present in the Inaha Stream.

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Appendix III

Golder Associates Air Audit Report

April 2017

TARANAKI BY-PRODUCTS LIMITED

TBP AUDIT REPORT - Odour Control System Audit 2017

Submitted to:
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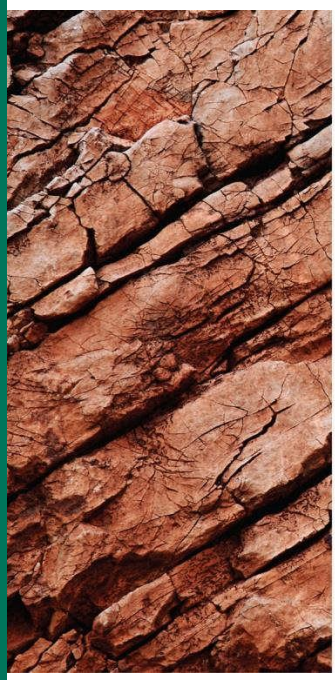

Report Number: 1530864_7403-003-R-Rev0

REPORT

Golder Associates

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This report[1] documents the results of the audit by Golder Associates (NZ) Limited (Golder) of 'Engineering Practice' with respect to the odour control systems that are operated at the Taranaki By-Products Limited (TBL) and Taranaki Bio-Extracts Limited (TBE) sites at Kohiti Road, Okaiawa. The audit investigations were completed during site visits on the 16 and 17 March 2017 by Golder. The requirement for this audit is specified within special condition 6 of Resource Consent 4058-4. This consent was issued by the Taranaki Regional Council on 11 October 2011.

This report contains the following:

- Confirmation of scope of services
- Audit approach
- Summary of site processes
- Description of odour control systems
- Description of physical condition of equipment
- Instrumentation
- Design aspects
- Summary of audit findings

2.0 CONFIRMATION OF SCOPE OF SERVICES

Special Condition 6 of consent 4058-4 defines the scope of work required and states that:

> *"By the 30 April 2013, and every two years thereafter, the consent holder shall provide certification by a suitably qualified independent person that the works, processes and equipment relevant to all discharges to air from the site are operational in accordance with good engineering practice."*

Please note Golder considers that an assessment of operational control systems at the site is outside of the scope of a review of 'good engineering practice'.

3.0 AUDIT PERSONNEL

The site audit was undertaken by Roger Cudmore (Principal Environmental Engineer, Golder). The analysis of site data and report preparation was supported by Maria Luisa Oliveira de Aguiar (Environmental Engineer, Golder). Roger has the qualification of *B.Eng. (Hons) Chemical & Process* and has over 20 years of experience designing, reviewing and overseeing the installation and operation of air extraction and biofilter treatment systems within numerous rendering plants throughout New Zealand. Maria has qualifications of *B.Eng. Environmental* and has over 8 years environmental engineering experience in industry and consultancy.

[1] Your attention is drawn to the document, "Report Limitations", as attached in Appendix A. The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

4.0 AUDIT APPROACH

This audit repeats the engineering review of ducts and biofilters as per previous audits by Golder in 2013 and 2015). However, this audit excludes an assessment of management documentation as the previous audit findings are still relevant to current systems that are largely unchanged since 2015. This audit addressed the following aspects of good engineering practice with respect to the odour control systems operated by TBE and TBL:

- **Physical condition of equipment:** The state of odour control components, including consideration of materials used for construction.
- **Operating conditions and monitoring:** An assessment of operating parameters that are key to good odour control and their monitoring.
- **Design aspects:** The current engineering design with respect to the air extraction, air cooling and biofilter systems.

5.0 SITE PROCESSES

5.1 Overview

The rendering processes operated by TBL and TBE are described by Golder (2015). These processes are the same as those currently operated except for the inclusion of an additional bovine rendering line at TBL and the associated modification of the concentrated sources extraction system.

5.2 Taranaki By-Products

The TBL rendering plant currently operates the following processes:

- Two identical bovine by-products rendering lines (nominally processing 650 tonnes/day raw material) both lines share a pre-breaker and hogger, but have separate surge bins, pre-cookers, solids press, dual decanters, shared tallow recovery plant (liquid phase tank and three tallow separators), three indirect steam dryers (TST-100, TST-100 and TST150) and dedicated meal processing plant.
- Blood processing line (nominally processing 150 tonnes/day blood) including a steam coagulator, decanter and indirect steam dryer (TST-70) and milling plant.
- A poultry rendering line (nominally 8 tonnes/hr of raw material) including continuous cook, decanter, indirect steam dryer (TST-70), milling line and tallow recovery.
- Pressurised feather hydrolyser (4.5 tonnes/hr) co-sharing the poultry line's dryer and milling line.
- Three waste heat evaporators (WHEs) that utilise hot dryer exhaust streams from the chicken, blood processing and bovine rendering lines to evaporate and concentrate the stick liquor streams that are produced from the tallow recovery plants.

5.3 Taranaki Bio-Extract

TBE is unchanged from 2015. This operates an edible (food grade) gelatine bone chip recovery plant that nominally processes 160-180 tonnes/day of bone and associated material.

The TBE bio-extracts plant operates the following process:

- Melting plant (holding 20 tonne of material including recycled stick liquor).
- Solids decanting (pusher-centrifuge) to separate solids and liquor for recycling.
- Bone dryer (Duskie TDP 3000 gas-fired dryer), product screening and sorting.
- Melter tank liquor processing including decanting, screening, liquid phase tank and tallow recovery.
- Decanter solids indirect steam heated drying (Duskie drier).
- Final stick liquor waste stream is directed to the TBL wastewater system, or recycled to the melter.

5.4 Odour Control Systems – TBL

The odour extraction, cooling system and biofilters comprise the main components of the odour control systems that are operated by TBL. These systems are summarised below.

Point Source Extraction System (PSES): The TBL site also operates a point source extraction system (PSES) that targets concentrated odour sources. The PSES targets the two bovine, chicken and feather rendering lines including associated tallow recovery and meal processing systems.

The TBL concentrated sources PSES and cooling system is shown in Figure 1, Appendix B. The extraction is driven by a single fan (TBL concentrated sources fan). This fan pulls the concentrated sources air stream and non-condensable gases (NCGs) (i.e. associated with the meal dryer exhausts) through a 2-stage water spray scrubbing tower. The scrubber system's primary function is to pre-cool the mixed concentrated sources and NCG stream.

The concentrated sources duct has two sub-manifolds – one for targeting the two bovine lines and the other for targeting chicken line point sources.

