Taranaki By-Products Ltd
Monitoring Programme
Annual Report
2018-2019

Technical Report 2019-78

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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 the TBP, and a food grade plant owned by Taranaki Bio-Extracts Ltd (TBE). A trucking firm, Jackson Transport Ltd (JTL), owned by TBP, also operate from the site.

This report for the period July 2018 to June 2019 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess TBP's environmental and consent compliance 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.

TBP 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, TBP demonstrated an overall improvement required level of environmental performance.

Monitoring was carried out by both the Council and TBP. TBP monitors water abstraction rates, wastewater volumes and composition, effluent loading on irrigation areas, bio-filter 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 hapu engagement meetings.

The Council's monitoring programme for the year under review included 11 inspections, 144 water samples collected for physicochemical analysis, and two biomonitoring surveys of receiving waters. In addition, two community meetings and a hapu meeting were also held.

The monitoring indicated the following:

The discharge of cooling water recorded an increasing ammonia concentration throughout the monitoring period, though the impact to the Inaha stream was minimal. The thermal effect of the plant discharges were within the thermal limits for the duration of the monitoring year. The abstraction of surface water and groundwater was undertaken within compliance standards for the duration of the year. The dilution rate for the surface water discharge was maintained for the period (99 days) the Company was discharging to the Inaha stream.

The monitoring of dissolved oxygen within the final pond 6 was below the requisite limit of 1.0 g/m^3 on three of four occasions.

The nitrogen loading records for irrigation of wastewater to land indicated no exceedance in 300 Kg N/ha. The highest wastewater loading was recorded as 299 kg N/ha. Four paddocks contained a combined wastewater and fertiliser nitrogen loading of greater than 300 kg N/ha.

Groundwater monitoring of the irrigation area indicated that four wells of 12 held a value for nitrate-nitrite nitrogen (NNN) of greater than 55 g/m^3. Of these four, three remained above 55 g/m^3 throughout the monitoring period.

Surface water monitoring indicated elevated NNN within the western tributary of the Inaha stream. The nitrate concentration within this water course increases down the catchment area, from NPSFM grade B to grade D, which is below the national bottom line for this contaminant.

The main stem of the Inaha stream fluctuates from grade B to grade C for NNN concentrations down the catchment area of the TBP site.

Biological monitoring indicated that overall, there was no evidence that discharges from TBP have impacted the freshwater macroinvertebrate communities present in the Inaha Stream or unnamed tributary of the Inaha Stream.

Two of five groundwater monitoring wells in close proximity to the burial pits recorded significantly elevated ammonia in groundwater. The nearest receptor (the Inaha stream) was not affected. No material was buried in this monitoring period.

Seven odour complaints were received in relation to TBP activities this monitoring period, of which four identified objectionable odour. TBP received a letter of explanation and four infringement fines. The reasons for these odours impacts were related to a failure in one bio-filter on three occasions and a breakdown in a mechanical process which resulted in material stored outside which was vastly odorous.

The biennial audit of odour control system was undertaken this monitoring period and the recommendations will be implemented.

TBP met with the community on two occasions this monitoring period and the Ngati Manuhiakai hapu on one occasion.

Site developments are continuing with the facility attempting to recycle its wastewater and utilise less freshwater within its processes. The main goal is to evolve the facility to a point where there is a minimal requirement to discharge wastewater to surface water or land in the long term. This is the goal the facility has set itself.

By comparison with previous years, the monitoring indicated a slight decline in the TBP performance. There were four main unauthorised incidents recording non-compliance in respect of this consent holder during the period under review.

During the year, TBP demonstrated an improvement required level of environmental and good level of administrative performance with the resource consents.

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% 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 has reduced in the year under review.

This report includes recommendations for the 2019-2020 year.

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1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2018 to June 2019 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 the Company that relate to abstractions and discharges of water within the Inaha catchment, and the air discharge permit held by the Company 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 Company's use of water, land and air, and is the 27th combined annual report by the Council for the Company.

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 the Company 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 Company's site/catchment.

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

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

Section 4 presents recommendations to be implemented in the 2019-2020 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 the Company, this report also assigns them a rating for their environmental and administrative performance during the period under review.

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

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

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

Environmental Performance

High: No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving 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 during investigations of incidents reported to the Council by a third party 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 during investigations of incidents reported to the Council by a third party. 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 during investigations of incidents reported to the Council by a third party. 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 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.[1]

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, also owned by TBP.

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 (Figure 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, this includes 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.

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[1] The Council has used these compliance grading criteria for 15 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

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 is limited to deliveries from within the Taranaki region.

Figure 1 Taranaki By-Products and Bio-Extracts site

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 reduced the output of the registered fertiliser Zeal Grow.

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 to 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 and the wastewater treatment plant. The bio-filters used to be shared by both plants, but now they have been separated.

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, 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 the current monitoring year TBP engaged Golder Associates to undertake the certification of the process. This is the fourth occasion this certification of apparatus associated with odour control has been undertaken by Golder Associates.

1.3 Resource consents

The Company holds 12 resource consents the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in Section 3 of this report.

A summary of the various consent types issued by the Council is included Appendix I, as are copies of all permits held by the Company during the period under review.

Table 1 Summary of resource consents held by the Company

Consent number	Purpose	Granted	Next review date	Expiry date
Water discharge permit				
2049-4	Discharge treated wastewater to Inaha Stream	October 2006	2017	2019

Consent number	Purpose	Granted	Next review date	Expiry date
5426-1	Discharge stormwater to Inaha tributary	May 1999	2017	2019
2050-4	Discharge cooling/backwash water to Inaha Stream	May 1999	2017	2019
Water take permit				
2051-4	Take from Inaha Stream	January 2015	2017	2019
9756-1	Take groundwater	February 2014	2017	2029
Discharge to land permit				
3941-2	Discharge treated wastewater to land	November 2009	2014	2019
5495-1	Discharge meat wastes by burial into land	August 2000	2017	2019
Air discharge permit				
4058-4	Discharge emissions to air from rendering operations	October 2011	2015	2024
10054-1	Discharge emissions to air from burning	January 2015	2017	2029
Land use permits				
6431-1	Place culverts in Inaha Stream	October 2004	2017	2023
7234-1	Disturb to realign Inaha Stream	March 2009	2017	2023
7329-1	Discharge sediment during Inaha Stream realignment	June 2008	2017	2023

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.

1.4 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 Company site consisted of four 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;
- 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 site was visited on eleven occasions during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company 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 Chemical sampling

Compliance sampling is undertaken by the Council to assess the Company's discharges to receiving waters. The Company operates a dual wastewater disposal system. The system discharges wastewater from the final (aerobic pond) pond 6 (Table 2 and Figure 2). 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 the Company irrigation area (Figure 3). 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 across the discharge mediums of surface water and soil/groundwater.

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 the Company is discharging to land to assess the likely contribution from the irrigation areas' discharge to the groundwater (Figure 4) which may result in surface water interaction. Surface water analytes are provided in Table 4.

In terms of the irrigation areas, the Council samples groundwater monitoring bores to assess the likely effects of the wastewater discharge on the groundwater across these areas. 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 (Figure 3).

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. The Company 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 the Company.

Table 2 Taranaki By-Products point source monitoring location 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 Inaha Stream and associated tributaries sampling locations key

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
10	Unnamed western tributary 250 m u/s Inaha confluence	1701518	5623227	INH000440
11	State Highway 45	1700393	5620330	INH000470

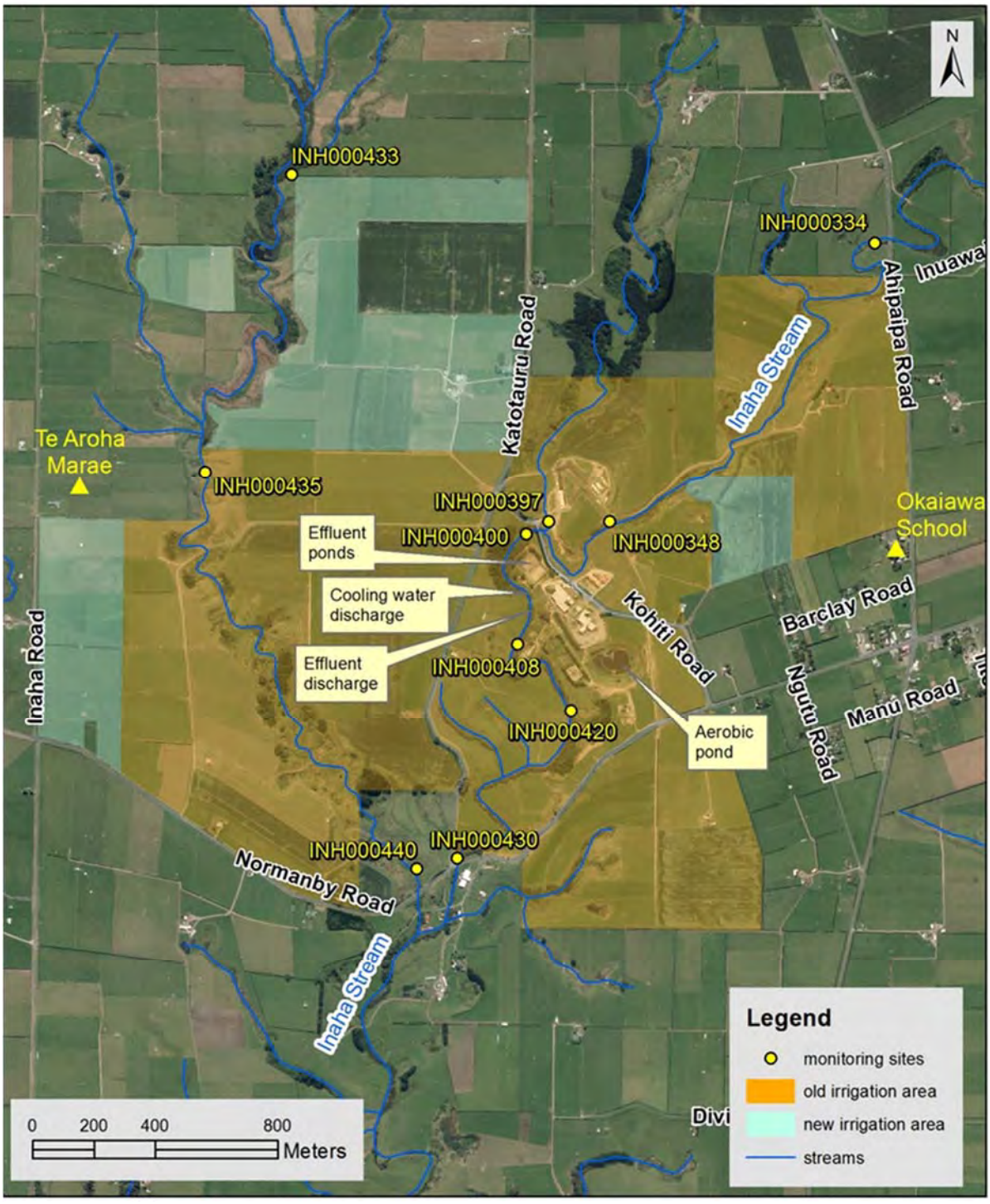

Figure 2 Inaha Stream and tributary surface water monitoring locations

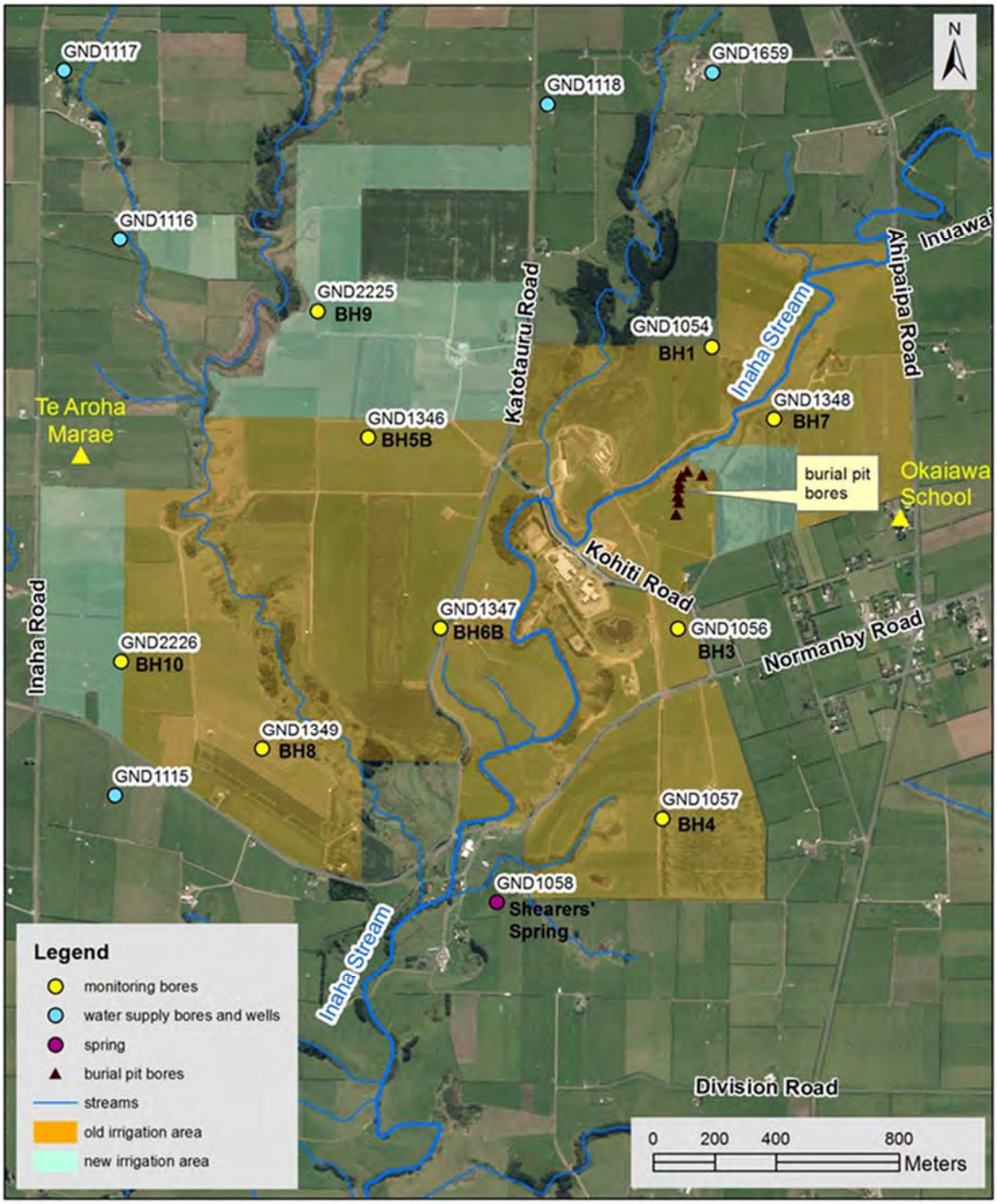

Figure 3 The locations of the associated groundwater monitoring wells

Table 4 Monitoring analyte by medium

Parameter	Description	Units	Medium
BOD	Biochemical oxygen demand 5day	g/m^3	SW/DS
CL	Chloride	g/m^3	DS
CONDY	Conductivity @ 20°C	mS/m@25°C	SW/GW*/DS
DO	Dissolved Oxygen	g/m^3	SW/DS
DRP	Dissolved reactive phosphorus	g/m^3 P	SW/DS
E-Coli	E-coli	/100 ml	DS
NH_3	Un-ionised ammonia	g/m^3	SW
NH_4	Ammoniacal nitrogen	g/m^3 N	SW/GW*
NNN	Nitrite/nitrate nitrogen	g/m^3 N	SW/GW*
NO_2	Nitrite nitrogen	g/m^3 N	DS
NO_3	Nitrate nitrogen	g/m^3 N	DS
PERSAT	Dissolved Oxygen Saturation %	%	SW/DS
pH	pH	pH	SW/GW*/DS
TEMP	Temperature	°C	SW/GW*/DS
TURBY	Turbidity	NTU	SW/DS
BODCF	Bioch.Ox.Demand,5day,filt;Ninh	g/m^3	SW/DS
FLOW	Flow	m^3/s	DS
LEVEL	Water Level	m	GW*
ALKT	Alkalinity Total	g/m^3 $CaCO_3$	GW/DS
CA	Calcium	g/m^3	GW/DS
COD	Chemical Oxygen Demand	g/m^3	GW*/DS
HCO_3	Bicarbonate	g/m^3 HCO_3	GW/DS
K	Potassium	g/m^3	GW/DS
KAR	Potassium Adsorption Ratio	None	DS
MG	Magnesium	g/m^3	GW/DS
NA	Sodium	g/m^3	GW/DS
SAR	Sodium Adsorption Ratio	None	DS
SO_4	Sulphate	g/m^3	GW/DS
SS	Suspended solids	g/m^3	DS
ST	Sulphide Total	g/m^3	DS
TG	Total grease	g/m^3	DS
TN	Total nitrogen	g/m^3 N	DS
TP	Total phosphorus	g/m^3 P	DS
O&G	Oil and Grease	g/m^3	DS
GW=Groundwater/ DS=Discharge/ SW=Surface water/GW*=Burial pit groundwater			

1.4.5 Biomonitoring surveys

Two surveys of biological communities at up to eight sites in the Inaha Stream and a major tributary were scheduled this year as part of the compliance monitoring program. These surveys assessed the effects of the Company discharges (point source discharges and any diffuse source discharges as a result of spray irrigation) on benthic invertebrate communities of the stream. A summary of these reports is provided in Section 2.4.6.

The main reports are reported separately and are available on request.

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

1.5.3 Site inspections

The TBP site was inspected on 11 occasions during the 2018-2019 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, the Company was required, under the new (at the time) 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 bio-filter 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.

In addition to the plan there is also a consent defined requirement that an audit of odour controls systems be undertaken on a biannual basis by a suitably qualified consultant.

There is also a requirement to meet with representatives of the local community to discuss site activities and also specifically those relating to the exercise of this consent (4058-4).

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 11 routine inspections were undertaken during the 2018-2019 year. Council holds a record of detailed inspection notes which are available by request, they are also presented in Section 2.4.6. 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 Company 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

Pre 2014 all water for processing at the Company'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, the Company 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.

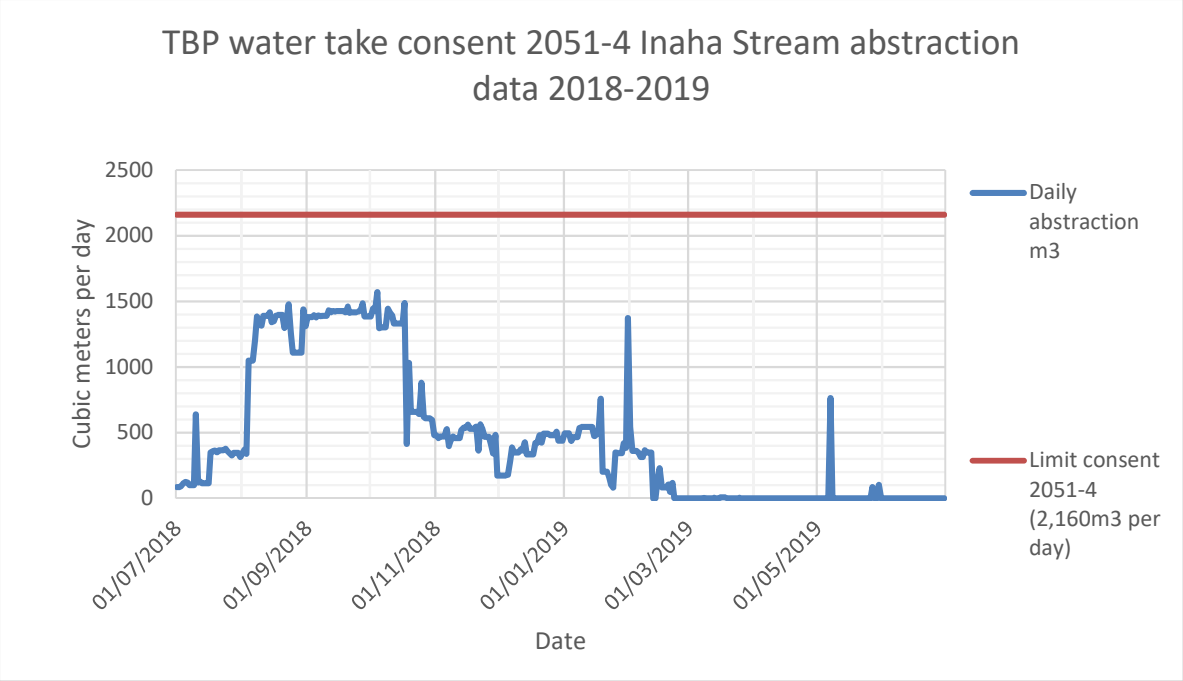

Figure 4 Consent 2051-4 abstraction data 2018-2019

The records provided by the Company (Figure 4) indicated that the consented abstraction daily maximum of 2,160 m^3 was complied with for the entirety of the 2018-2019 monitoring period. This is an improvement from the 2017-2018 monitoring period where an exceedance was observed on one occasion.

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 2019 is presented in the following Figure 5.

The analysis provided in Figure 5 indicated that the daily maximum limit of 1,970 m^3 was not exceeded for the whole of the monitoring period.

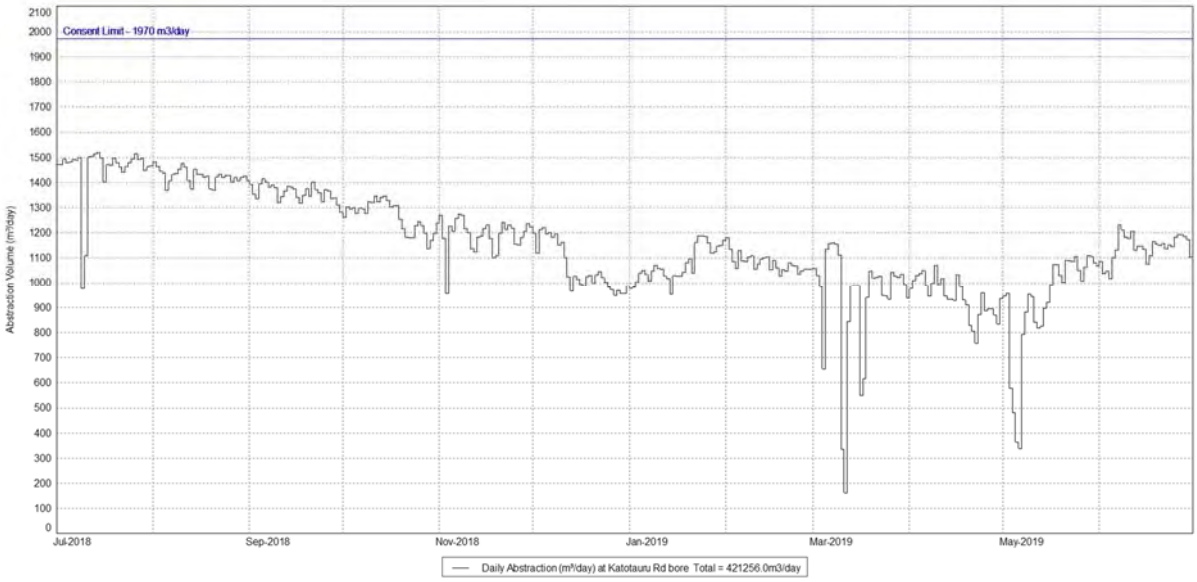

Figure 5 Daily groundwater abstraction volumes consent 9756-1 2018-2019

2.3 Discharges of wastewater

2.3.1 Pond six sampling

TBP hold consent 3941-2; to discharge up to 1,400 m^3/ day of treated wastewater from a rendering operation and from a dairy farm 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 (8 and 11) 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 analysis from Table 5 indicated the following:

- Dissolved oxygen was monitored on four occasions, on three of the four the values recorded were below the consent minimum requirement of 1.0 g/m^3. This also had a corresponding percent saturation ranging 7.62-11.45 %.
- The associated SAR indicated values below the maximum allowable value of 15 on all four occasions. Ranging 4.8-8.4 SAR.
- Temperature in IND004004 remained relatively stable across the four rounds, ranging 24-28.5°C.
- pH of the irrigation fluid remained relatively neutral, ranging 7-7.6 pH.
- Bicarbonate ranged 99-400 g/m^3 at 25°C.
- The associated chemical oxygen demand (COD) of the irrigation fluid remained high, ranging 280-550 g O_2/m^3.
- Chloride values within the irrigation fluid remained relatively stable, ranging 181-200 g/m^3.
- Filtered carbonaceous (nitrogen inhibitor) biochemical oxygen demand ($CBOD_5$) ranged from 1.1-12.5 g O_2/m^3.
- Dissolved reactive phosphorous (DRP) ranged 25-40 g/m^3.
- Dissolved sulphide was not identified above the limit of detection (LOD) this period, with all four results below the LOD which was set at >0.05 g/m^3 by the laboratory, RJ Hills.
- Electrical conductivity values of the fluid ranged 221-225 mS/m @25°C.
- E-coli values ranged from 471->2,420 MPN/100 ml.

- In terms of nitrogen within the wastewater.
    - Free ammonia (NH_3) ranged 0.46-1.53 g/m^3.
    - Total ammoniacal nitrogen (NH_4) ranged 67-110 g/m^3.
    - Nitrate nitrogen ranged 16.7-107 g/m^3.
    - Nitrite nitrogen ranged 9.8-96 g/m^3.
    - Total nitrogen ranged 194-240 g/m^3.
    - Total kjeldahl nitrogen (TKN) ranged 78-133 g/m^3.
- Oil and grease within the wastewater recorded one value 12 g/m^3 in May 2019, the remaining three rounds were below the LOD.
- The potassium absorption ratio (KAR) remained low with a value range of 2-3 (mmol/l) 0.5.
- Sulphate within the wastewater ranged 75-128 g/m^3.
- Total alkalinity ranged 81-330 g/m^3 as $CaCO_3$.
- Total biochemical oxygen demand ($TBOD_5$) ranged from below the LOD through to 48 g O_2/m^3.
- Total calcium in the wastewater ranged 22-67 g/m^3.
- Total magnesium ranged 10.2-19 g/m^3.
- Total phosphorous ranged 27-50 g/m^3.
- Total potassium ranged 108-137 g/m^3.
- Total sodium ranged 174-190 g/m^3.
- Suspended solids within the wastewater ranged from 81-350 g/m^3.
- The turbidity of the wastewater ranged from 34-129 NTU.

Table 5 Effluent monitoring data 2018-2019 IND004004

Parameter	DO	PERSAT	TEMP	pH	Bicarbonate	Chemical Oxygen Demand	Chloride	Dissolved C-Biochemical Oxygen Demand	Dissolved Reactive Phosphorus	Dissolved Sulphide	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N
Collected	g/m^3	%	°C	pH Units	g/m^3 at 25°C	$g\ O_2/m^3$	g/m^3	$g\ O_2/m^3$	g/m^3	g/m^3	mS/m	MPN / 100 ml	g/m^3	g/m^3	g/m^3	g/m^3
02 Nov 2018	1.36	11.45	27.2	7	99	310	181	2.1	25	< 0.05	221	1789	0.46	107	116	9.8
17 Jan 2019	0.59	7.7	28.5	7.3	195	550	200	1.1	40	< 0.05	251	471	1.53	23	118	96
22 May 2019	0.62	7.62	26.5	7.6	400	380	191	12.5	26	< 0.05	225	882	3	16.7	78	62
19 Jun 2019	0.87	10.4	24.4	7.3	169	280	187	< 5	29	< 0.05	222	> 2420	1.07	42	107	64

Parameter	Oil and Grease	Potassium Absorption Ratio	Sodium Absorption Ratio (Total)	Sulphate	Total Alkalinity	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Total Calcium	Total Kjeldahl Nitrogen (TKN)	Total Magnesium	Total Nitrogen	Total Phosphorus	Total Potassium	Total Sodium	Total Suspended Solids	Turbidity
Collected	g/m^3	(mmol/L)0.5		g/m^3	g/m^3 as $CaCO_3$	g/m^3	$g\ O_2/m^3$	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	NTU
02 Nov 2018	< 8	2	4.8	128	81	67	42	67	78	19	194	27	137	174	240	110
17 Jan 2019	< 8	3	7	124	160	107	< 20	34	124	11.8	240	50	132	185	350	129
22 May 2019	12	3	8.4	75	330	110	32	22	133	10.2	210	31	108	190	137	56
19 Jun 2019	< 7	3	8.3	114	139	98	48	22	90	10.5	197	32	113	189	81	34

2.3.2 Cooling water analysis

The cooling water discharge (IND002004) to the firewater pond was sampled on four occasions this period Table 6.

Table 6 Cooling water discharge IND002004

IND002004	pH	Electrical Conductivity (EC)	Sample Temperature	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity
Collected	**pH Units**	**mS/m**	**°C**	**g/m³**	**g O_2/m³**	**NTU**
02 Nov 2018	7.4	33.5	26.6	1.77	< 0.8	12.3
17 Jan 2019	7.5	34.5	61.6	1.92	< 0.4	6
22 May 2019	7.3	34.2	40.8	1.95	< 0.4	7.4
19 Jun 2019	7.4	33.4	46.4	2.1	3.9	7.7

The results indicated the following:

- The pH of the discharge remained relatively stable, with all values close to neutral, ranging 7.3-7.5 pH.
- Electrical conductivity of discharge also remained relatively stable, ranging 33.5-34.5 mS/m.
- These values do denote a slight increase in conductivity values over time, when compared to the long term analysis of this parameter (Figure 6). Condition 2 of consent 2050 requires that the discharge shall not contain concentrations of any chemical, biological or physical contaminant (other than heat or suspended solids) greater than those found in the water abstracted from the Inaha Stream.
- Surface water monitoring location INH000400, which is above the surface water intake, generally ranged (in term of conductivity) around 25 mS/m at 25°C, whereas the values reported ranged around 33.5 mS/m at 25°C. The likely cause of this slight elevation in conductivity may be related to the cooling water boiling as a process of its use as a cooling agent, however it may also indicate some enrichment of cooling water.
- Total ammoniacal nitrogen recorded four values which ranged between 1.77-2.1 g/m³. The Company may have to assess this asset to make sure there is no potential for contamination from elsewhere in the plant (Figure 7).
- Total biochemical oxygen demand ($TBOD_5$) indicated no results above the LOD in three of four rounds, whilst the final round, June 2019, recorded an elevated value of 3.9 g O_2/m³.
- Turbidity within the cooling water discharge ranged 6-12.3 NTU.
- Temperatures within the cooling water varied greatly, ranging 26.6-61.6°C. Note that this temperature does not reach the Inaha stream as it is reduced though mixing in the fire pond.

The analysis of the cooling water discharge is indicative that the returned fluid is not close to back ground concentrations. There appears to be an organic component within the discharge as defined by the slight increases in ammonia reported throughout the monitoring period. Further the value for $TBOD_5$ (3.9 g O_2/m³, June 2019) is also further indicative of the potential for organic input. TBP will be asked to undertake an internal investigation into the source of the elevated parameters.

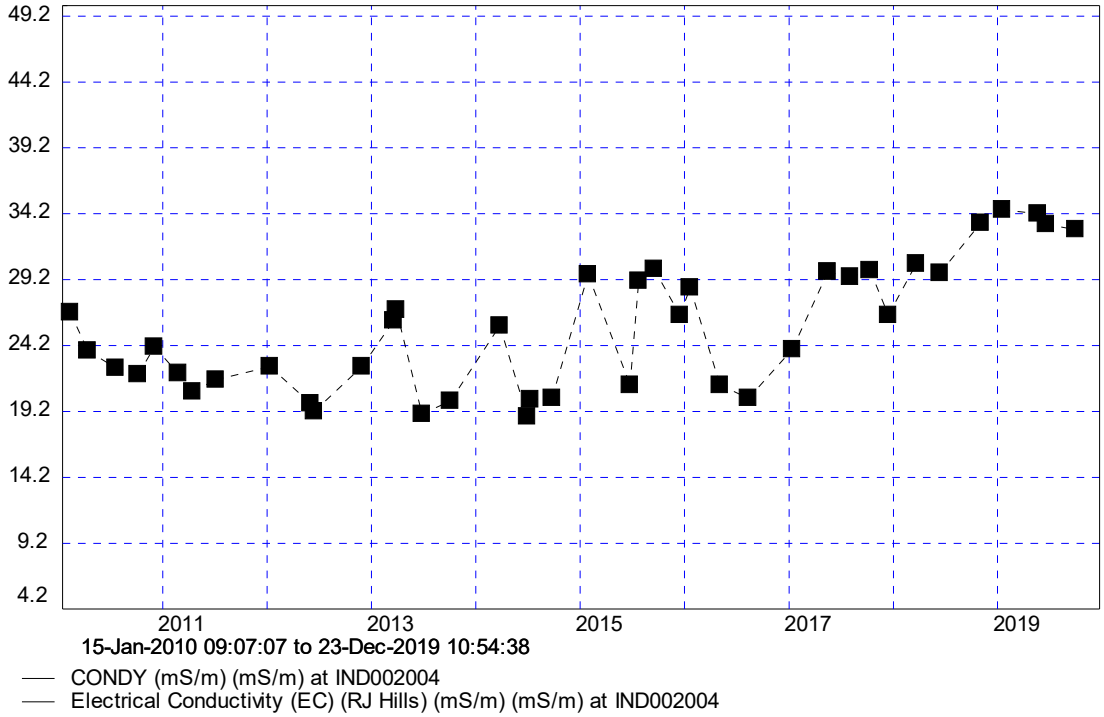

Figure 6 Long term conductivity measurements of IND002004 January 2010-December 2019

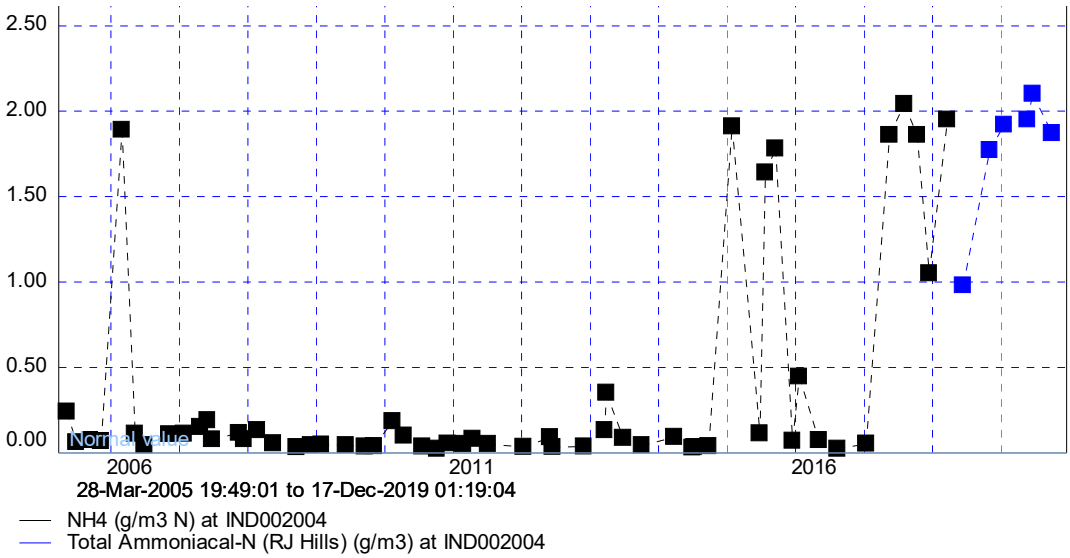

Figure 7 Long term ammoniacal nitrogen (NH_4) IND002004 March 2005 till December 2019

2.3.3 Stormwater analysis

Stormwater from the main yard, garage and raw material reception area, flow via a drain, from Kohiti Road into the firewater pond. This is monitored as it discharges in to the firepond at STW001075. The Council sampled this location four times during this monitoring period. The results of the sampling are provided in the following Table 7.