The *bovine sub-manifold* is connected to the following processes within each of the two bovine rendering trains:

- Pre cooker feed, pre-cooker and it's discharge
- Solids press and enclosed screen
- Decanters
- Cooked material transfer conveyors

The *chicken line sub-manifold* is connected to the following processes:

- Pre cooker
- Liquid phase tank
- Press
- Decanter discharge screw and pump
- Dryer feed conveyors
- Chicken mill and meal bin

Upgrade to the PSES: The TBL PSES has been upgraded by the replacement of the old bovine line manifold with a larger 600 mm diameter duct that targets sources from both of the bovine rendering lines (see Figure 1, Appendix B). However, to accommodate the additional bovine line, a larger flowrate of concentrated sources needs be extracted. As such TBL is planning to replace the existing TBL conc. source fan with a larger fan. It is considered that this fan should be capable of discharging up 30,000 m^3/hr of air against a 2.5 kPa head.

Dryer Exhaust Streams: The three bovine meal dryers, the chicken and blood meal dryers, and the feather hydrolyser all have their hot exhaust air streams directed to the waste heat evaporation plant (WHE). The WHE produces concentrated stick liquor and non-condensable dryer exhaust gases (NCGs) that are drawn into the 2-stage water scrubber system as described above (see Figure 1A, Appendix B). This scrubber system is supplied with cooling water from the final wastewater treatment pond at the site. Therefore, the evaporative cooling from the pond surface is relied on to meet the scrubbers cooling duty.

Blood Room and Bovine Meal Bins: The blood processing room is well sealed and has its dryer exhaust extracted to the WHE plant via the same duct that collects the chicken dryer exhaust stream. Building air from the blood room is extracted to a new single stage water spray scrubber that also scrubs air extracted from the bovine meal bins – see Figure 2, Appendix B. The discharge from the scrubber is ventilated by the Factory Air #2 system. This scrubber is supplied with a potable water supply and its main purpose is to remove dust from the air stream.

Building Air Ventilation: TBL operate two independent building air extraction systems (Factory Air 1 and 2) that extract building air from the TBL plant (including the fallen stock pre-breaker bin). The bovine rendering tallow recovery plant (liquid phase tank and separators) are currently connected to the Factory Air system.

Concentrated Sources Cooling: The TBL concentrated sources cooling system has been described above. This effectively constitutes of the WHE plant and the dual water scrubber tower. The WHEs provide an important role in condensing vapours and removing most of the latent energy from the dryer exhaust air streams (i.e., bovine, chicken and blood steam dryers) before these are further cooled by the two-stage water scrubber. As well as providing a key pre-cooling function, the WHE operation also provides a key role in the containment of highly odorous dryer exhaust streams.

TBL Biofilters: There are three biofilter systems used by TBL including the two factory air biofilters (1 & 2) and a concentrated source biofilter. The biofilters and associated sources are summarised as follows:

The Factory Air #1: This biofilter now consists of a 1.2 m deep bark bed with 3 cells of 30m x 40m (4,300 m^3 media in total). The inlet air flow was measured at 90,500 m^3/hr at 42°C during the audit. This infers a biofilter bed loading rate of inlet air at 21 $m^3_{air}/hr/m^3_{media}$. This is close to the recommended guideline value of 20 $m^3_{air}/hr/m^3_{media}$ for bark-bed biofilters used to treat warm air (i.e., around 40°C). The bed contains a significant degree of composted material as well as bark and is effectively removing odour from the inlet air stream.

The Factory Air #2: This biofilter consists of a 1.5 m deep bark bed with a total area of 30m x 25m (1,125 m^3 media in total). The inlet flow to this bed was measured at 38,000 m^3/hr and 38°C during the audit. This infers a biofilter bed loading rate of inlet air at 34 $m^3_{air}/hr/m^3_{media}$. This is well above the guideline value of 20 $m^3_{air}/hr/m^3_{media}$ for bark-bed biofilters treat. As noted from the previous audit (Golder, 2015), this flow is prone to rise in temperature between the fan inlet and discharge. During the audit the air temperature within the lateral was measured 38°C. The main issue with this biofilter is that some of the building is by-passing the bark media along one side of the bed. The addition of more bark along this side of the bed is recommended to remove these leaks and also to help reduce the air loading rate (i.e. currently 34 $m^3_{air}/hr/m^3_{media}$).

TBL Concentrated Sources (Inedible): This biofilter consists of a 40 m x 30 m x 1.2m deep bark bed (i.e. 1,440 m^3 media in total). The inlet flow to this bed was measured at 18,500 m^3/hr during the audit. This infers a biofilter bed loading rate of inlet air at 13 $m^3_{air}/hr/m^3_{media}$. For saturated air that is cooled down to 40°C, or lower, this is a low loading rate. As discussed later, the main issue with this bed is that it appears to have a relatively uneven distribution of air flow coming through the bark media – this was associated with areas of the bed that were relatively damp and warm.

5.5 Odour Control Systems – TBE

The TBE plant operates a similar odour extraction, cooling and biofilter system to that operated by TBL, but does have some essential differences as discussed below.

Point Source Extraction System (PSES): The PSES for concentrated sources at the TBE plant in shown in Figure 3, Appendix B. The Duskie dryer fan is used to ventilate and recycle exhaust air from and to the Duskie dryer as originally designed for. However, as can been seen it also extracts other concentrated sources and discharges the final mixed stream through the scrubber tower and eventually the TBE biofilter system.

The PSES at TBE has become less effective since the last audit in 2015 and TBE is concerned that there is insufficient extraction provided to the concentrated sources including the TST30 dryer exhausts. TBE are considering options to upgrade the PSES and are considering the use of building air ventilation and biofilter treatment of this air. It is considered that it would be more effective to upgrade the TBE PSES by incorporating an additional concentrated sources fan (e.g. between the water scrubber and the biofilter as shown in Figure 4, Appendix B). This is discussed in greater detail below with respect to design aspects.

Dryer Exhaust Streams: There is no WHE system for receiving either Duskie TPD 3000 gas fired dryer or the relatively small TST30 dryer exhaust. This is not required because the main flow of gas fired Duskie exhaust is not suitable for WHE operation and also because spare stick liquor is pumped to TBL for evaporation and protein recovery using its WHE system.

Concentrated Sources Cooling: The various concentrated sources within the TBE process and its dryer exhaust air streams continue to be cooled via a single water spray scrubber tower. This utilises water from the final wastewater polishing pond. (In addition to the use by the TBL concentrated sources scrubber system).

5.6 Biofilter – TBE

TBE Concentrated Sources (Edible): This biofilter consists of 2 x bark beds each with dimensions of 0.7 m deep and dimensions of 20 m x 25 m (i.e. giving 700 m^3 media). The dual bed treats the TBE concentrated air flow, which was measured at 14,000 m^3/hr during the site audit. This equates to a media air loading rate of 20 $m^3_{air}/hr/m^3_{media}$ which is reasonable for rendering plant concentrated sources that are typically cooled to below 40°C. During the audit the inlet air was measured at 38.5°C and was saturated.