Table 7 2018-2019 monitoring of stormwater from the fire pond (STW001075)

STW001075	pH	Electrical Conductivity (EC)	Escherichia coli	Sample Temperature	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Total Suspended Solids	Turbidity
Collected	pH Units	mS/m	MPN / 100 ml	°C	g/m^3	g O_2/m^3	g/m^3	NTU
02 Nov 2018	6.7	5,500	< 1	15.2	0.43	< 0.8	10	3.2
17 Jan 2019	7.3	54.3	> 2420	18.6	0.81	11	17	4
22 May 2019	6.9	36.8	> 242000	25.6	3.3	18	28	17.9
19 Jun 2019	7.3	68.2	> 2420	13.4	6.9	200	390	210

Consent 5426-1 places the following limits on the stormwater quality.

- pH between 6-9 pH.
- Suspended solids below $100g/m^{3.}$
- Oil and grease below 15 g/m^3. Please note that no oil and grease testing was undertaken this period. A visual check and odour check is undertaken by the inspector during the sampling and no sheen or odour was noted during the monitoring period. Oil and grease monitoring is undertaken in the firewater pond discharge IND001015, Section 2.3.4.
- The pH of the stormwater discharge was found to be compliant across all four rounds.
- The electrical conductivity values ranged considerably this period, the value recorded during the November 2018 round (5,500 mS/m @25°C) was the most elevated to date, in a data set which has been monitored since 1999.
- E-coli values also ranged considerably, from below the limit of detection (LOD) in November 2018, through >242,000 MPN/100 ml. This would indicate an organic component entering the firepond system.
- The temperature of the discharge ranged 13.4-25.6°C across the four monitoring rounds.
- Total ammoniacal nitrogen (NH_4) demonstrated an increasing value throughout the monitoring period, increasing from 0.43 g/m^3 in November 2018, through to 6.9 g/m^3 in June 2019.
- Total biochemical oxygen demand ($TBOD_5$) also demonstrated an increasing value throughout the monitoring period, from <0.8 g O_2/m^3 in November 2018 through to 200 g O_2/m^3 in June 2019.
- Total suspended solids followed a similar trend, with the data indicating increases throughout the monitoring period. Ranging from 10 g/m^3 through to 390 g/m^3 in June 2019. The values recorded in June 2019 were in breach of condition 2 of consent 5426-1 which requires the discharge to not exceed a value of 100 g/m^3. However, as the stormwater discharges into the firepond and is further assessed at IND001015, the assessment is prior to the discharge to the Inaha stream.
- Turbidity similarly increased throughout the monitoring period, ranging from 3.2 NTU in November 2018, through to 210 NTU in June 2019.

2.3.4 Inaha Tributary at plant site

The Council collected four samples from the tributary which runs through the firewater pond. The aim of this sampling exercise was to assess 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, prior to discharge to the Inaha stream from the firepond. The sample location is IND001015, the resultant analysis is presented in Table 8.

Table 8 IND001015 2018-2019 monitoring results

IND001015	DO	PERSAT	pH	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N	Nitrate-N
Collected	g/m^3	%	pH Units	g/m^3	g/m^3	mS/m	MPN / 100 ml	g/m^3 at Client Temperature	g/m^3
02 Nov 2018	6.56	73.9	7.5	58	0.027	42.3	402	0.017	2.8
17 Jan 2019	9.4	117.8	7.9	50	0.022	41.6	4110	0.095	0.89
22 May 2019	2.14	23.8	7.2	50	0.027	40.5	1624	0.0175	0.38
19 Jun 2019	2.59	28.9	7.4	58	0.063	46.8	> 2420	0.042	0.5
IND001015	Nitrate-N + Nitrite-N	Nitrite-N	Oil and Grease	Sample Temperature	Total Alkalinity	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Total Suspended Solids	Turbidity
Collected	g/m^3	g/m^3	g/m^3	°C	g/m^3 as $CaCO_3$	g/m^3	g O_2/m^3	g/m^3	NTU
02 Nov 2018	2.9	0.112	< 4	21	95	1.4	2.8	30	14.2
17 Jan 2019	0.99	0.103	< 5	26.3	98	2.1	8	22	9.2
22 May 2019	0.43	0.053	< 5	20.4	118	2.7	2.8	12	16.6
19 Jun 2019	0.55	0.05	5	20.9	128	3.8	1.9	15	8.9

The analysis of IND001015 in this monitoring period indicated the following:

- The dissolved oxygen monitoring of this source ranged from 2.14-9.4 g/m^3, the corresponding percentage saturation ranged 23.8-117.8 %.
- pH ranged 7.2-7.9 pH.
- Chloride remained relatively stable with a range of 50-58 g/m^3.
- Dissolved reactive phosphorous (DRP) indicated low concentrations, ranging 0.022-0.063 g/m^3.
- Electrical conductivity values ranged 40.5-46.8 mS/m @ 25°C.
- E-coli values ranged 402->2420 MPN/100 ml.
- Free ammonia nitrogen (NH4) ranged at 0.017-0.095 g/m^3.
- Nitrate nitrogen ranged 0.38-2.8 g/m^3.
- Nitrite nitrogen ranged 0.053-0.112 g/m^3.
- Nitrate and nitrite nitrogen (NNN) which is the combined values of both these oxidised forms of nitrogen ranged from 0.43-2.9 g/m^3.
- Oil and grease analysis indicated on value above the LOD this period, June 2019 indicated a value of 5 g/m^3. The limit imposed by consent 5426-1 is for a maximum of 15 g/m^3.
- The temperature range across these samples was 20.9-26.3°C.
- Alkalinity demonstrated a slight increasing value across the four monitoring rounds, 95 g/m^3 as $CaCO_3$ in November 2018, through to 128 g/m^3 as $CaCO_3$ in June 2019.
- Total ammoniacal nitrogen also demonstrated a slight increase in values throughout the monitoring period, 1.4 g/m^3 in November 2018, through to 3.8 g/m^3 in June 2019.
- Total biochemical oxygen demand (TBOD5) ranged from 1.9-8 g O_2/m^3.

- Total suspended solids (TSS) values ranged 15-30 g/m^3 this period. The limit imposed by 5426-1 condition 2 is set at 100 g/m^3.
- Turbidity ranged 8.9-14.2 NTU.

2.4 Results of receiving environment monitoring

2.4.1 Inaha Stream flow and discharge

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 three stream gaugings in the 2018-2019 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 2018-2019 period, drawn from the staff gauge readings at Kohiti Road is provided in the following Figure 8, 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 whole of the 2018-2019 period. The discharge ceased on the 11 October 2018, and no discharge to the Inaha Stream occurred till the following monitoring period 4 July 2019.

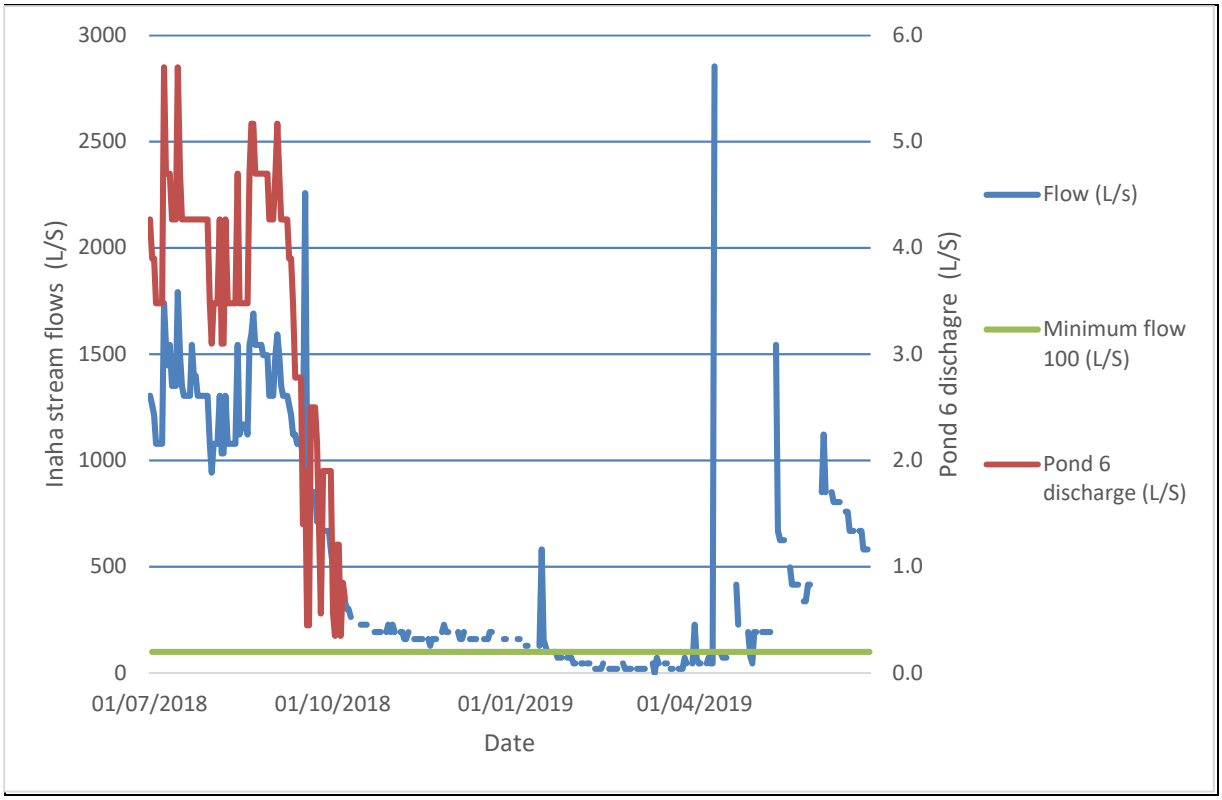

Figure 8 Hydrograph of Inaha stream and pond 6 discharge 2018-2019

2.4.2 Inaha Stream 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 2018-2019 monitoring period for the temperature of cooling water discharged, and the increase in Inaha Stream temperature, is given in Figure 9 and Figure 10. 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 9) the limit was not exceeded, marking the sixth year TBP has been in compliance with this cooling water temperature condition.

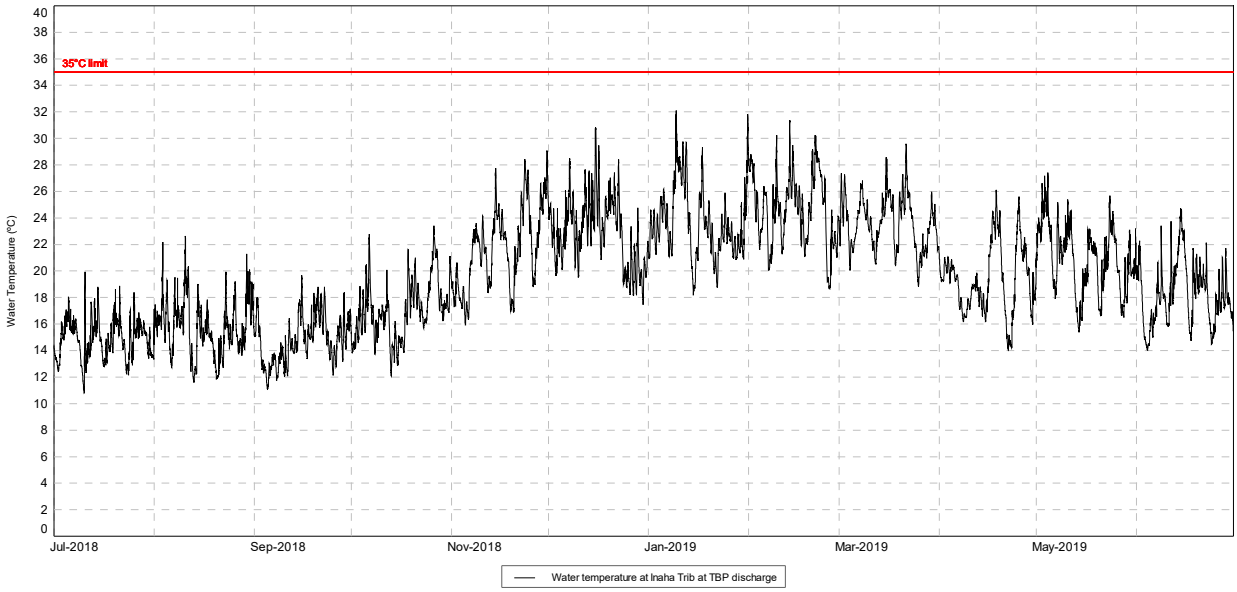

Figure 9 Cooling water temperature Inaha tributary 2018-2019

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 10 indicate compliance with this condition.

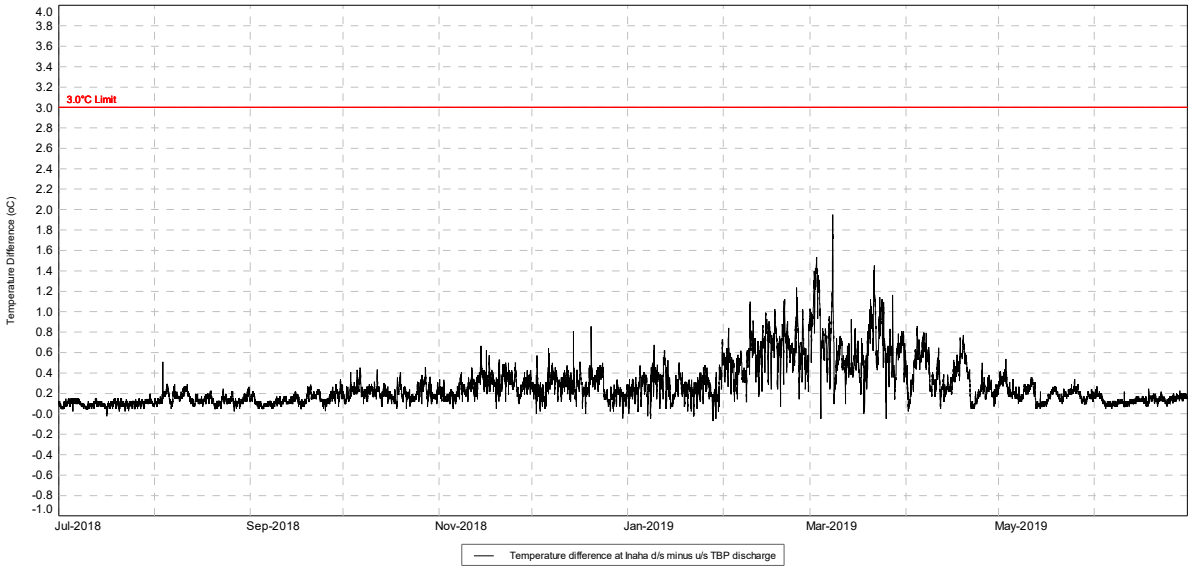

Figure 10 Inaha stream temperature increase post discharge 2018-2019

2.4.3 Water chemistry

2.4.3.1 Inaha Stream

Surface water analysis is undertaken of the Inaha Stream and associated northern and western tributaries. In this monitoring period four rounds of surface water sampling were undertaken. These rounds were conducted on the following dates: 2 November 2018 (Table 9), 17 January 2019 (Table 10), 22 May 2019 (Table 11) and 19 June 2019 (Table 12).

All four monitoring rounds were undertaken when the facility was discharging to land only. TBP's dual wastewater disposal system compliments the TRC requirement to maximise application to land and not water, and also when flow conditions in the Inaha stream prevent the prescribed 1:300 dilution rate.

The following Tables 9-12 indicate sampling from the Inaha stream specifically, the northern and western unnamed tributaries are discussed later in this section.

Table 9 Inaha Stream surface water monitoring round (1) 2 November 2019

Surface water 1	Parameter	DO	PERSAT	pH	Chloride	D-CBOD$_5$	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Date/Unit	g/m^3	%	pH Units	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN / 100 ml
INH000334	02 Nov 2018	11.78	105.9	7.8	25		0.068	23.3	2,420
INH000348	02 Nov 2018	11.27	102.5	7.8	28		0.065	25	1,046
INH000400	02 Nov 2018	11.24	102.9	7.8	30	< 1.0	0.055	26.3	1,046
INH000408	02 Nov 2018	11	102.3	7.8	31	< 1.0	0.053	27	921
INH000420	02 Nov 2018	10.98	104.3	7.9	31	< 1.0	0.053	27.1	980
INH000430	02 Nov 2018	10.54	95.4	7.9	30	< 1.0	0.053	27.4	727
INH000450	02 Nov 2018	10.35	101.3	7.9	35	< 1.0	0.046	29.9	613
INH000470	02 Nov 2018	10.54	103.4	7.9	39		0.053	31.5	548
Surface water 1	Parameter	Free Ammonia as N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Temperature	Total Ammoniacal-N	TBOD$_5$	Turbidity
Site	Date/Unit	g/m^3	g/m^3	g/m^3	g/m^3	°C	g/m^3	g O_2/m^3	NTU
INH000334	02 Nov 2018	0.00044	3.1	3.1	0.038	11.1	0.032	< 0.4	4.3
INH000348	02 Nov 2018	0.00023	3.8	3.8	0.037	11.7	0.017	< 0.4	4.4
INH000400	02 Nov 2018	0.00053	3.8	3.8	0.032	12	0.038	< 0.8	4.8
INH000408	02 Nov 2018	0.0017	4.2	4.2	0.037	12.9	0.112	< 0.8	4.6
INH000420	02 Nov 2018	0.0016	4.1	4.2	0.036	13.6	0.087	< 0.8	4.4
INH000430	02 Nov 2018	0.0015	4.2	4.3	0.034	14.7	0.069	< 0.8	5
INH000450	02 Nov 2018	0.001	5.2	5.2	0.029	14.9	0.044	< 0.8	4.5
INH000470	02 Nov 2018	0.0013	4.8	4.8	0.039	15	0.062	< 0.4	5.7

Table 10 Inaha Stream surface water monitoring (2) 17 January 2019

Surface water 2	Parameter	DO	PERSAT	pH	Chloride	D-CBOD$_5$	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Date/Unit	g/m^3	%	pH Units	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN / 100 ml
INH000334	17 Jan 2019	9.691	101.3	7.8	27		0.063	24.7	238
INH000348	17 Jan 2019	9.89	104.7	7.9	28		0.052	26.7	248
INH000400	17 Jan 2019	9.89	103.8	7.9	30	< 1.0	0.048	27.8	276
INH000408	17 Jan 2019	9.65	104.8	7.9	32	1.2	0.044	29.2	345
INH000420	17 Jan 2019	9.33	101.7	7.7	33	< 1.0	0.041	29.3	276
INH000430	17 Jan 2019	9.89	106.4	8	32	< 1.0	0.044	29.3	727
INH000450	17 Jan 2019	8.91	98.9	7.9	37	< 1.0	0.039	32.2	579
INH000470	17 Jan 2019	9.78	107.8	8	41		0.058	34.5	1120

Surface water 2	Parameter	Free Ammonia as N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Temperature	Total Ammoniacal-N	TBOD$_5$	Turbidity
Site	Date/Unit	g/m^3	g/m^3	g/m^3	g/m^3	°C	g/m^3	g O^2/m^3	NTU
INH000334	17 Jan 2019	0.0002	1.97	1.98	0.011	16.8	0.012	1.3	1.03
INH000348	17 Jan 2019	0.0003	2.9	2.9	0.011	17.2	0.011	0.6	1.1
INH000400	17 Jan 2019	0.0002	2.6	2.6	0.009	17.2	0.01	< 0.4	1.3
INH000408	17 Jan 2019	0.0036	2.9	2.9	0.026	18.5	0.123	0.7	1.42
INH000420	17 Jan 2019	0.00098	2.9	2.9	0.036	18.7	0.059	0.6	1.76
INH000430	17 Jan 2019	0.0021	3	3	0.038	23.9	0.042	0.9	1.69
INH000450	17 Jan 2019	0.0009	4.1	4.1	0.025	19.6	0.032	0.7	1.86
INH000470	17 Jan 2019	0.0007	3.8	3.8	0.028	19.6	0.021	0.5	3.6

Table 11 Inaha Stream surface water round (3) 22 May 2019

Surface water 3	Parameter	DO	PERSAT	PH	Chloride	D-CBOD$_5$	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Date/Unit	g/m^3	%	pH Units	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN / 100 ml
INH000334	22 May 2019	10.81	100.4	7.5	21		0.033	20.6	435
INH000348	22 May 2019	11.03	102.7	7.6	22		0.032	24.8	322
INH000400	22 May 2019	10.99	102.6	7.6	24	< 1.0	0.031	23.4	331
INH000408	22 May 2019	10.82	102.3	7.6	24	< 1.0	0.03	22.7	350
INH000420	22 May 2019	10.14	103.1	7.7	26	< 1.0	0.032	24	354
INH000430	22 May 2019	10.4	101.4	7.7	26	< 1.0	0.032	23.3	332
INH000470	22 May 2019	10.71	101.3	7.7	30		0.036	25.7	288

Surface water 3	Parameter	Free Ammonia as N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Temperature	Total Ammoniacal-N	TBOD$_5$	Turbidity
Site	Date/Unit	g/m^3	g/m^3	g/m^3	g/m^3	°C	g/m^3	g O_2/m^3	NTU
INH000334	22 May 2019	< 0.00008	2.8	2.8	0.007	12	< 0.010	0.7	2.5
INH000348	22 May 2019	< 0.00010	3	3	0.008	12.1	< 0.010	0.4	2.8
INH000400	22 May 2019	< 0.00010	2.9	2.9	0.007	12.3	< 0.010	< 0.8	2.4
INH000408	22 May 2019	0.00083	3.1	3.1	0.011	12.3	0.098	< 0.8	3.3
INH000420	22 May 2019	0.0007	3	3.1	0.013	12.8	0.069	< 0.8	2.6
INH000430	22 May 2019	0.00059	3.1	3.1	0.014	13.2	0.051	< 0.8	2.8
INH000470	22 May 2019	0.00033	3.4	3.4	0.019	13.5	0.028	0.6	3.6

Table 12 Inaha Stream surface water monitoring round (4) 19 June 2019

Surface water 4	Parameter	DO	PERSAT	PH	Chloride	D-CBOD$_5$	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Unit	g/m^3	%	pH Units	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN / 100 ml
INH000334	19 Jun 2019	11.67	97.8	7.5	22		0.024	21.8	179
INH000348	19 Jun 2019	11.84	99.2	7.6	23		0.024	22.5	219
INH000400	19 Jun 2019	11.23	98.3	7.6	24	< 1.0	0.023	23.8	228
INH000408	19 Jun 2019	11.68	99.5	7.6	25	< 1.0	0.025	24.8	308
INH000420	19 Jun 2019	11.69	99.8	7.6	25	< 1.0	0.024	25.1	248
INH000430	19 Jun 2019	11.71	101.1	7.7	25	< 1.0	0.025	24.4	249
INH000450	19 Jun 2019	11.68	99.9	7.6	28	< 1.0	0.025	25.4	276
INH000470	19 Jun 2019	11.68	98.9	7.6	30		0.022	26.9	214

Surface water 4	Parameter	Free Ammonia as N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Temperature	Total Ammoniacal-N	TBOD$_5$	Turbidity
Site	Unit	g/m^3	g/m^3	g/m^3	g/m^3	°C	g/m^3	g O_2/m^3	NTU
INH000334	19 Jun 2019	0.00012	3.5	3.5	0.012	7.7	0.022	0.7	5.5
INH000348	19 Jun 2019	0.00013	3.6	3.6	0.012	7.9	0.018	0.5	4.7
INH000400	19 Jun 2019	0.0001	3.6	3.6	0.011	7.9	0.016	< 0.8	11.8
INH000408	19 Jun 2019	0.00057	3.7	3.7	0.013	8.3	0.088	< 0.8	9.2
INH000420	19 Jun 2019	0.00043	3.7	3.7	0.014	8.6	0.07	< 0.8	8.7
INH000430	19 Jun 2019	0.00051	3.7	3.7	0.016	9	0.058	< 0.8	6.9
INH000450	19 Jun 2019	0.00042	4.2	4.2	0.016	8.9	0.057	< 0.8	3.7
INH000470	19 Jun 2019	0.00032	4	4.1	0.022	9.2	0.044	0.6	35

TBP holds discharge consent 2049-4. This consent allows for the discharge of treated wastewater from TBP's rendering plant to the 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 specific limits are as follows: Consent 2049-4 Condition 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 to above 2.0 g/m^3;
c. a temperature rise of more than 3.0°C;
d. a reduction in the dissolved oxygen concentration to below 80% 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 colour or visual clarity;
g. any emission of objectionable odour;

h. the rendering of freshwater unsuitable for consumption by farm animals;
i. any significant adverse effects on aquatic life, habitats or ecology; and
j. any visible bacterial and/ or fungal growths in the receiving waters.

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.

Results for individual parameters of concern are discussed separately below.

Please note the main wastewater discharge was to land during these monitoring rounds, with the Company ceasing discharges of wastewater to the Inaha stream on 11 October 2018. In this monitoring period the Company discharged to the Inaha Stream for 99 days. The fire water pond (IND001015) was the only continual discharge from the site.

Dissolved oxygen in the Inaha stream surface water

The discharge shall not reduce the dissolved oxygen percent saturation below 80%. The analysis indicated that across all sites, and all rounds, the limit was not breached. The lowest percentage saturation recorded was during the November 2018 monitoring round at site INH000430 with a value of 95.4%.

Filtered carbonaceous biochemical oxygen demand

The analysis of filtered carbonaceous biochemical oxygen demand (D-COB5) indicated no exceedance in the 2.0 g O_2/m^3 limit. The most elevated result was recorded at site INH000408 with a value of 1.2 g O_2/m^3. The remaining assessed sites were reported below the LOD.

Temperature variation

The requirement bestowed by 2049-4 for temperature effects on the receiving waters is no increase greater than 3.0°C below the 30 meter mixing zone. Monitoring location INH000408 is below the 30 meter mixing zone. Across all four rounds the temperature range was not exceeded. This is also further assessed in Section 2.4.2.

It should be noted that across certain data sets (November 2018 and January 2019) the temperature variation was greater than 3.0°C, though these thermal impacts are likely a result of natural forcing than of discharge origin. This was particularly evident between monitoring sites INH000420 and INH000430 during the January 2019 round, with a variation of 5.2°C noted.

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.

Ammonia and pH analysis recorded values which were compliant with the consent conditions.

Tributaries of the Inaha Stream

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 3 and Table 3 respectively.

The water quality of the two tributaries have a 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.

2.4.3.2 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 INH000397. The analysis of the samples collected in this monitoring period are provided in Table 13.

The analysis indicated a decrease in nitrate values when compared to the previous monitoring period (2017-2018) which recorded a value of 4.61 g/m^3 (NNN). The corresponding June 2019 sample round indicated a value of 3.5 g/m^3 N (NNN).

Table 13 INH000397 northern tributary of Inaha stream 2018-2019 monitoring

INH000397	DO	PERSAT	pH	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	E-Coli	Free Ammonia as N
Date/unit	g/m^3	%	pH Units	g/m^3	g/m^3	mS/m	MPN / 100 ml	g/m^3
02 Nov 2018	11	98.8	7.7	35	0.024	31.3	1,414	0.00106
17 Jan 2019	8.94	90.9	7.7	39	0.027	34.4	461	0.00033
22 May 2019	10.25	96.3	7.6	33	0.027	30.3	504	0.00014
19 Jun 2019	10.98	92.4	7.5	30	0.019	28.8	345	0.00009

INH000397	Nitrate -N	Nitrate-N + Nitrite-N	Nitrite-N	Sample Temperature	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity
Date/unit	g/m^3	g/m^3	g/m^3	°C	g/m^3	g O_2/m^3	NTU
02 Nov 2018	3.9	3.9	0.022	11.2	0.102	< 0.4	5
17 Jan 2019	1.84	1.85	0.008	15.6	0.025	< 0.4	2.7
22 May 2019	2.4	2.4	0.006	12.6	0.016	0.6	1.81
19 Jun 2019	3.5	3.5	0.011	8	0.018	0.6	44

2.4.3.3 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: INH000433 which is above the TBP farm; INH000435 which was the original upstream site is situated 2.5 km above the Inaha confluence, before the irrigation area was extended; and INH000440 which is the final site on the Western tributary. This is located immediately above Normanby Road, about 0.22 km above the confluence with the main stem of Inaha Stream.

In this monitoring period the main stem of the western tributary (which includes three monitoring sites: INH000433/435 and 440) was monitored on four occasions (Tables 14 and 15), following the Inaha Stream sample collection.

In addition, monitoring location INH000440, which is the site at the bottom of the western tributary, was spot sampled on five occasions (Table 16).

Table 14 Western tributary of Inaha Stream surface water rounds 1 and 2

W Tributary	Parameter	DO	PERSAT	pH	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N
Site	Date/unit	g/m³	%	pH Units	g/m³	g/m³	mS/m	MPN / 100 ml	g/m³
Surface water one									
INH000433	02 Nov 2018	10.11	92.3	7.7	39	0.007	32.4	156	< 0.00011
INH000435	02 Nov 2018	10.06	95.6	7.7	44	0.01	35.1	214	< 0.00014
INH000440	02 Nov 2018	11.18	106.8	8	49	0.012	39.4	276	< 0.0003
Surface water two									
INH000433	17 Jan 2019	7.64	78	7.7	39	0.013	33.6	1,120	< 0.00015
INH000435	17 Jan 2019	8.07	86	7.7	50	0.01	39.2	517	0.00029
INH000440	17 Jan 2019	8.24	86	7.7	56	0.012	45.8	866	< 0.00015

W Tributary	Parameter	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Sample Temperature	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity
Site	Date/unit	g/m³	g/m³	g/m³	°C	g/m³	g O_2/m³	NTU
Surface water one								
INH000433	02 Nov 2018	2.7	2.7	0.003	11.7	< 0.010	0.5	7.9
INH000435	02 Nov 2018	4.8	4.8	0.007	13.7	< 0.010	< 0.4	3.4
INH000440	02 Nov 2018	8.4	8.4	0.006	13.8	< 0.010	< 0.4	4.4
Surface water two								
INH000433	17 Jan 2019	1.33	1.33	0.002	15.4	< 0.010	0.9	16.6
INH000435	17 Jan 2019	4.1	4.1	0.008	18.4	0.017	< 0.4	2
INH000440	17 Jan 2019	9.5	9.5	0.003	16.7	< 0.010	< 0.4	2.4

Table 15 Western tributary of Inaha stream surface water rounds 3 and 4

W Tributary	Parameter	DO	PERSAT	pH	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N
Site	Date/unit	g/m³	%	pH Units	g/m³	g/m³	mS/m	MPN / 100 ml	g/m³
Surface water three									
INH000433	22 May 2019	9.45	89.7	7.6	40	0.01	33.9	218	0.0001
INH000435	22 May 2019	9.91	94.1	7.5	49	0.011	37.5	345	< 0.00009
INH000440	22 May 2019	10.51	101.1	7.7	53	0.013	41.5	450	0.00025
Surface water four									
INH000433	19 Jun 2019	10.24	98.9	7.6	37	0.011	33.4	78	0.00006
INH000435	19 Jun 2019	11.25	92.9	7.6	42	0.014	35.7	219	< 0.00007
INH000440	19 Jun 2019	11.68	98.4	7.7	46	0.017	38.1	326	0.00021

W Tributary	Parameter	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Sample Temperature	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity
Site	Date/unit	g/m³	g/m³	g/m³	°C	g/m³	g O_2/m³	NTU
Surface water three								
INH000433	22 May 2019	2.1	2.1	0.003	12.9	0.012	0.5	8.4
INH000435	22 May 2019	4.7	4.7	0.005	13	< 0.010	< 0.4	3.1
INH000440	22 May 2019	7.6	7.6	0.006	13.2	0.021	< 0.4	2.6
Surface water four								
INH000433	19 Jun 2019	3.3	3.3	0.005	8.6	0.01	0.6	10.5
INH000435	19 Jun 2019	5.9	5.9	0.012	8.6	< 0.010	0.5	2.2
INH000440	19 Jun 2019	7.9	7.9	0.014	8.2	0.027	0.6	4

Table 16 Western tributary of Inaha stream spot samples

W Tributary	Parameter	DO	PERSAT	pH	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N
Site	Date/unit	g/m³	%	pH Units	g/m³	g/m³	mS/m	MPN / 100 ml	g/m³
INH000440	31 Jul 2018	9.8	99	7.6	48	0.019	37.8	220	<0.010
INH000440	23 Nov 2018	10.18	104.9	8	50	0.01	41.6	170	< 0.0003
INH000440	30 Jan 2019	6.72	72	7.6	59	0.005	50.5	420	0.00018
INH000440	10 Apr 2019	NR	NR	7.8	69	0.008	50.8	160	0.00031
INH000440	24 Jun 2019	10.04	98.4	7.7	48	0.015	37.8	350	0.00013

W Tributary	Parameter	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Sample Temperature	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity
Site	Date/unit	g/m³	g/m³	g/m³	°C	g/m³	g O_2/m³	NTU
INH000440	31 Jul 2018	9.6	9.6	0.016	9.6	0.017	<2	5.4
INH000440	23 Nov 2018	9.8	9.8	0.007	15.9	< 0.010	0.5	4.1
INH000440	30 Jan 2019	13.9	13.9	0.011	18.7	0.012	0.6	1.8
INH000440	10 Apr 2019	9	9	0.006	15.2	0.02	0.5	1.12
INH000440	24 Jun 2019	7.5	7.5	0.008	10.3	0.013	0.8	5.4

The main effect noted on the western tributary, as a process of the exercise of consent (to discharge waste water to land) is elevated concentrations of nitrate nitrogen within the surface water. This was particularly evident throughout the monitoring period with the most elevated nitrate recorded (as nitrate-nitrite nitrogen, NNN) of 13.9 g/m³ on 30 January 2019 (Table 16). The greatest increase in this analyte down the length of the western tributary was observed between sites INH000433 and INH000440 on 17 January 2019 of 8.17 g/m³ (Table 14, surface water two).

Nitrate values within rivers are classified in the National Policy Statement for Freshwater Management (Freshwater NPS). The draft for comment, guide to attributes[2], is a document of proposed guidelines aimed at assessing nutrient concentrations within rivers through a grading system (Table 17).

Utilising the grading system it can be discerned that the upper site (INH000433) within the catchment sits within grade B for nitrate values. While the mid-catchment site (INH000435) is firmly in grade C. The lower site (INH000440) is below the national bottom line for nitrate defined as grade D (>6.9 g/m³).

[2] Ministry for the Environment. 2018: *A Guide to Attributes in Appendix 2 of the National Policy Statement for Freshwater Management (as amended 2017).* Wellington: Ministry for the Environment.

Table 17 Extract nitrate rivers a guide to attributes NPSFM/MFE 2018

Value	Ecosystem health		
Freshwater Body Type	Rivers		
Attribute	Nitrate (Toxicity)		
Attribute Unit	mg NO_3-N/L (milligrams nitrate-nitrogen per litre)		
Attribute State	Numeric Attribute State		Narrative Attribute State
	Annual Median	Annual 95th Percentile	
A	≤1.0	≤1.5	High conservation value system. Unlikely to be effects even on sensitive species
B	>1.0 and ≤2.4	>1.5 and ≤3.5	Some growth effect on up to 5% of species.
C	>2.4 and ≤6.9	>3.5 and ≤9.8	Growth effects on up to 20% of species (mainly sensitive species such as fish). No acute effects.
National Bottom Line	6.9	9.8	
D	>6.9	>9.8	Impacts on growth of multiple species, and starts approaching acute impact level (ie risk of death) for sensitive species at higher concentrations (>20 mg/L)

Note: This attribute measures the toxic effects of nitrate, not the trophic state. Where other attributes measure trophic state, for example periphyton, freshwater objectives, limits and/or methods for those attributes will be more stringent.