6.0 PHYSICAL CONDITION OF THE ODOUR CONTROL SYSTEM

6.1 Overview of Extraction and Discharge Ducts

All process equipment, extraction ducts, cooling equipment, fans and biofilters were generally found to be in a sound physical and functioning state as previously reported by Golder (2013 and 2015).

The stainless steel ducts that form the TBL and TBE concentrated source extraction systems and fans are in a good engineering condition and showing no significant corrosion effects and/or leakage of air.

The 1,200 mm diameter TBL Factory Air #2 (FA2) discharge duct (constructed in corrugated iron) still exhibits some rust at its inlet to the FA2 biofilter bed. This duct is still operating under significant pressure at 3.3 kPa, albeit less than in 2015 (i.e. 4 kPa gauge). There were not obvious air leaks but this area of the duct needs to be checked regularly.

The stainless steel 990 mm diameter TBL Factory Air 1 (FA1) discharge duct is in a good condition and exhibits minor corrosion near to the location where it enters the concrete access chamber (opposite the FA2 fan). This duct is also operating under a reasonable high pressure of 2.7 kPa gauge.

The concrete sump that used to be opposite the FA2 fan has been replaced by a new concrete and sealed access chamber that is no longer leaking odorous vapours as noted during the 2015 audit.

There are no significant emissions from the bovine mill area as previously observed in 2015. The bovine meal bin air is extracted and scrubbed along with blood dryer room building air and is ventilated by the FA2 building air extraction system (see Figure 2, Appendix B). Furthermore, dust emissions from bovine meal mills are well controlled as a result of extraction to the TBL chicken line concentrated sources sub-manifold (see Figure 1, Appendix B).

6.2 Fans

Air blower fans that extract concentrated sources from TBE and TBL, as well as large factory air fans used by the TBL plant are all operating without leaks and appeared to be well maintained. This aside, the TBL and TBE concentrated sources fans now require additional capacity. For the former this is a result of the additional bovine rendering train that is now operated. For the TBE fan, the need for additional capacity relates to concerns regarding the TBE concentrated sources system performance.

6.3 Cooling equipment

All of the concentrated and dryer exhaust air stream cooling systems are in very good working order – this includes:

- the TBE single stage scrubber and water to and from the cooling pond;
- the TBL two staged scrubbers, WHE exhaust vapour air cooler, blood room scrubber; and
- All associated water supply and scrubber recirculation pumps and associated pipework.

6.4 Biofilters

In this section the physical state of the four biofilters including support structures, pipework and their media is discussed.

TBL Concentrated Sources: This biofilter is an in ground type system with earth walls – it is effectively an additional cell and extension to the FA1 bark biofilter. During the 2017 audit the media temperature variation was mapped via multiple measurements over the bed surface at 200mm depths. The resultant spatial temperature variation provides a good indication of the inlet airflow variation across the bed surface. This indicated relatively high flows from approximately 10 % of the bed surface in areas opposite the concrete pipe inlet manifold (eastern side of the bed) and the south eastern corner (see Figure 1 below). The inlet pressure drop of 0.9 kPa is within normal ranges for the relatively low bed air loading rate of 13 $m^3_{air}/hr/m^3_{media}$. Given that air channelling issues are resolved then this bed could realistically treat another 50 % more flow and therefore increase its media to air loading rate to around 20 $m^3_{air}/hr/m^3_{media}$.

The bark within the TBL biofilter is in a relatively new condition. However, we recommend measures are undertaken to reduce the extent of air channelling that is currently occurring. The exact measures required are not obvious (this requires further investigation), but we recommend investigating air leaks around the Novaflow pipe lateral connections to the main concrete manifold. Furthermore, additional bark can be used to better cover the manifold and fill in the gaps between the bed and the western earth wall.

Figure 1: Photographs of the TBL concentrated source biofilter viewed from the northeast corner.

Factory Air #1: The large FA1 biofilter is shown in Figure 2 below and is a similar design to the TBL biofilter but with more coarse bark. Steam emissions visible in the photograph are variable across the bed surface. Media temperature measurements at 200mm depths across the bed surface also indicate significant variations in air flows through different sections of the bed.

The presence of visible steam emissions confirms the significant extent to which concentrated source fugitive emissions are occurring within the TBL building, which are being effectively collected by the FA1 building air system. The inlet duct pressure of 2.7 kPa to the FA1 biofilter is reasonably high given the moderate bed air loading rate of 21 $m^3_{air}/hr/m^3_{media}$. The media does not appear to be overly wet which might otherwise explain this. More likely reasons possibly include the uneven air distribution across the bed, the blinding of slots within the air distribution laterals, and the potential build-up of water and material within the manifold, laterals and possibly the bottom layers of the bed. It is recommended that the spatial variation in air distribution is further investigated by TBL including pressure drops across the media (at several locations) and the internal condition of manifold air distribution and laterals.

Irrespective of the current inlet duct pressure, the FA1 fan is maintaining sufficient extraction flow (90,500 m^3/hr) from the highest region of the TBL rendering building to contain fugitive odours. Furthermore the FA1 biofilter is effectively removing odour from the inlet air stream.

Factory Air #2: The FA2 biofilter is located on an elevated pad and has no side walls – see Figure 3. The inlet pressure to the FA2 biofilter of 3.3 kPa is down from 4.0 kPa measured during the 2015 audit. The current high backpressure has built up from a much lower level of 1.7 kPa that was measured in February

2016 (data obtained from TBL's daily monitoring records). This lower operating pressure followed remediation of the then blocked distribution pipework and installation of the new blood room scrubber system. The latter now protects the bed from blinding up with blood and meal dust. However, the FA2 biofilter bed still has geotextile within its media, which may well explain the gradual build-up of inlet duct pressure over the last year. It recommended that this removed from the bed including any associated built up layer of material (if present).

The southern edge of the bed has a high degree of air channel due to protruding air distribution laterals, or their terminus being close the outer southern edge of bed. This can be rectified by laying an additional 1.5 m deep strip of bark along the southern edge of the bed for its full width. This should be at least 2 m wide to eliminate the by passing of untreated air from the lateral system.

TBE Concentrated Sources: Both of the two biofilter beds that make up the TBE biofilter have bark media that is mostly broken down into a compost/soil like material. As with some of the other onsite biofilters, multiple media temperature measurements at 200mm depths across the bed surface also indicated significant variations in warm and moist air flows through different sections of the bed.

This media is due for replacement and therefore size distribution testing of this is recommended to help confirm what fraction of existing media is retained and remixed with new bark. When replacing these two beds (one at a time) it will be an opportune time to check and clean out the manifold and air distribution system as necessary, strengthen sections of timber wall and re-seal any leaking joints within the internal liner. Figure 3 shows a photograph of the concrete inlet chambers that connect to the two inlet air manifolds to each of the biofilter beds.

Figure 2: Photograph of the Factory Air #1 Biofilter viewed its northeast corner.