2.4.4 Irrigation area loading 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 the following. Inspection of the irrigation areas, effluent analysis, chemical and biological surveys of the Inaha Stream, sampling from the groundwater bores installed around the irrigation areas and of a spring (Te Kopanga) 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, for more information please see Section 2.4.4.1 Technical Report 2018-70, referenced later in this report. Note this is the 2017-2018 monitoring report for TBP.

Previous year and current year loading rates

A comparison between the previous monitoring period (2017-2018) and the current monitoring period is provided in the following Table 18.

Table 18 2017-2018 and 2018-2019 loading rates

2017-2018 loading rates		2018-2019 loading rates	
Utilised land application area	302.54 Ha	Utilised land application area	322.76 Ha
Total applied nitrogen (stickwater)	11,483 Kg/N/pa	Total nitrogen (stickwater)	10,067 Kg/N/pa
Total nitrogen (wastewater)	33,727 Kg/N/pa	Total nitrogen (wastewater)	43,738 Kg/N/pa
Combined nitrogen	45,210 Kg/N/pa	Combined nitrogen	53,805 Kg/N/pa
Calculated average loading rate	149 Kg/N/Ha/pa	Calculated average loading rate	167 Kg/N/Ha/pa
Highest application wastewater	Paddock 22 295 Kg/N/ha/pa	Highest application wastewater	Paddock 35 299 Kg/N/ha/pa
Highest application stickwater	Paddock 1 250 Kg/N/ha/pa	Highest application stickwater	Paddock 32 205 Kg/N/ha/pa
Highest combined loading rate	Paddock 31 306 Kg/N/ha/pa	Highest combined loading rate	Paddock 20 386 Kg/N/ha/pa

The data, provided by the consent holder, indicated that the total volume of wastewater irrigated to land increased the nitrogen load by 10,011 Kg/N when compared to the previous monitoring period. The total volume of stickwater to land deceased the nitrogen load by 1,416 Kg/N. The total combined nitrogen volume from both the applications increased by 8,595 Kg/N.

The consent holder utilised a greater area of land (322.76 Ha) than the previous monitoring period with an increase of 20 Ha.

Four paddocks (7, 20, 23 and 35) contained a combined total nitrogen loading rate in excess of 300 Kg/N/ha (Figure 11).

No paddock received an application of wastewater which exceeded 300 Kg/N/ha, which is the limit of the consent.

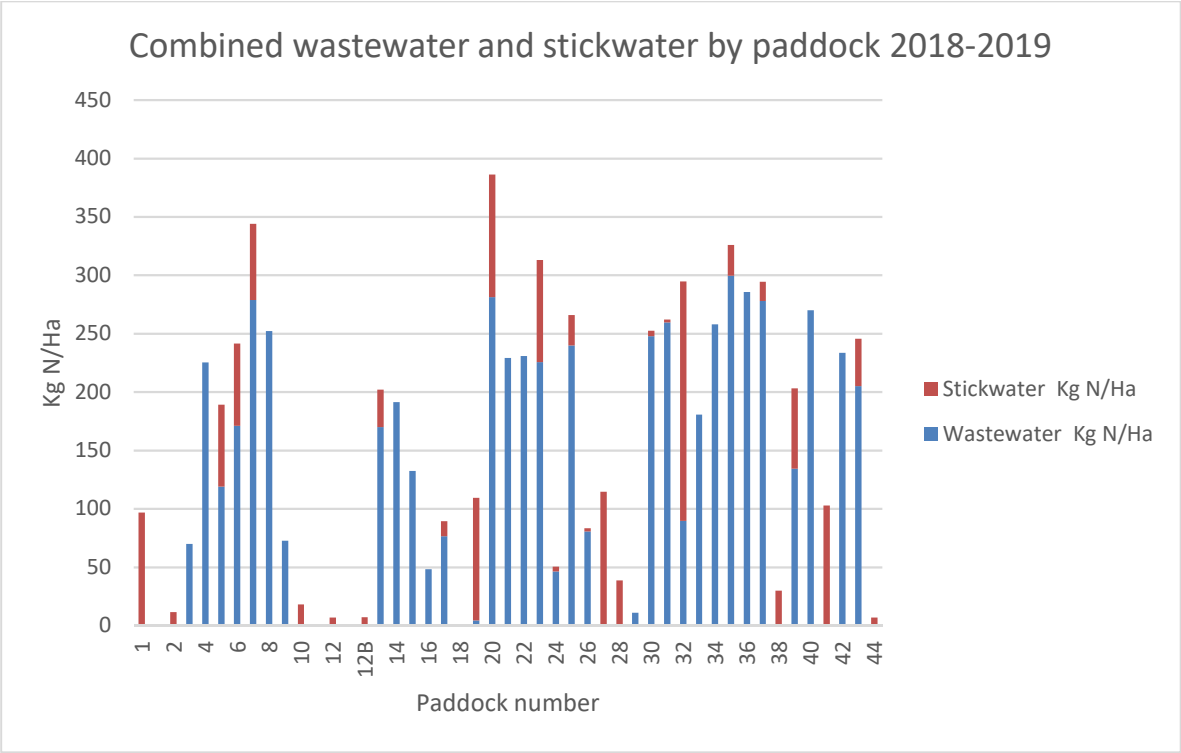

Figure 11 Combined water and stickwater loading by paddock 2018-2019

2.4.4.2 Groundwater monitoring of irrigation areas

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 (Te Kopanga 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 below and shown in Figure 3.

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
Te Kopanga	GND1058		1701770	5623022
BH5B	GND1346	8.6	1701352	5624536
BH6B	GND1347	12.2	1701586	5623914
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.

Background

Monitoring of the irrigation area was undertaken to assess for the effects of the land based applications of wastewater through irrigation and injection spreading of fertiliser (Zealgrow/stickwater). As previously discussed the TBP site operates a dual wastewater disposal system. The disposal of diluted effluent to the Inaha stream was previously discussed in section 2.4.3.1. In this section the groundwater monitoring of the irrigation area is presented. Specific effects are related to nitrate impacts in the groundwater and the analyte nitrite/nitrate nitrogen (NNN) is the main analyte of concern, as it is proposed to be leading to an increase in surface water values, specifically in the western tributary which was discussed in Section 2.4.3.3.

GND1054: The control bore. Table 19 details the results from the bi-monthly irrigation monitoring of this monitoring well. Primarily nitrate/ nitrite nitrogen (NNN) concentrations are of concern across the irrigation areas. The remaining parameters are also assessed to monitoring for change over time.
Chloride values remained quite stable, ranging 7 g/m^3 throughout the monitoring period. Electrical conductivity (EC) also demonstrated a stable concentration. E-coli readings indicated low values, below the LOD on four occasions and on two occasions (November 2018 and June 2019) trace values were recorded, which may have been a result of cross contamination during sampling.

Long term NNN values are provided in the below Figure 12. The values recorded indicated a slight increase in NNN concentrations throughout the year, and since 2018 these values have increased by 2 g/m^3. pH results indicated stable results, fluctuating either side of 6.6 pH.

Groundwater temperature also remained quite stable, fluctuating 0.7°C. Ammoniacal nitrogen values were below the lab LOD.

Table 19 GND1054 2018-2019

	Site	GND1054	GND1054	GND1054	GND1054	GND1054	GND1054
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	6.64	7.02	7.64	8.33	8.7	7.82
Chloride	g/m^3	41	43	45	42	48	48
Electrical Conductivity (EC)	mS/m	31.6	30.9	33.5	33.3	33.8	34
Escherichia coli	cfu / 100 ml	< 1	< 1	2	< 1	< 1	28
Nitrate-N + Nitrite-N	g/m^3	6.2	6.7	6.7	6.8	6.9	7.6
pH	pH Units	6.5	6.7	6.6	6.6	6.7	6.6
Sample Temperature	°C	13.7	14.4	14.2	14.5	14.4	13.9
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

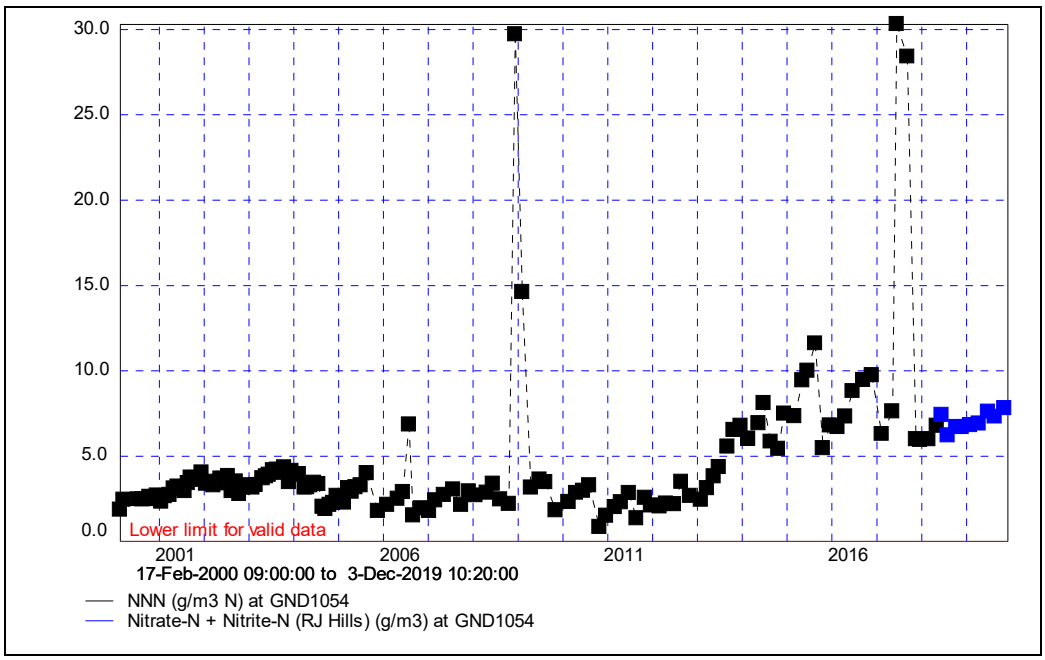

Figure 12 Long term NNN nitrogen monitoring GND1054 2000-2019

GND1056: Borehole 3, located to the south of the TBP plant in paddock 12. The 2018-2019 monitoring data is provided below in Table 20. Chloride analysis indicated a steady range (10 g/m^3) throughout the monitoring period. EC values were also quite stable, with a slight reduction in values. E-coli results indicated a range of low values. NNN concentrations recorded a slight decreasing trend within this monitoring location. The long term analysis of this analyte (Figure 13) indicates that nitrogen impacts in this location continue to decrease.

pH analysis indicated a relatively stable pH across the year, with a variation of 0.3 pH. Groundwater temperatures ranged 1.3°C. No ammoniacal nitrogen was reported above the LOD.

Table 20 GND1056 2018-2019

	Site	GND1056	GND1056	GND1056	GND1056	GND1056	GND1056
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	7.8	7.55	8.5	9.5	10.45	10.71
Chloride	g/m^3	41	50	43	40	42	43
Electrical Conductivity (EC)	mS/m	30.3	32.9	29.5	28.7	28.2	28.8
Escherichia coli	cfu / 100 ml	4	< 1	3	10	4	2
Nitrate-N + Nitrite-N	g/m^3	5.2	6.6	4.2	3.3	3.1	3.8
pH	pH Units	6.5	6.5	6.7	6.6	6.8	6.6
Sample Temperature	°C	13.8	14.4	15.1	14.7	14.4	14.3
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

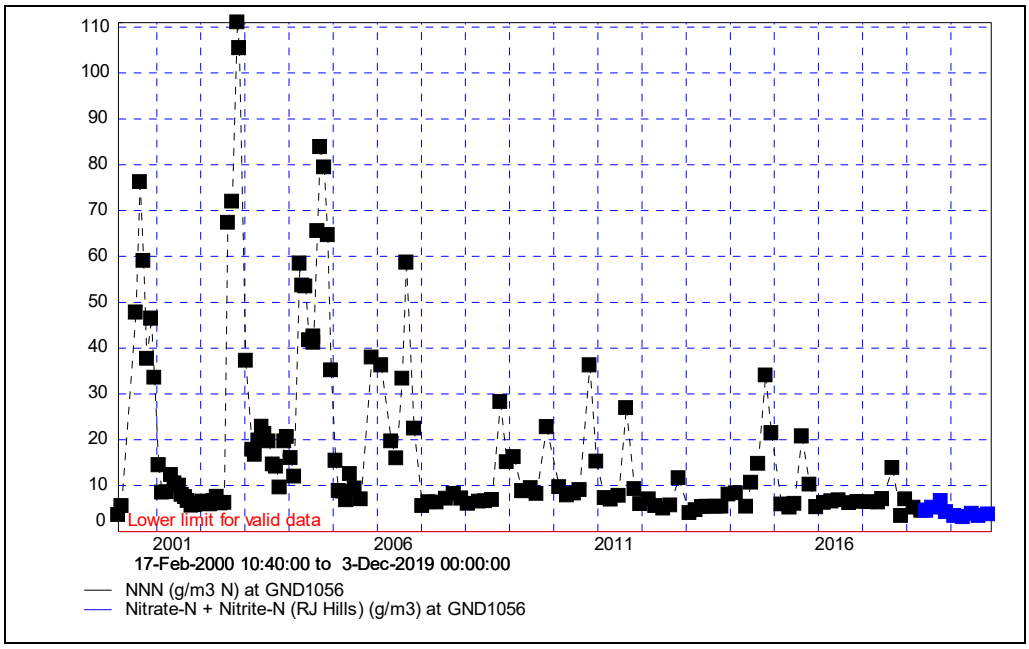

Figure 13 Long term NNN monitoring GND1056 2000-2019

GND1057: Borehole 4. Located on the edge of paddocks 17 and 13, these two paddocks are part of the southernmost irrigation areas, on the eastern side of the Inaha stream. The 2018-2019 monitoring data is provided in Table 21. The chloride analysis indicated a stable range (8 g/m^3). EC values also remained quite stable across the monitoring period. E-coli indicated two values (1 cfu/100 ml April 2019 and 17 cfu/100 ml 17 June 2019) which may have been the result from cross contamination during sampling. NNN values indicated a decreasing trend. The long term analysis for this analyte (Figure 14) indicated that this location has observed a slight increasing trend in values since 2013. Groundwater temperatures ranged 0.9°C. No ammoniacal nitrogen was recorded above the LOD this monitoring period.

Table 21 GND1057 2018-2019

	Site	GND1057	GND1057	GND1057	GND1057	GND1057	GND1057
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	17 Jun 2019
LEVEL	m	5.11	5.66	6.32	7.02	7.6	6.79
Chloride	g/m^3	58	56	57	50	52	52
Electrical Conductivity (EC)	mS/m	47.3	45.7	45.5	42.3	40.3	40
Escherichia coli	cfu / 100 ml	< 1	< 1	< 1	< 1	1	17
Nitrate-N + Nitrite-N	g/m^3	19.8	18	17.4	14.8	11.3	11.3
pH	pH Units	6.4	6.7	6.5	6.6	7	6.6
Sample Temperature	°C	13.8	14.3	14.5	14.7	14.3	14.2
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

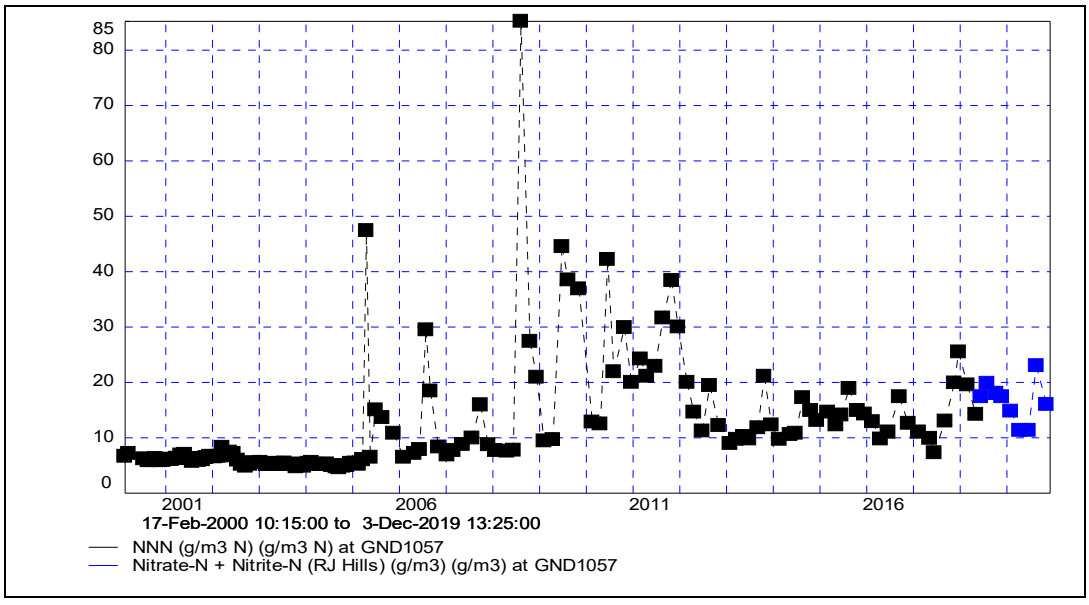

Figure 14 Long term NNN monitoring GND1057 2000-2019

GND1058: This monitoring location is known as Te Kopanga Spring. It is held in high regard as a place of significance by the Ngati Manuhiakai Hapu. This spring also supplies local residents with a source of fresh water.