Figure 3: TBE concentrated sources biofilter inlet chambers and timber wall of the second bed.

7.0 INSTRUMENTATION

At the time of the 2017 audit, TBL were installing new industrial grade temperature and pressure gauges throughout the concentrated sources system. These replace existing gauges that have been previously checked by Golder in 2015 using a Fluke 50D thermometer and the Dwyer digital manometer (Model AQTI-WDPM-005). Because these gauges are all brand new, only several Baumer temperature gauges were compared to Golder's Fluke meter - the readings were all within 1°C of each other.

As per recommendations made previously by Golder (2013), this audit confirmed that TBL have now installed fittings into the existing air ducting systems to allow for the following:

- Installing industrial grade pressure/vacuum gauges near the terminus of each main air extraction duct, including concentrated sources and factory air ducts. These gauges are situated approximately one metre back from the final opening of the factory air ducts (including the pre-breaker hood).
- Installing industrial grade pressure/vacuum gauges at the inlet and discharge side of all concentrated source and factory air fans.
- Installing industrial grade temperature gauges on the inlet of the biofilters that treat concentrated source air from TBE and TBL.

- Install industrial grade temperature gauges on the inlets and outlets of the water spray scrubbers that cool the TBE and TBL concentrated source air flows, as well as on the inlet cooling water supply and discharge line.
- For overhead air extraction manifolds that are difficult to access, run steel tubing down walls to mounted gauges that can be readily accessed and viewed from floor level.

The only recommendation for further monitoring is the installation of water tube manometers or tubing that allows for checks upon the media air pressure drop within the biofilter beds. This requires stainless or plastic tubing to be installed so that one open end terminates within the gravel/stone layer of each biofilter bed and with the other end open to atmosphere (on the outside wall of the bed) to enable periodic gauge pressure measurements.

8.0 DESIGN ASPECTS

8.1 Odour Extraction System

Taranaki By-Products: The operation of the new bovine line by TBL does place more volumetric extraction and heat load respectively on its concentrated sources PSES and cooling system. The installation of the new 600 mm diameter bovine concentrated sources manifold should accommodate the increase of extraction flow required.

It was noted during the audit that the pre-cooker on the chicken line was losing a substantial quantity of process emission. The decanters on the older bovine line were also losing significant process emissions. The installation of a new TBL concentrated sources air fan with a design capacity of approximately 30,000 m^3/hr against a 2.5 kPa discharge should reduce these process emissions into the building to a minor level. Additionally, the chicken line concentrated sources duct also needs to be checked for blockages.

It is clear that the existing FA1 building air system is effectively containing the building air by its extraction from the highest regions of the TBL rendering building. This is located above the tallow recovery plant and bovine rendering lines. The emissions from the tallow recovery plant and liquid phase tanks are directly connected to the FA1 building air system. Consequently the air stream that is extracted by the FA1 system is containing the fugitive emissions from the chicken and bovine rendering lines, as well as acting as a PSES for the tallow recovery area. This results in this building air exhibiting temperatures similar to pre-cooled concentrate sources e.g., having a maximum and 99.5th percentile temperatures of 40°C and 35°C respectively during a recent 12 month period (see Table 1).

Taranaki Bio-Extracts: The TBE plant requires improved performance from its concentrated odour sources system. During the 2015 audit, the total flow to the TBE biofilter was 17,000 m^3/hr and this corresponded to there being good odour control. Therefore, this flow is considered to be a useful benchmark target for the system to achieve.

The hold-up of material within the raw material bin due to a rolling action was identified as a source of significant odour (as per discussions with operational staff during the audit). Therefore, it is recommended that this area is also ventilated to the TBE biofilter along with the extracted concentrated sources. When enclosed by its roller door, the bin room has a volume of 320 m^3. For an effective building air extraction, an additional air flow of approximately 3200 m^3/hr would be needed (based on 10 building volume changes/hr).

Given the above, with the additional raw material room ventilation to the desired concentrated source flow of 17,000 m^3/hr, the total flow of air for biofilter treatment would be approximately 20,000 m^3/hr. This would load the TBE dual biofilter bed at 30 $m^3_{air}/hr/m^3_{media}$. Accordingly, for this to be effective the TBE biofilter media would need to be remediated and a low level of loamy type soil (< 10 % bark volume) added.

Up-Graded PSES: A configuration is suggested in Figure 4 (Appendix B) for incorporating an additional fan that is dedicated to the concentrated sources PSES. This configuration should be assessed using fan curves for the Duskie and concentrated source fans and a calculated system *flow-pressure* curve.

A key benefit of incorporating a dedicated concentrated source fan for the PSES is that hot exhaust air can be recycled to the Duskie dryer without dilution of cooler air streams that currently occurs with the existing system. This will result in improved dryer energy efficiency and an associated reduction in energy use.

Building Air Extraction: An alternative approach for improving the control of TBE process odours is to employ building air extraction in combination with the existing concentrated source PSES (as is employed successfully by TBL). However, this approach is likely to be significantly more expensive to install and operate compared to improving the PSES as discussed above and presented in Figure 4 (Appendix B), or some other version of this configuration.

To clarify the above view, it is understood that the TBE wet processing room volume is 1,510 m^3 – this is where the main odour sources are located. This room volume infers an additional extraction flow rate of 15,000 m^3/hr – again based on ten volume changes per hour. This indicates a total air flow of approximately 35,000 m^3/hr needing to be treated by the TBE biofilter system at an excessive loading rate of 50 $m^3_{air}/hr/m^3_{media}$. Therefore a building air extraction system at TBE is likely to require larger fans, ducts and additional biofilter capacity than currently exists.

9.0 COOLING SYSTEMS

The data summarised in Table 1 indicates the degree of cooling imparted on the concentrated sources from TBE and TBL has improved in comparison with 2013. During the period of February 2016 to February 2017, daily records show that inlet temperatures to the TBE and TBL concentrated sources biofilters were below 40°C for more than 99% of time and below 35°C for 95 % of time or more.

The above summary of biofilter inlet air temperature statistics indicates that the TBL and TBE water scrubber systems are sufficiently cooling air stream prior to the biofilters (the former in combination with the TBL WHE system that removes latent energy from the steam dryer exhaust streams). There is one daily record in August 2016 when the TBL biofilter inlet had a measured temperature of 79°C. Such a high value could have resulted from abnormal function of the WHE or more likely the cooling water supply circuit not working due to a blockage. The latter can happen when suspended solids in the final wastewater pond either block the pump intake filter or else block the scrubber nozzles.

TBL has implemented automatic operational cut-outs that cease processing should the recirculating pond scrubber water cease to flow due to blockages at the pump, within the scrubber nozzles or any other reason. This forces rendering plant operator to remove any cooling water flow blockages to enable the scrubber to perform its air cooling function and therefore allow the rendering process to continue.

As noted during the 2015 audit, the availability of the final wastewater pond to provide an adequate flow of cooling water to the TBL and TBE water scrubbers is the main determinant of the scrubber systems ability to adequately cool concentrated source streams. With the operation of the additional bovine rendering line at TBL there would have been a greater cooling duty demand on the scrubbers and wastewater pond cooling capacity. However, the limitations of the evaporative cooling capacity of the wastewater pond does not appear to have create an issue since operating the new bovine line. The waste treatment pond has had further surface aeration installed which would have increased its evaporative cooling capacity. This is an a key area for TBL to monitor more carefully and as such, the installation of temperature gauges on the water inlet and outlet lines to the pond are important measures.

As it stands, the ability of TBL to fully utilise the material processing capacity its current plant allows for, may well be limited by the cooling duty that the current final wastewater pond can achieve through mechanically enhanced evaporative cooling from its surface.

10.0 SUMMARY OF DATA AUDIT

This section summarises measured temperatures, pressures, relative humidity and flow rates obtained from the 2017 audit and compares them to values measured by Golder in 2015. This includes biofilter inlet air flows measured in 2017 and 2015 by Golder and a summary of daily records of inlet duct air temperature and pressure data for one full year (Table 1). Further data collected during the Golder audits are summarised in (Table 2).

Table 1: Biofilter Inlet Air Flows, 2017 with 2015 in brackets.

Biofilter	Source(s)	Flow rate (m^3/hr)	Inlet duct pressure (kPa)		Inlet air temperature °C	
		2017 Audit	Max.#	99.5%ile+	Max.#	99.5%ile+
TBE Conc. Source	Concentrated sources, dryer exhaust	14,000 (17,000)	1.4	0.63	42	35
TBL Conc. Source	Conc. sources, mills and dryer NCGs	18,500 (11,000)	1.8	0.82	71	36
TBL Factory Air 1	Rendering Building Air	90,500 (88,000)	3.7	3.4	40	35
TBL Factory Air 2	Rendering and Blood Building Air	38,000 (21,000)	3.3	2.85	38	32.5

Notes: #Maximum value of all TBL weekly compliance monitoring data for period of Feb 2016 to Feb 2017. +99.5 percentile value of all TBL weekly compliance monitoring data for period of Feb 2016 to Feb 2017.

Table 2: Air Stream Parameters 2017 compared to 2015 in brackets.

Location	Gauge pressure (kPa)	Temperature (°C)	Humidity %RH
TBL conc. sources 1st scrubber inlet	-1.0 (-0.68)	64 (52)	100
TBL conc. sources 2nd scrubber inlet	ND	55 (ND)	100
TBL conc. sources fan - Inlet Duct	-1.6 (-1.25)	43 (30)	100
TBL conc. sources fan – Outlet Duct	0.9 (>1.8)	42 (36)	100
TBL conc. sources fan – Outlet Duct (Opposite Sump)	1.6 (1.8)	42 (30)	100
Factory Air 1 Fan – Inlet Duct	-1.6 (-1.6)	37.5 (30)	ND (52)
Factory Air 1 Fan – Outlet Duct (Opposite Sump)	2.7 (2.6)	41.5 (33)	ND (52)
Factory Air 2 Fan – Inlet Duct (Opposite Sump)	-1.500 (-0.68)	28 (25)	ND (58)
Factory Air 2 Fan – Outlet Duct (Opposite Sump)	3.3 (4.0)	38 (38)	ND (58)
TBE conc. sources fan – Outlet Duct (River Crossing)	ND (0.32)	38.5 (39)	100
TBE conc. sources – Scrubber Inlet	ND (0.99)	ND (60)	100

Note: ND = not measured.

11.0 CONCLUSIONS AND RECOMMENDATION

Following Golder's audit of the TBL and TBE odour control system, it is concluded that the associated equipment, including ducts, fans, cooling system and biofilters, continue to be maintained and operated in a sound engineering state.

The existing biofilters and extraction systems are generally working effectively. However, some design and remedial measures are recommended as follows:

- The TBL concentrated source biofilter design is effective but requires deeper coverage of the inlet manifold and improved sealing against air leakage along the western border of the bed (opposite the inlet manifold).
- Measures are required to reduce the extent of air channelling that is currently occurring in the TBL concentrated source biofilter, including investigating air leaks around the Novaflow pipe lateral connections to the main concrete manifold, the addition of bark to cover the inlet manifold and improve the sealing of the western wall of the bed.
- The FA1 biofilter design is appropriate for a building air treatment system. However, given its increasingly important role for treating humid fugitive process emissions it may in time be necessary to consider sealing its western side. Currently this does not appear to be causing an issue, however some further investigations are recommended for the FA1 biofilter. This includes an assessment of pressure drops across the media and the internal condition of inlet manifold and air distribution laterals.
- The geotextile within FA2 biofilter could well be causing its high inlet air duct pressure and it should be removed. Additionally this bed needs additional bark material along its southern side to avoid untreated air by-passing the media and also to lower the bed's air loading rate.
- The TBE biofilter's bark requires replacement/remediation and that a low fraction (< 10 vol.%) of loamy soil is incorporated into any new bark to ensure effective odour removal at air loading rates that could approach 30 $m^3_{air}/hr/m^3_{media}$ following an upgrade to the concentrated sources PSES.
- Testing of the TBE biofilter media for size distribution to help establish what fraction of existing media to retain and remix with new bark.
- Upgrading the PSES for concentrated sources is recommended in preference to employing building air extraction at TBE. An optimised configuration of the Duskie and new concentrated source fans should be based on their respective fan specifications and a system curve.
- Ventilation of the TBE raw material bin room to the TBE biofilter is recommended. However, the optimal approach achieving this requires more detailed design consideration than provided in this report (e.g., a dedicated duct connecting down-stream of the scrubber or connecting to the existing concentrated sources dust)
- For all site biofilters, install water tube manometers or tubing that allows for checks upon the media air pressure drop within the biofilter beds.

The existing cooling systems continue to achieve inlet airstreams to the biofilters that are normally 40°C or lower, which represents good practice. However, installation of new gauges for monitoring the pond water temperature changes across the TBL and TBE scrubber systems will help monitor the ability of the pond's evaporative cooling capacity to meet the required cooling duty that the concentrated sources PSESs require.

12.0 REFERENCES

Golder 2015. Site Visit Report - Consent 4058-4 Certification. Letter report prepared by Golder Associates (NZ) Limited for Taranaki By-Products Limited. Document No. 1578104138_002_LR_Rev0. 2 July 2013.