The monitoring from the 2018-2019 monitoring period is provided in Table 22. Chloride values within this spring source indicated a stable concentration, ranging 6 g/m^3 throughout the year. EC values remained stable, with a slight variation of 0.5 mS/m. E-coli recorded three trace results this period, ranging 1-3 cfu/100 ml between November 2018 and April 2019. No values were reported in the final monitoring round. The initial monitoring results from the 2019-2020 monitoring period followed similar patterns with no E-coli reported above the LOD.

NNN concentrations in this spring source continue to exhibit a slight decrease in values, reducing 1.4 g/m^3 by the June 2019 sample round. The long terms analysis for this parameter (Figure 15) indicated a slight decrease in values in the past two years, while prior to that an increase was observed. pH results indicated a stable, close to neutral pH across the six rounds. Groundwater temperatures ranged 1.8°C. No ammoniacal nitrogen was recorded above the LOD.

Table 22 GND1058 Te Kopanga Spring 2018-2019

	Site	GND1058	GND1058	GND1058	GND1058	GND1058	GND1058
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
Chloride	g/m^3	60	60	57	54	57	57
Electrical Conductivity (EC)	mS/m	34.8	35.6	35.3	35	35.3	34.7
Escherichia coli	cfu / 100 ml	< 1	< 1	1	1	3	< 1
Nitrate-N + Nitrite-N	g/m^3	5.9	6	5.6	5	4.2	4.5
pH	pH Units	7	6.9	6.7	6.7	6.8	6.8
Sample Temperature	°C	13.7	14.6	15.2	15.6	15.8	14
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

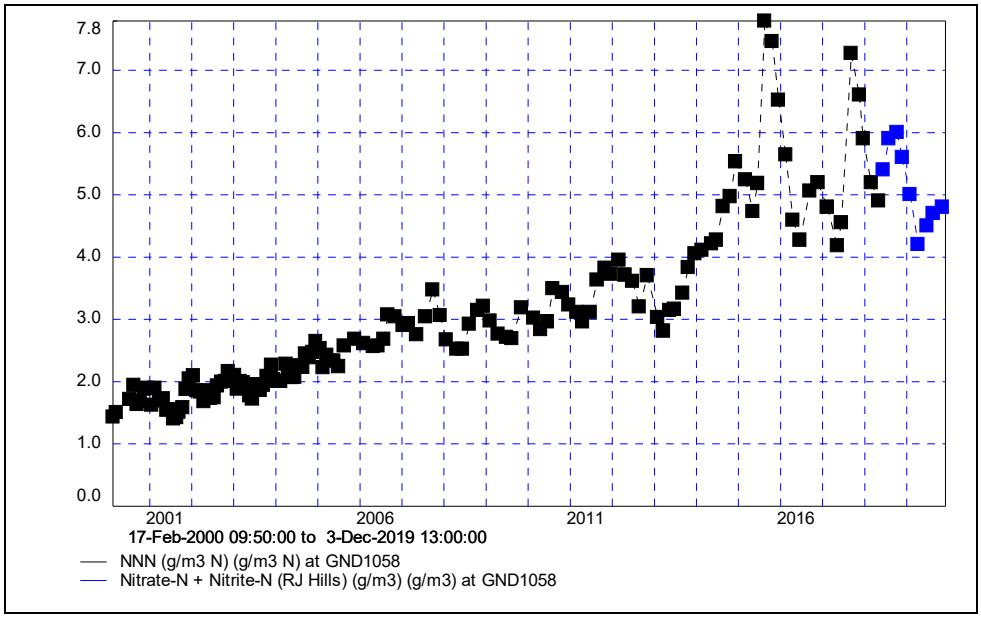

Figure 15 Long term NNN concentrations GND1058 Te Kopanga Spring 2000-2019

GND1346: Borehole 5B. Located in paddock 35, which received a combined application of 325 kg/N/ha this period. The monitoring is provided in Table 23. Elevated chloride values were recorded in this monitoring well, which as a process increased the EC. E-coli results were recorded in five of six monitoring rounds, the values were all below 10 cfu/100 ml. NNN values were elevated (>65 g/m^3) with a range of 14 g/m^3. The long term analysis of this parameter (Figure 16) indicated a slight down ward trend since November 2017. However the overall time series does detail a cyclical reduction and increase in nitrogen values over time since 2011.

pH values were relatively stable, with a fluctuation of 0.3 pH units. Groundwater temperatures remained stable across the year, ranging 0.5°C. No ammoniacal nitrogen was reported above the LOD this monitoring period.

Table 23 GND1346 2018-2019

	Site	GND1346	GND1346	GND1346	GND1346	GND1346	GND1346
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	3.15	4.51	5.15	4.59	5.56	3.23
Chloride	g/m^3	115	113	102	108	99	109
Electrical Conductivity (EC)	mS/m	108.7	106.9	103.4	103.7	98.4	101.5
Escherichia coli	cfu / 100 ml	4	< 1	1	2	2	8
Nitrate-N + Nitrite-N	g/m^3	83	79	77	77	69	70
pH	pH Units	6.6	6.3	6.3	6.3	6.4	6.4
Sample Temperature	°C	14.2	14.3	14.4	14.6	14.1	14.4
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

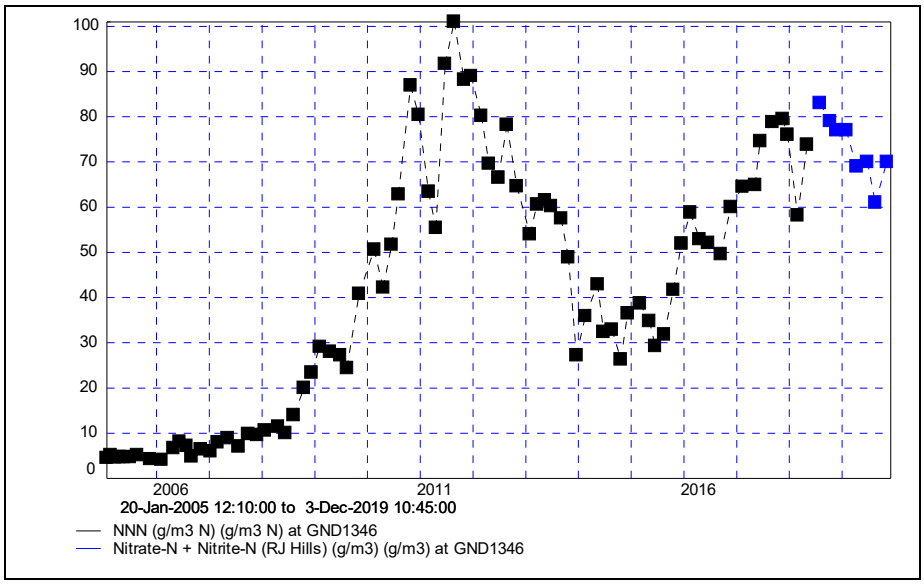

Figure 16 Long term NNN monitoring GND1346 2005-2019

GND1347: Borehole 6B. This bore is located down gradient from GND1346, on the corner of paddock 19. Paddock 19 received a combined application of 109 Kg N/ha/pa this period, while the surrounding paddocks 20 (386 Kg/N/Ha), 21 (229 Kg/N/Ha) and 22 (230 Kg/N/Ha) received larger applications.

The annual monitoring analysis is provided in Table 24. Chloride analysis indicated reasonably elevated chloride within the groundwater, when compared to the previous monitoring wells. A slight increasing trend was noted throughout the year. EC values also demonstrated an increasing trend in line with the increased chloride. E-coli results were below the LOD in five of six monitoring rounds this period. The final round (June 2019) recorded a value of 170 cfu/100 ml, however the following samples conducted in the upcoming 2019-2020 monitoring period were similarly below the LOD. NNN values remained elevated (> 50 g/m^3), they also demonstrated a slight increasing trend, with an increase of 13 g/m^3 observed by round 6. However, the overall long term monitoring (Figure 17) indicated a reducing trend. pH values remained stable at 6.3 pH, with one fluctuation of 0.3 pH units (April 2019). Groundwater temperatures ranged by 1°C. One result for ammoniacal nitrogen was reported (0.025 g/m^3, June 2019).

Table 24 GND1347 2018-2019

	Site	GND1347	GND1347	GND1347	GND1347	GND1347	GND1347
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	6.43	7.41	8.56	9.19	9.5	8.13
Chloride	g/m^3	72	90	86	84	88	93
Electrical Conductivity (EC)	mS/m	72	82.9	83.4	85.7	86.6	85.6
Escherichia coli	cfu /100 ml	< 1	< 1	< 1	< 10	< 1	170
Nitrate-N + Nitrite-N	g/m^3	50	58	59	62	58	63
pH	pH Units	6.3	6.3	6.3	6.3	6.6	6.3
Sample Temperature	°C	13.9	14.3	14.4	14.9	14.3	13.9
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.025

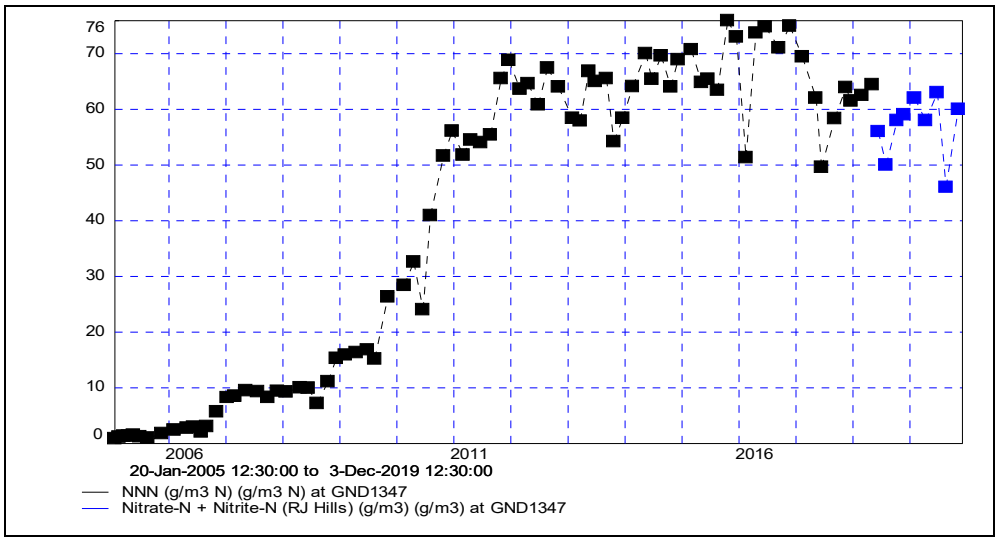

Figure 17 Long term NNN monitoring GND1347 2005-2019

GND1348: Borehole 7. Located in the north east of the site irrigation areas, in paddock 8, in close proximity to the Inaha stream. The associated nitrogen paddock loading was a 252 Kg/N/Ha. The annual monitoring of this well is provided in Table 25. Chloride values were on the more elevated side (>50 g/m^3) with a range through the year of 50 g/m^3. This monitoring location displayed a good deal of variation, with the more elevated values recorded during the summer months, which also corresponds with paddock loading data.

EC values, in line with the chloride, also displayed considerable variation. E-coli values ranged from below the LOD on three occasions, while recordable coliform forming units (CFU) were found on three occasions (ranging from 1- 32 CFU/100 ml). NNN values also recorded variation (42 g/m^3) throughout the monitoring period. The long term analysis of this parameter (Figure 18) indicated a reduction in concentrations since the 2012-2013 monitoring period, where a data set high value of 83 g/m^3 for NNN was reported. pH values ranged 0.5 pH units, while remaining below neutral pH. Groundwater temperatures ranged 0.8°C throughout the year. Ammoniacal nitrogen values were below the LOD this monitoring period.

Table 25 GND1348 2018-2019

	Site	GND1348	GND1348	GND1348	GND1348	GND1348	GND1348
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	9.09	9.32	9.99	10.74	11.37	11.11
Chloride	g/m^3	50	61	87	95	99	62
Electrical Conductivity (EC)	mS/m	47.5	54.9	83.6	91.7	89	58.5
Escherichia coli	cfu / 100 ml	1	< 1	< 1	< 10	1	32
Nitrate-N + Nitrite-N	g/m^3	22	28	55	64	55	38
pH	pH Units	6.5	6.5	6.4	6.6	6.9	6.5
Sample Temperature	°C	14.1	14.4	14.4	14.9	14.5	14.3
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

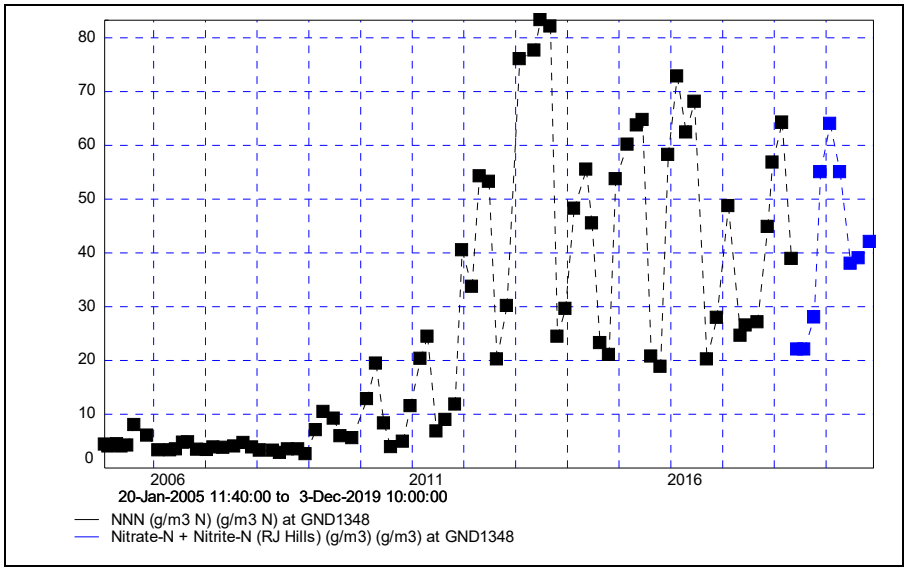

Figure 18 Long term NNN monitoring GND1348 2005 - 2019

GND1349: Borehole 8 is located on the western side of the Katotauru / Normanby block in paddock 25. Combined paddock loadings were recorded at 265 Kg/N/Ha. Annual monitoring is provided in Table 26.

Chloride values indicated a range of 22 g/m^3 this monitoring period and remained above 50 g/m^3. EC reflected the fluctuation of the chloride values. E-coli results ranged from below the LOD on four occasions, the two remaining results ranged 1- 130 cfu/100 ml. NNN values displayed variation throughout the monitoring period, which is in line with the long term analysis of this monitoring site (Figure 19). This monitoring location continues to exhibit a steady increasing trend in NNN concentrations, which has been apparent since the 2013-2014 monitoring period. pH values remained quite stable, ranging 0.2 pH units throughout the monitoring period. Groundwater temperatures ranged 1.1 °C across the monitoring period. Ammoniacal nitrogen values were below the LOD on five of six occasions, on one occasion (April 2019) a low value of 0.12 g/m^3 was recorded.

Table 26 GND1349 2018-2019

	Site	GND1349	GND1349	GND1349	GND1349	GND1349	GND1349
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	9.71	9.57	10.31	11.09	11.57	11.79
Chloride	g/m^3	65	62	65	51	53	73
Electrical Conductivity (EC)	mS/m	73.2	74.6	74.2	65.2	66.6	78.8
Escherichia coli	cfu / 100 ml	4	< 1	< 1	< 10	< 1	130
Nitrate-N + Nitrite-N	g/m^3	46	49	47	19.1	33	47
pH	pH Units	6.3	6.4	6.3	6.4	6.5	6.3
Sample Temperature	°C	13.7	14.2	14.7	14.8	14.8	14
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.010

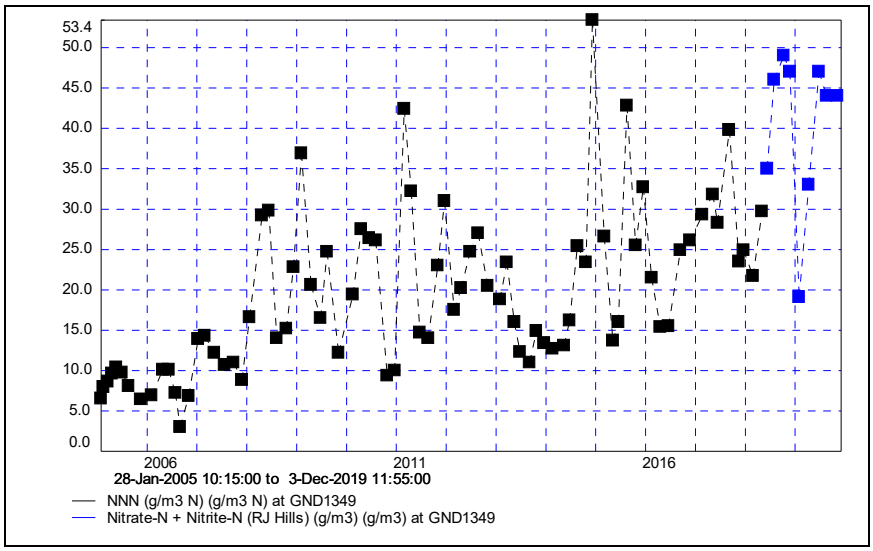

Figure 19 Long term NNN monitoring GND1349 2005 -2019

GND2225: Borehole 9 is located down gradient on the eastern side of the Kingi block, which is in paddock 42. Paddock loading was recorded at 233 Kg/N/Ha. The annual monitoring of this location is provided in Table 27. Chloride values were slightly elevated (>70 g/m^3), when compared to other monitoring wells in this data set. The values held a range of 8 g/m^3 throughout the period. EC values remained slightly elevated though stable, with a slight range of 6.9 mS/m.