APPENDIX A

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APPENDIX A
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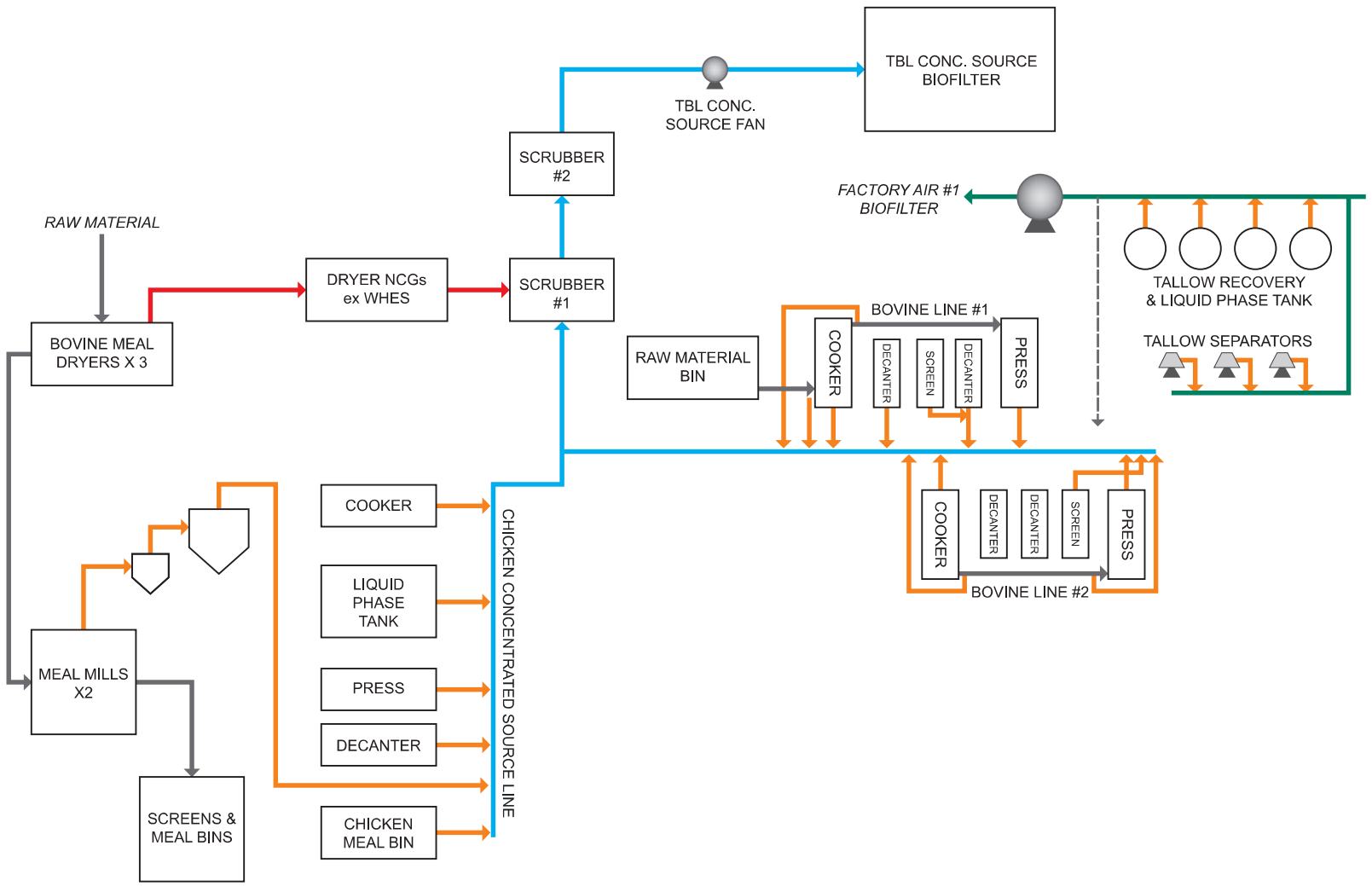
APPENDIX B

Figures



LEGEND

- Equipment items
- Cyclones
- Building air extraction
- Cooling water
- Concentrated sources manifold
- Dryer exhaust
- Liquor flows
- Point source extraction ducting
- Recommended changes
- Solids
- Air fan
- Separator/centrifuge
- Manual valve

NOTES

1. Schematic only, not to be interpreted as an engineering design or construction drawing.
2. Figure must be printed in colour.

CLIENT
TARANAKI BY PRODUCTS LTD

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2017)

TITLE
SCHEMATIC DIAGRAM OF POINT SOURCE EXTRACTION SYSTEM (PSES) FOR THE TBL BY-PRODUCTS RENDERING PLANT

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-03-27
PREPARED	AA
REVIEW	KC
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
1530864	002	0	01

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: A3

25 mm

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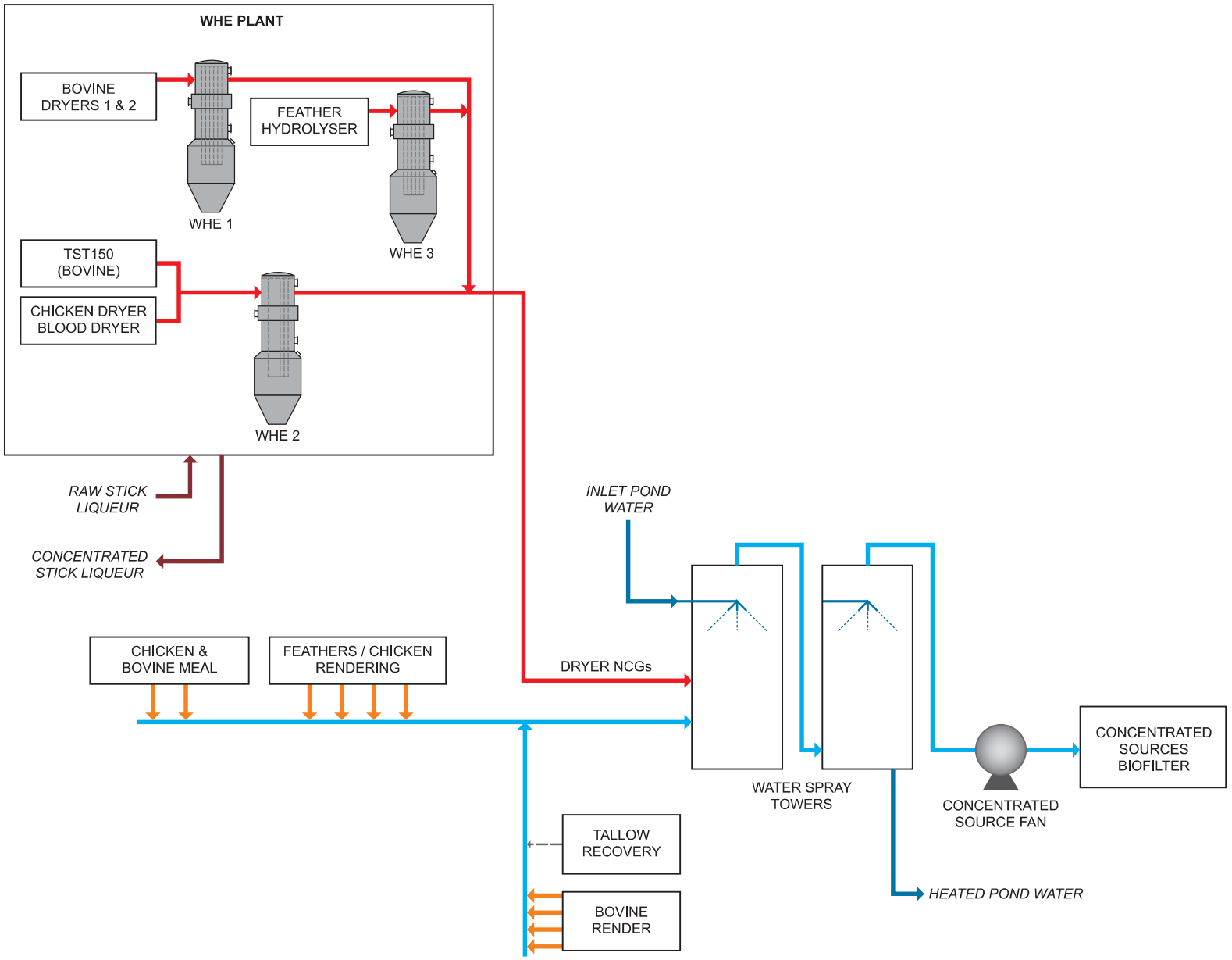