E-coli results were recorded in five of six monitoring rounds. These results ranged from 1-60 cfu/100 ml. If continued e-coli results are found on this well it may be a consideration for the consent holder to assess the integrity of this monitoring location. NNN values were equal to or below 50 g/m^3 this period, with a range of 13 g/m^3. The long term analysis of this parameter is provided in Figure 20. The recent analysis (since 2018) indicates a stable, though elevated concentration of nitrogen in this monitoring location. The groundwater temperatures ranged 1°C. Ammoniacal nitrogen values were below the LOD on five of six occasion, on one occasion (June 2019) a trace value of NH_4 was recorded.

Table 27 GND2225 2018-2019

	Site	GND2225	GND2225	GND2225	GND2225	GND2225	GND2225
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	30 Jan 2019	10 Apr 2019	24 Jun 2019
LEVEL	m	5.09	5.78	6.29	6.62	6.99	5.54
Chloride	g/m^3	77	78	75	73	81	79
Electrical Conductivity (EC)	mS/m	73.1	68.4	66	65.5	66.2	69.1
Escherichia coli	cfu / 100 ml	60	< 1	1	1	14	40
Nitrate-N + Nitrite-N	g/m^3	50	43	40	40	37	43
pH	pH Units	6.3	6.4	6.3	6.3	6.4	6.4
Sample Temperature	°C	14	14.6	14.9	15	14.6	14.3
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.014

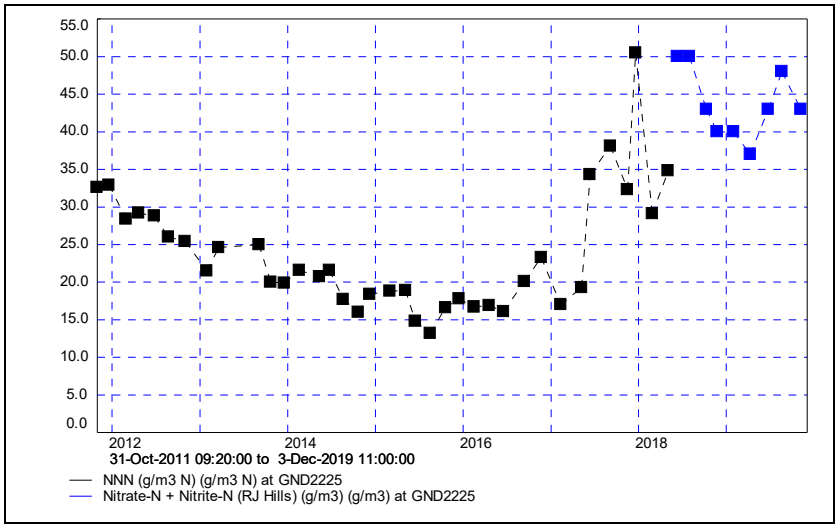

Figure 20 Long term NNN monitoring GND2225 2011-2019

GND2226: Borehole 10 is located in paddock 29, on the edge of the 200 m buffer zone, along Normanby and Inaha Roads. Paddock loading was recorded as 10 Kg/N/Ha, which one of the lowest in the loading data set. This monitoring period it was planted in maize and later ryegrass for the majority of the monitoring period. The annual monitoring data is provided in Table 28. Chloride analysis indicated the most elevated in the data set (>155 g/m^3), with a stable range of 11 g/m^3. EC also followed a similar suit to the chlorides, with stable, though elevated concentrations observed. E-coli analysis indicated two of six results above the LOD, with the two results ranging 15 cfu/100 ml. NNN concentrations were also found to be elevated, with all results above 80 g/m^3.

The long term analysis of this parameter is provided in Figure 21. In comparison to the previous monitoring periods, the values reported in this period are the most elevated in this data set to date (99 g/m^3, October 2019). Reported pH values were stable with a range of 0.2 pH units this monitoring period. The groundwater temperatures remained relatively stable throughout the monitoring period with a range of 0.8 °C. Ammoniacal nitrogen was reported on one occasion of six (June 2019), at trace concentration (0.024 g/m^3). The remaining five samples were all below the LOD.

Table 28 GND2226 2018-2019

	Site	GND2226	GND2226	GND2226	GND2226	GND2226
Parameter	Unit/date	31 Jul 2018	09 Oct 2018	23 Nov 2018	10 Apr 2019	24 Jun 2019
LEVEL	m	4.8	5.48	6.8	8.74	8.6
Chloride	g/m^3	159	170	163	162	164
Electrical Conductivity (EC)	mS/m	126.7	135.3	135.8	136.1	132.1
Escherichia coli	cfu / 100 ml	< 1	1	< 1	< 1	16
Nitrate-N + Nitrite-N	g/m^3	93	99	98	88	93
pH	pH Units	6.2	6.4	6.2	6.4	6.2
Sample Temperature	°C	13.8	14.3	14.3	14.6	14.2
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010	< 0.010	0.024

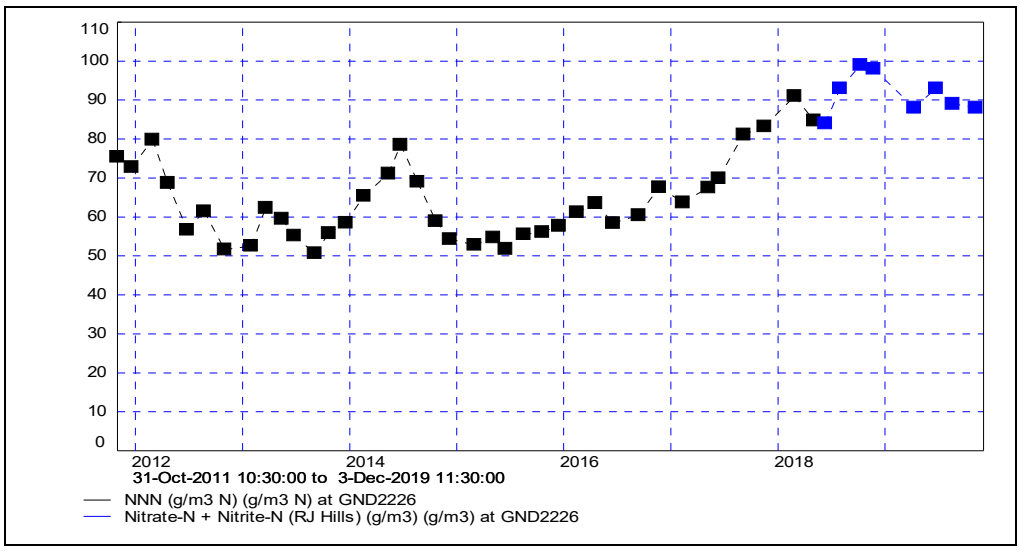

Figure 21 Long term NNN monitoring GND2226 2011-2019

2.4.5 Solid waste burial

Solid waste burial is undertaken under consent 5495-1. This consent allows for the discharge of up to 200 tonnes per day of wastes from meat and rendering operations by burial into land in the vicinity of the Inaha Stream.

The foremost reason for holding this consent was to allow contingency for the consent holder in the case of a significant mechanical malfunction with the rendering process. Whereby material which cannot be processed expires, due to a requirement for material to be processed within a given time period. Thus this material is required to be buried quickly to negate odour impacts.

In this monitoring period no material was buried. The previous use of this area was in the 2017-2108 monitoring period where sand trap waste was buried. Currently the consent holder is undertaking a consent renewal. This will include assessing the current burial pit area and proposing a newly developed burial pit system. This will be in the form of a closed loop system, which will negate the potential for impacts to groundwater, as a process of the decomposition of buried material. Whereby the decomposed material will be periodically removed from the burial pit sumps via suction truck, rather than discharging into the ground, which currently occurs.

The current consent requirement for this activity is a minimum of eight monitoring wells. Over time, ten wells have been constructed (Figure 22) however site operations have adversely effected the construction of some of these wells, rendering them un-useable. Currently there are five monitoring wells assessing the quality of the groundwater in the locality of the burial pits.

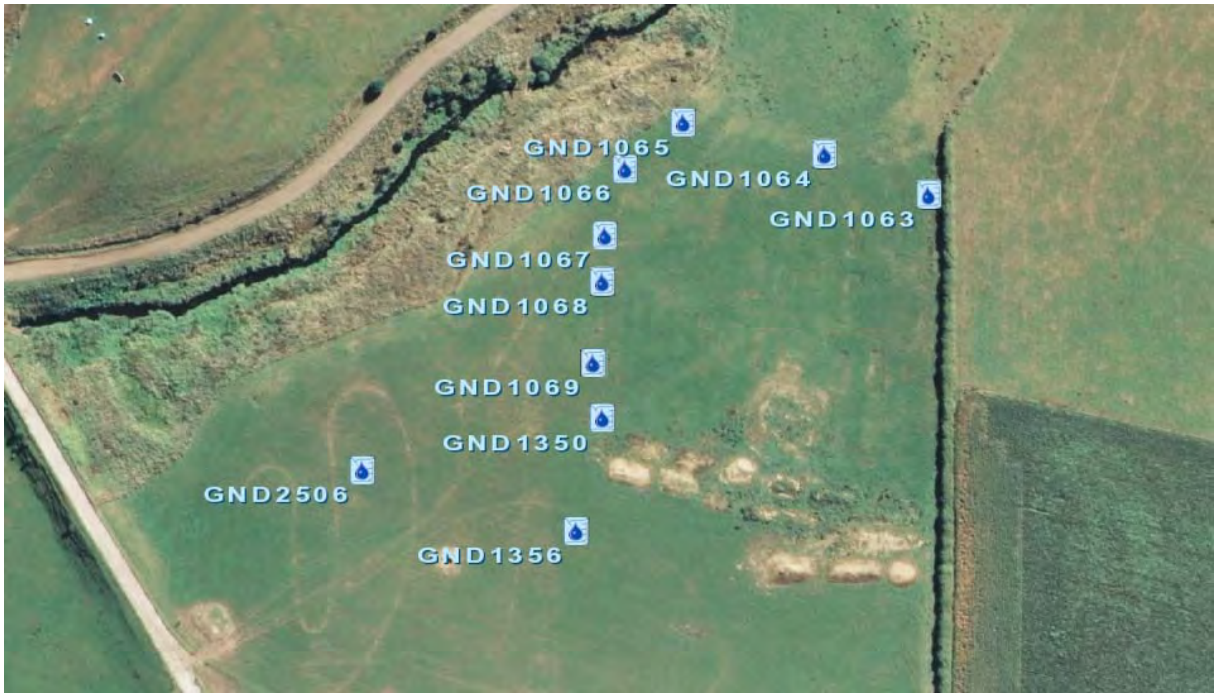

Figure 22 Burial pit groundwater monitoring well locations

The analysis of the five wells in the 2018-2019 monitoring period is provided in the following Tables 29-33.

Table 29 GND1063 burial pit monitoring 2018-2019

	Site	GND1063	GND1063	GND1063	GND1063
Parameter	Unit/date	19 Sep 2018	28 Nov 2018	19 Mar 2019	19 Jun 2019
LEVEL	m	6.49	7.76	9.08	8.99
TEMP	°C	14.2	14.3	14.6	13.9
Chemical Oxygen Demand (COD)	g O_2/m^3	< 6	< 6	9	< 6
Electrical Conductivity (EC)	mS/m	40.1	39.8	39.7	37.7
Escherichia coli	MPN / 100 ml	< 1			
Nitrate-N + Nitrite-N	g/m^3	15.2	14.7	14.2	15.5
pH	pH Units	6.4	6.4	6.4	6.4
Total Ammoniacal-N	g/m^3	< 0.010	0.011	0.014	< 0.010

Table 30 GND1066 burial pit monitoring 2018-2019

	Site	GND1066	GND1066	GND1066	GND1066
Parameter	Unit/date	19 Sep 2018	28 Nov 2018	19 Mar 2019	19 Jun 2019
LEVEL	m	5.48	5.77	6.18	6.01
TEMP	°C	15.6	15.3	15.5	14.9
Chemical Oxygen Demand (COD)	g O_2/m^3	18	25	53	44
Electrical Conductivity (EC)	mS/m	216	296	343	345
Escherichia coli	MPN / 100 ml	< 1			
Nitrate-N + Nitrite-N	g/m^3	30	14	6.5	6.8
pH	pH Units	6.6	6.9	6.9	6.9
Total Ammoniacal-N	g/m^3	77	135	176	199

Table 31 GND1067 burial pit monitoring 2018-2019

	Site	GND1067	GND1067	GND1067	GND1067
Parameter	Unit/date	19 Sep 2018	28 Nov 2018	19 Mar 2019	19 Jun 2019
LEVEL	m	5.43	5.92	Insufficient water to sample	
TEMP	°C	15.6	15.5		
Chemical Oxygen Demand (COD)	g O_2/m^3	< 6	< 6		
Electrical Conductivity (EC)	mS/m	81.9	110.4		
Escherichia coli	MPN / 100 ml	< 1			
Nitrate-N + Nitrite-N	g/m^3	10.5	10.9		
pH	pH Units	6.3	6.7		
Total Ammoniacal-N	g/m^3	0.018	21		

Table 32 GND1069 burial pit monitoring 2018-2019

	Site	GND1069	GND1069	GND1069	GND1069
Parameter	Unit/date	19 Sep 2018	28 Nov 2018	19 Mar 2019	19 Jun 2019
LEVEL	m	5.19	5.95	6.65	6.37
TEMP	°C	15.7	15.6	15.5	15.1
Chemical Oxygen Demand (COD)	g O_2/m^3	39	43	73	43
Electrical Conductivity (EC)	mS/m	294	302	297	262
Escherichia coli	MPN / 100 ml	< 1			
Nitrate-N + Nitrite-N	g/m^3	3.5	0.049	0.58	17.2
pH	pH Units	6.8	7.1	7	6.9
Total Ammoniacal-N	g/m^3	200	230	220	197

Table 33 GND2506 burial pit monitoring 2018-2019

	Site	GND2506	GND2506	GND2506	GND2506
Parameter	Unit/date	19 Sep 2018	28 Nov 2018	19 Mar 2019	19 Jun 2019
LEVEL	m	4.26	4.72	6.55	6.54
TEMP	°C	14.6	14.3	14.7	14.9
Chemical Oxygen Demand (COD)	g O_2/m^3	7	< 6	36	41
Electrical Conductivity (EC)	mS/m	91	97.9	95.7	92.8
Escherichia coli	MPN / 100 ml	< 1			
Nitrate-N + Nitrite-N	g/m^3	17	13	10.6	14.3
pH	pH Units	6.4	6.4	6.4	6.3
Total Ammoniacal-N	g/m^3	0.013	0.011	< 0.010	0.192

The burial pit monitoring wells were sampled on four occasions. The analysis indicated the following:

- Groundwater temperatures ranged 13.9-15.7°C.
- Chemical oxygen demand (COD) ranged 7-73 g O_2/m^3. The elevated values were reported in wells GND1069 (43-79 g O_2/m^3,) and GND1066 (18-53 g O_2/m^3).
- Electrical conductivity values (EC) ranged 37.7-345 mS/m. The elevated values were again found in wells GND1069 (262-302 mS/m) and GND1066 (216-345 mS/m).
- E-coli sampling was undertaken on one round across all five wells, the analysis did not indicate any values above the LOD <1cfu/100 ml.
- Nitrate nitrite nitrogen (NNN) analysis indicated a range of values 0.049-30 g/m^3. The highest value was recorded in GND1066 30 g/m^3.
- pH values ranged 6.3-7.1 pH.
- Ammoniacal nitrogen values (NH_4) ranged considerably across the five monitoring locations 0.011-230 g/m^3. The most elevated results were recorded in GND1069 (197-230 g/m^3) followed by GND1066 (77-199 g/m^3).

Specifically, wells GND1066 and GN1069 indicated impacts to groundwater from the exercise of the consent. The nearest receptor to these impacted wells is the Inaha Stream. This was assessed in Section 2.4.3.1.

INH000348 is the stream monitoring location situated below the burial pits. No significant increases in analysed parameters were noted during the instream monitoring of this location (INH000348).

Of note was a slight increase in EC values between the two sites of INH000334 and INH000348 (Figure 23) as well NNN concentration (Figure 24). However there is considerable distance between these two monitoring locations and the Company do irrigate to land further up the catchment, on both sides of the stream, thus the slight increases may not be solely an effect of the waste burial consent.