LEGEND

- Equipment items
- Cyclones
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CLIENT
TARANAKI BY PRODUCTS LTD

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2017)

TITLE
SCHEMATIC DIAGRAM OF CONCENTRATED SOURCES EXTRACTION (SHOWING DETAILS OF WHE'S & COOLING TOWERS)

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-03-27
PREPARED	AA
REVIEW	KC
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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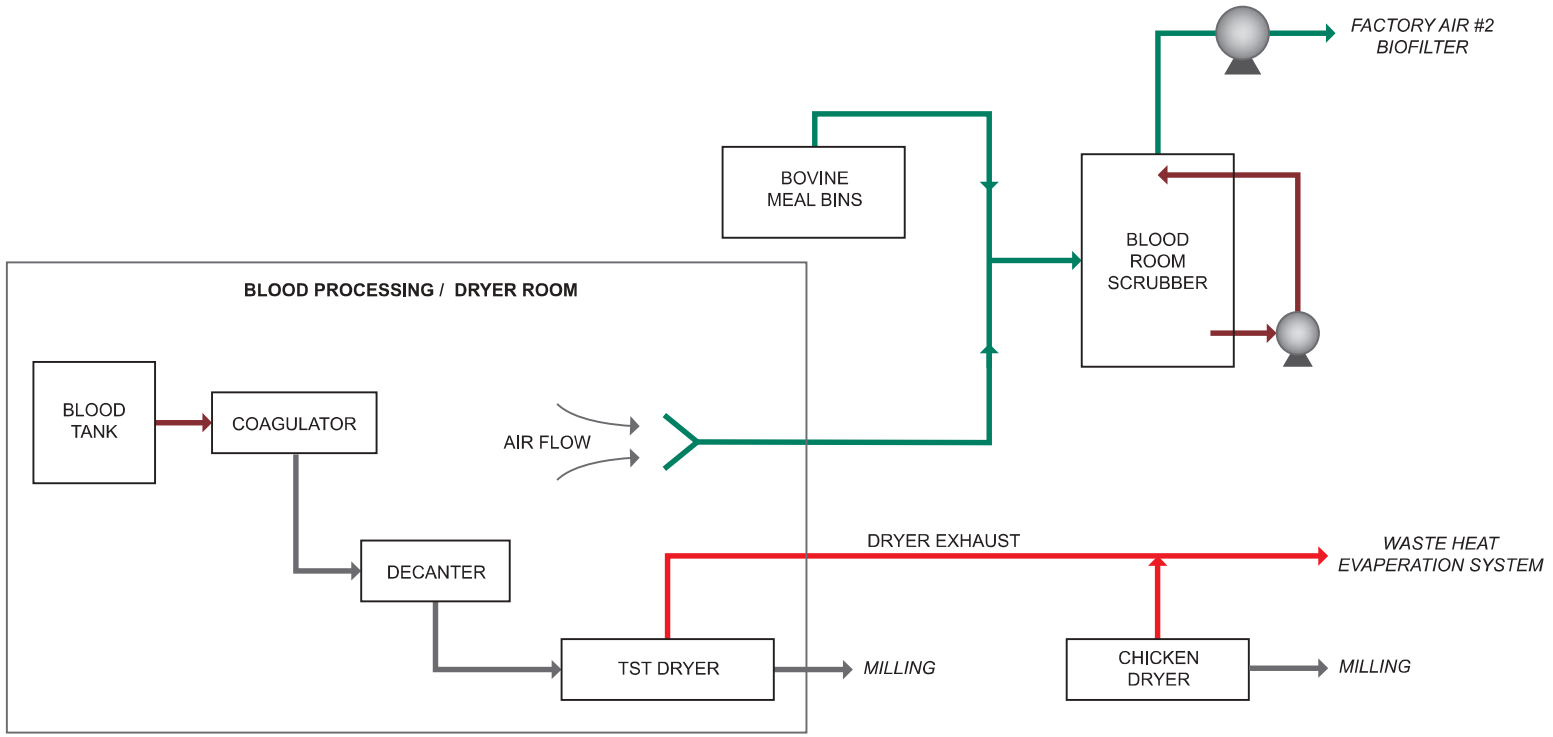

LEGEND

- Equipment items
- Cyclones
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CLIENT
TARANAKI BY-PRODUCTS

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2017)

TITLE
SCHEMATIC DIAGRAM OF BLOOM ROOM BUILDING AIR EXTRACTION & DRYER EXHAUST VENTILATION – TBL RENDERING PLANT

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-03-27
PREPARED	AA
REVIEW	KC
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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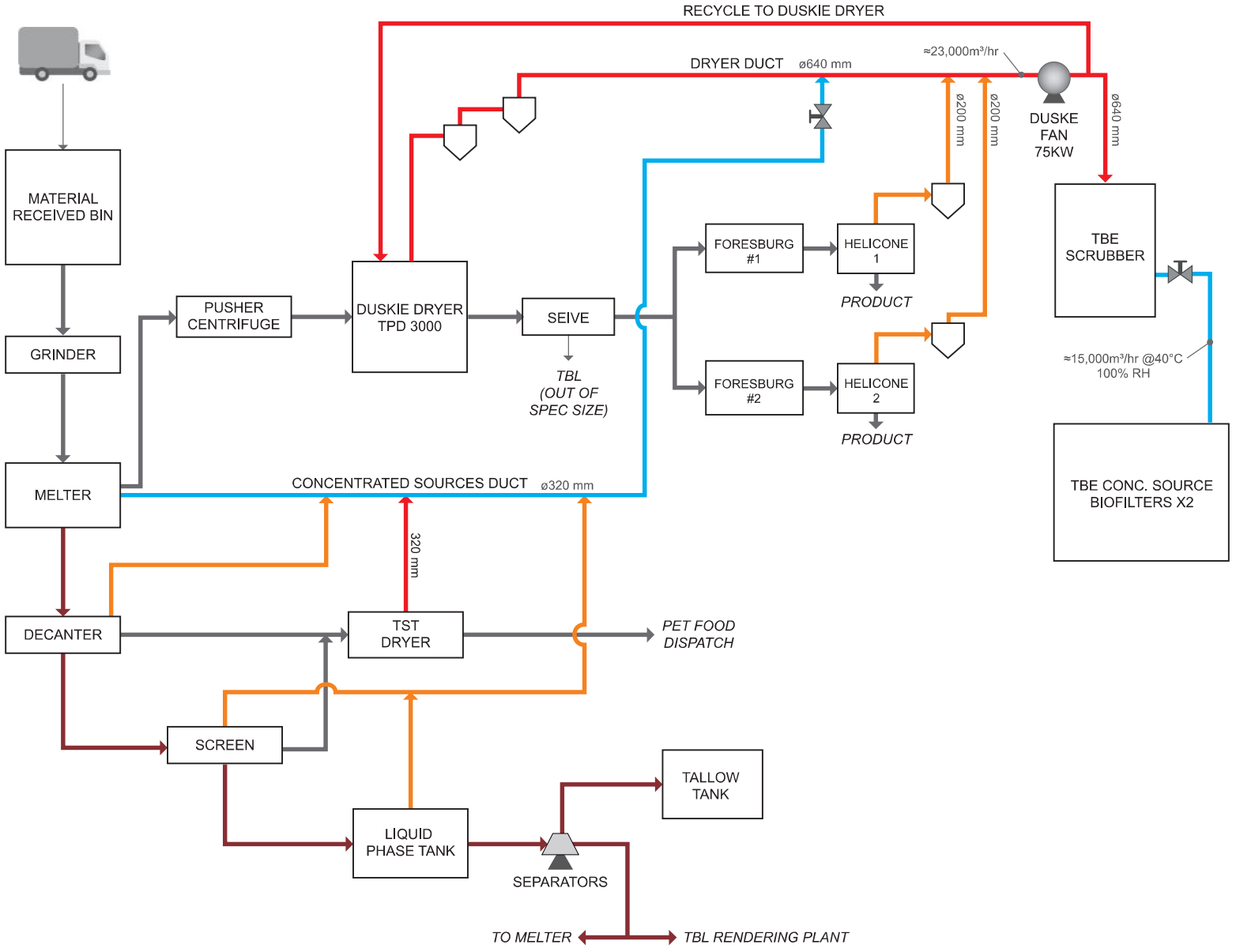

LEGEND

- Equipment items
- Cyclones
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- Liquor flows
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- Solids
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- Manual valve

NOTES

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2. Figure must be printed in colour.

CLIENT
TARANAKI BIO-EXTRACTS

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2017)

TITLE
SCHEMATIC DIAGRAM OF POINT SOURCE EXTRACTION SYSTEM (PSES) FOR THE TARANAKI – EDIBLE EXTRACT PLANT

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-03-27
PREPARED	AA
REVIEW	KC
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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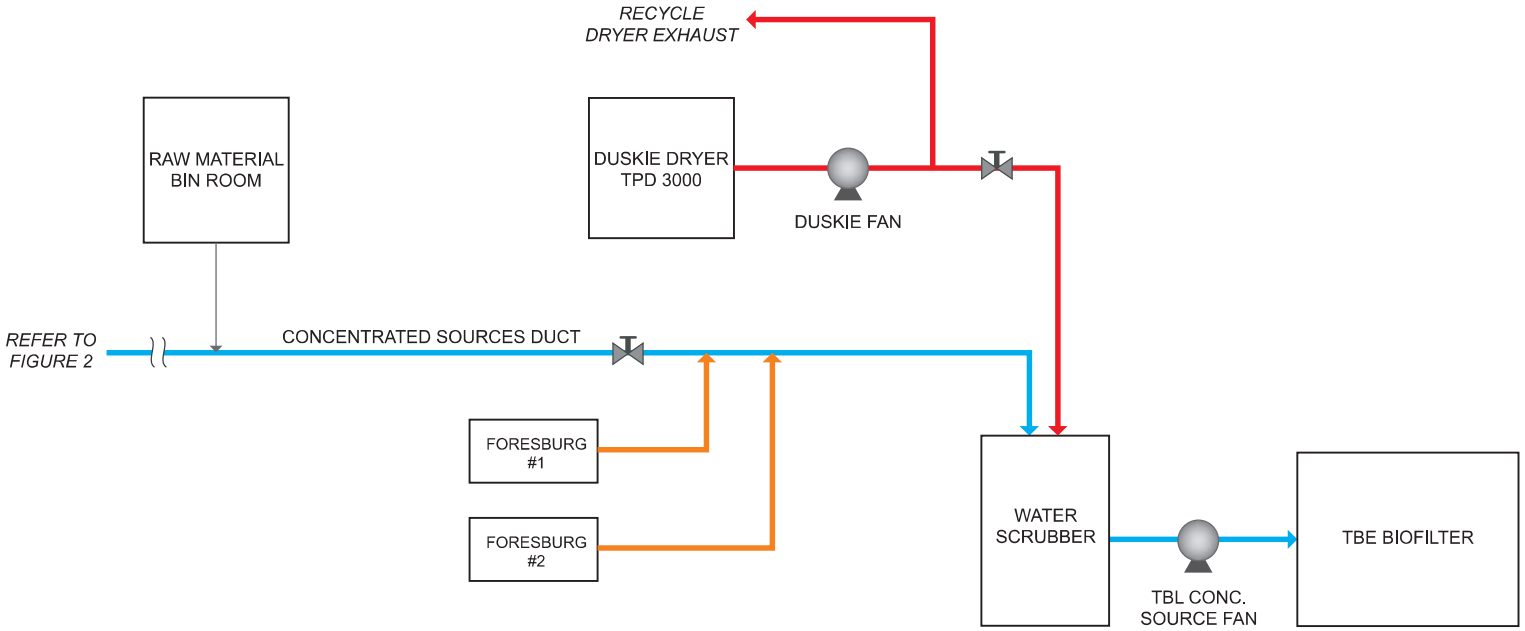

LEGEND

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CLIENT
TARANAKI BIO-EXTRACTS

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2017)

TITLE
RECOMMENDED LAYOUT OF CONCENTRATED SOURCE EXTRACITON & COOLING SYSTEM

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-04-05
PREPARED	AA
REVIEW	KC
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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