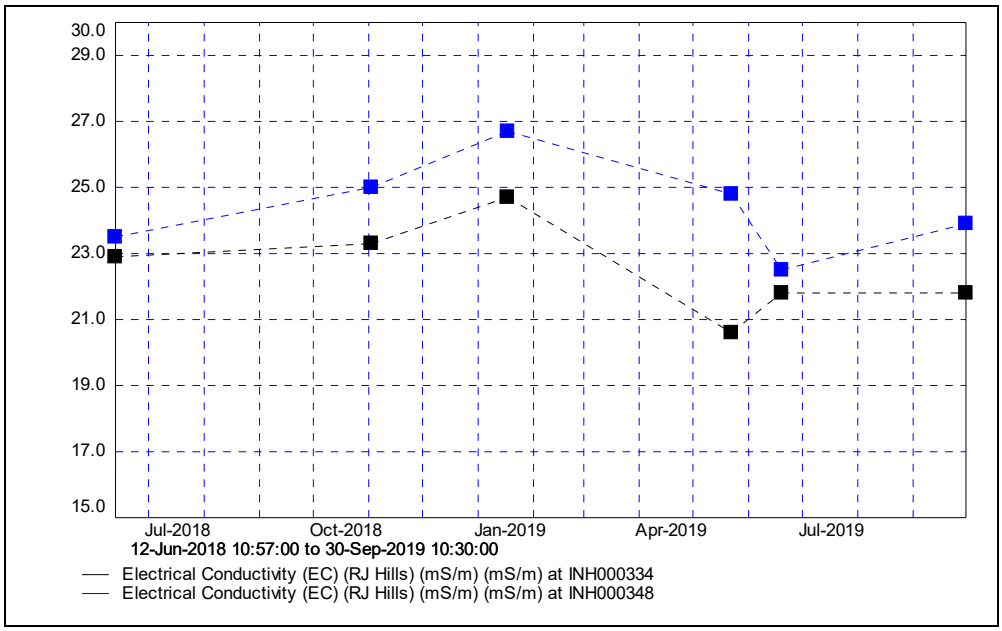

Figure 23 EC monitoring Inaha Stream INH000334 and INH000348 2018-2019

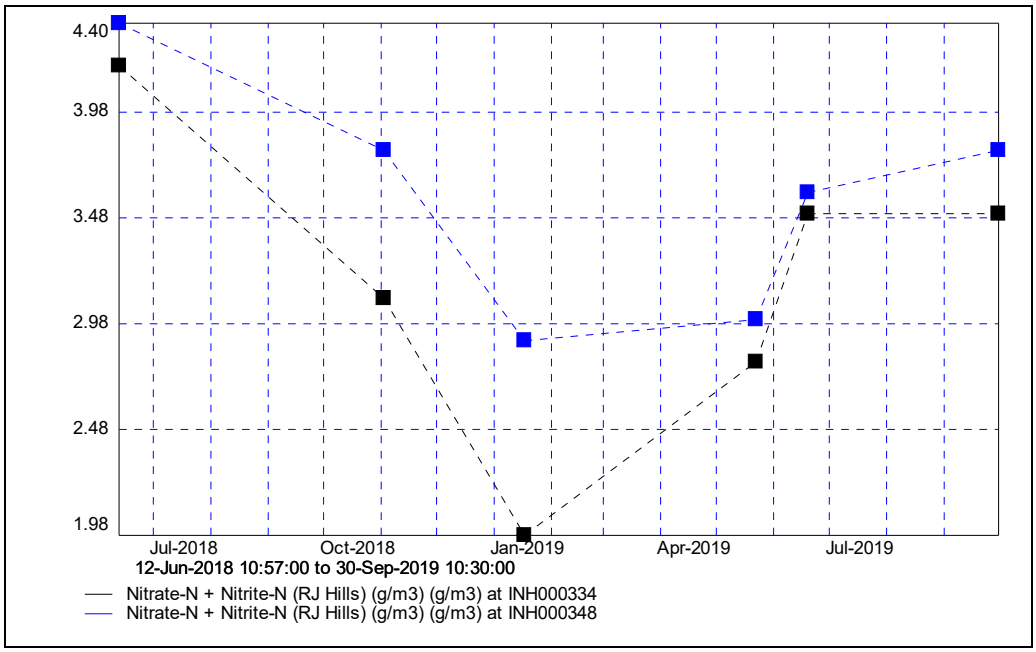

Figure 24 NNN monitoring Inaha Stream INH000334 and INH000348 2018-2019

2.4.6 Biomonitoring

Introduction

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). Please see reference section in the full biomonitoring report.

Two scheduled surveys of the Inaha stream catchment in the 2018-2019 monitoring year were undertaken in relation to discharges from the TBP plant. Results from previous surveys are also referred to in the main report.

Methods

The biomonitoring surveys (spring and late summer) were undertaken at eight sites on 06 November 2018 and 25 February 2019 (Table 34 and Figure 25). 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 25). 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 34 Biomonitoring sites in the Inaha Stream and unnamed tributary relating to the Company 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	Streambed kick
Unnamed tributary of Inaha Stream	UT	INH000433	Upstream of irrigation area	Streambed kick
	MT	INH000435	Middle site within the new irrigation area	Vegetation sweep
	DT	INH000440	50m upstream Normanby Road	kick-sweep

Two different sampling techniques were used to collect streambed macroinvertebrates in this survey. The Council's standard '400 ml kick-sampling' technique was used at sites U, 1, 2d, 3,4 and UT and the

'vegetation sweep' technique was used at site MT. A combination of these two techniques was used at site DT (Table 34). 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 and ethanol for later sorting and identification under a stereomicroscope according to the 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 based on the abundance categories in Table 35.

Table 35 Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	>499

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 gradation of biological water quality conditions based upon MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2013) from Stark's classification (Stark, 1985; Boothroyd and Stark, 2000) (Table 36).

Table 36 Macroinvertebrate community health based on MCI ranges adapated for Taranaki streams and rivers from Stark 1985 and Boothroyd and Stark 2000

Grading	MCI
Excellent	>140
Very Good	120-140
Good	100-119
Fair	80-99
Poor	60-79
Very Poor	<60

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 TBP plant as a result of organic nutrient enrichment from the wastewater discharge.

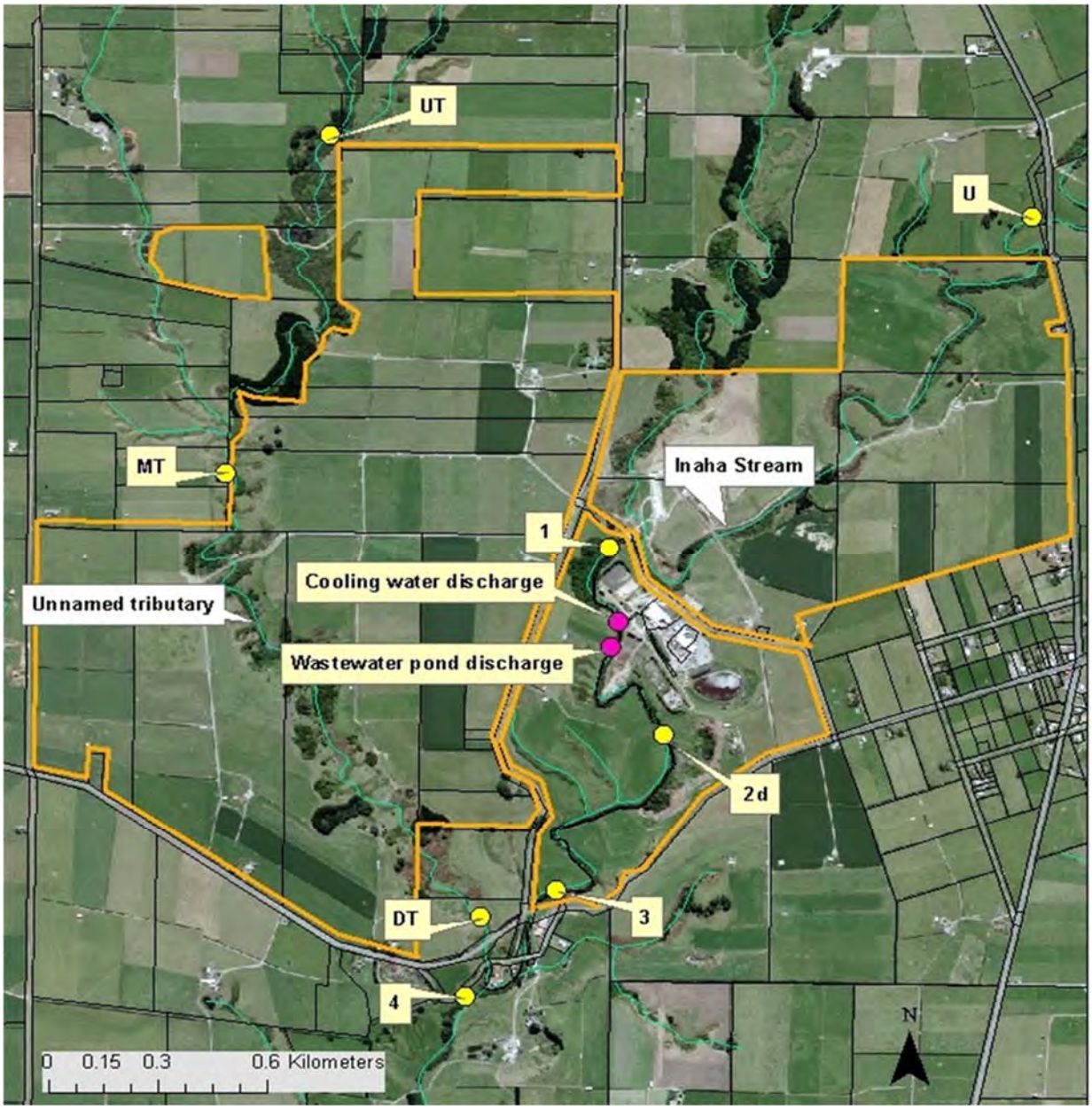

Figure 25 Biomonitoring locations on the Inaha Stream and associated unnamed tributary

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 TBP have impacted the freshwater macroinvertebrate communities present in the Inaha stream.

Summary March 2019

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 TBP have impacted the freshwater macroinvertebrate communities present in the Inaha Stream or unnamed tributary of the Inaha stream.

2.5 Air

2.5.1 Inspections

23 July 2018

During an inspection the following was noted. Odour surveys were undertaken downwind of the site, they found noticeable TBP pond and factory odours along Ngutu Road, extending to the corner of Manu Road. The odour was intermittent but distinct when present. The factory was not processing at the time of the inspection. No irrigators were operating at the time of inspection, all receiving pasture appeared healthy. The Inaha Stream staff gauge (SG) was at 3.35 m, which indicated a moderate flow, and it was slightly turbid. No fugitive site inputs were found. The discharge from the fire pond was essentially clear. Pond 6 was at 0.3 m and discharging. Dilution factors were being achieved and no adverse effects were observed at the time.

One water take was operating at 15 m^3/hr +/-. The bio-filters had magnehelic pressure sensors installed, TBP bio-filters observed at 0.7-1 kilopascal, while the TBE biofilters were not operating. There were no visible emissions discharging and leachate was directed to a sump and pumped to pond 3. The sump was coping with inputs.

Pond 6 had 5 aerators in operation, pond 4 had 7 aerators. Surface foam was prevalent across pond 4, the dissolved oxygen (D.O) 4.67 mg/L. Ponds 1 and 2 had wet fatty crusts with bubbles discharging across the pond. Typical putrid odours were noted immediately downwind. Sand trap cleanings were stored adjacent to the pond and leachate was discharging into pond 1.

The load-in area was tidy, and no product was stored outside. A long-run steel section of main door had ripped off, the plant manager outlined a replacement had been sourced and will be installed as soon as possible. Other areas of the factory exterior around load-in were showing signs of deterioration in places and will need addressing. Both farm dairy effluent systems were satisfactory, the feed pad (on Kohiti Road) was in use. Works were progressing on the wastewater treatment plant, the concrete pad had been poured. At the time the fire pit was not in use. No recent burial of product had occurred. It was conveyed that processing volumes were dropping due to expected seasonal variation.

17 August 2018

During an inspection the following was observed. Odour surveys were undertaken beyond the site boundary, they found noticeable 'factory' type odours along Normanby Road. The odour was distinct and intermittent. Strong putrid pond odours were found along Kohiti Road. No irrigation was occurring at the time of inspection, all pasture appeared healthy. Ponding in paddock 28 was noted and discussed, it was conveyed that the ponded water was caused by stormwater run-off from the paddocks on the south side of Normanby Road and the TBP catchment north of the area.

No product was stored outside at the time of inspection and the catchment was clean. All load-in doors were closed when not in use, no regurgitated material was present in this area. Sludge from pond 5 was being irrigated onto the pond 1 crust at the time. No bubbles were discharging through the crust at the time of inspection. Pasture on pond 3 appeared dead over two thirds of the surface but the crust remained

intact across the pond. Pond 4 had 7 aerators operating, the D.O probe was due for a clean as it was reading 0.6 mg/L. Surface foam was prevalent across the pond. The pond 6 discharge was 11.5 cm, the SG was observed at 3.34 m, this indicated that dilution factors were being achieved.

Bio-filter bed excavation works were occurring on one bed, as it was partially blocked with blood dust due to a scrubber failure. The bed was isolated, however all other beds were operational. The pressures were low, minimal visible emissions were observed. All piping and ducting across streams appeared in good repair. One water take was operating within the Inaha, this was observed at 57 m^3/hr +/-. No recent burial of product had occurred and no pit had been excavated. Nitrate levels in the western tributary remained elevated and variable. Farm dairy effluent (FDE) management appeared satisfactory at the time of inspection. It was conveyed that product processing volumes were reportedly low at present, no incidents were reported.

27 September 2018

During an inspection the following was noted. Odour surveys were undertaken downwind of site, they detected putrid pond 1 odours along Kohiti Road. No factory, bio-filter or cooking odours were found beyond the site boundary. Pond 6 was discharging at 11cm at the V-notch. The SG was observed at 3.22, this indicated dilution factors were being achieved. The discharge from the fire pond was clear. No adverse effects were observed in the receiving waters at the time of inspection. One water take was operating at 59 m^3/hr +/-.

Works were occurring on the wastewater treatment plant concrete pour, the staff outlined that contracts had been entered into between companies. The blood load-in was not in use and the area was tidy, the blood room doors were closed. The load-in area was clear of stored product and the doors were closed when not in use. The fire pit was in use, no prohibited materials were being burnt, a staff member and digger were on standby to manage the operation.

Visible emissions from the bio-filters were observed, a localised 'musty bark' odour was present. FDE systems appeared satisfactory. It was conveyed that capex had been approved for a solids separator system for one of the FDE systems. 110 mm main line had been approved, this is proposed to increase the in-flow required to drive the rotorainer irrigators. The travelling irrigator was operating at the time, pasture was coping with applications, and no ponding or run-off was observed at the time of inspection.

Ponds 1 and 2 had crusts, though very few bubbles were discharging through pond 1, as a crust of solid material had been applied from pond 5. Pond 5 was essentially empty. Pond 6 had 5 aerators in operation, pond 4 had 7, with a corresponding D.O 5.6 mg/L. Cover across pond 3 was absent due to vegetation die-off. Staff, upon discussion, immediately undertook to begin sourcing straw bales for the pond. No recent burial of product had occurred, no incidents were reported.

02 November 2018

During an inspection the following was noted. Odour surveys were undertaken beyond the site boundary, these observed strong 'pond' type odour along Kohiti Road, when directly downwind of ponds 1 and 2. The Inaha stream was running clear throughout the length of the sites influence. The SG was 3.08 m, the pond 6 discharge to surface water had ceased approximately 3 weeks earlier due to low flows.

7 aerators were operating in pond 4, with a corresponding D.O of 4.3 mg/L, surface foam was remaining localised. Pond 3 had straw applied to the cover at the inlet end. The discharge from the fire pond was clear, no adverse effects observed within the receiving waters.

Visible emissions were discharging through several bio-filter beds, typical musty odours remained localised, leachate was directed to sump and on to pond 3. The fire pile was not lit. The load-in area was clear and doors were closed when not in use. The blood load-in area was tidy. No recent product burial had taken

place. No irrigation was occurring at the time of inspection and all pasture appeared healthy. The discharge and surface water samples were collected during the inspection. No incidents were reported.

21 November 2018

During an inspection the following was noted. Odour surveys were undertaken beyond the site boundary these observed strong 'pond' type odour along Kohiti Road when directly downwind of ponds 1 and 2. The Inaha Stream SG was 3.1 and running clear throughout the length of the sites influence. No discharge from pond 6 was occurring. Six aerators were operating in pond 4, the D.O was 4.1 mg/l, very little surface foam was present on the pond at the time of inspection. The pond 3 cover looked good. The stormwater discharge into the fire pond appeared clear, while the discharge from the fire pond appeared slightly turbid. No adverse effects were observed within the receiving waters. Visible emissions were discharging through the TBE bio-filters and the final TBP bio-filter. Typical musty odours were present around these areas. Magnehelis pressure gauges looked good across all beds. No leachate discharge was occurring at the perimeters. The liquid was discharging into the sump from the beds, this was being directed to pond 3.

The fire pile was not burning. The load-in area was clear of spills and the doors were closed when not in use. Regurgitated product was stored in the area adjacent to the load-in doors. A couple of holes were present in the exterior wall above the regurgitated material which were to be fixed. The roof appeared in good repair. The blood load-in area was tidy. No recent product burial had taken place. No irrigators were in use at the time of inspection. All pasture appeared healthy. No incidents were reported.

17 January 2019

During an inspection the following was noted. Odour surveys were undertaken beyond the site boundary, these found strong factory/offal odours around Okaiawa township and along Normanby Road. The odour was constantly noticeable at the time. No odour was found upwind of the factory, staff outlined that the factory had been experiencing breakdowns but were back processing again.

The load-in area catchment was clean, no regurgitated material was stored outside and the doors were closed when not in use. Blood deliveries were occurring at the time. The blood load-in area was considered clean and the bund was empty. Ponds 1 and 2 odours were strong along Kohiti Road. Bubbles were discharging through the fat crust of pond 1, pond 3 had complete pasture cover. Pond 4 had 7 aerators operating and the D.O was being maintained above 1 mg/L. Pond 6 had 5 aerators operating, no discharge to surface water was occurring.

The cooling water discharge into the fire pond was very hot at 61°C. The discharge from the fire pond was the usual temperature (26.3°C) and no temperature increase in the receiving waters was occurring at the time of inspection. The bio-filters appeared in good repair and the pressure meters indicated good flow through the ducting. Typical 'musty bark' odours were found around the area and visible emissions were discharging from the final bed. The leachate was being contained and directed to the sump.

Irrigators were operating in two paddocks, no ponding or run-off was occurring. The water take from Inaha stream was 28 m^3/hr. FDE management was satisfactory. No adverse effects were found in the receiving waters throughout the length of the sites influence. Discharge and stream samples were collected.

28 February 2019

During an inspection the following was noted. Odour surveys were conducted beyond the site boundary, these found constantly noticeable 'plant odours' along Katotauru Road, the odour was not considered objectionable and had no putrid characteristics. It was considered to be a DAF/regurgitated material odour.

The load-in area was being washed clean at the time of inspection, some minor offal spills were noted around this area. All load-in doors were closed, the cow room (small) door had been ripped off and a new one was being sourced. The tallow tank at the rear of the site had recently discharged and the outside of the tank had tallow stuck to it. Works were occurring to install a well/sump for the water take from the Inaha

Stream as currently the submersible pumps were blocking up. Precast concrete chambers were used and a pipe will convey water into the structure from the stream. The Inaha stream was in low flow at 3.02 m. No fugitive discharges into the stream were found during the inspection. New bark had been applied to the concentrated sources bio-filter and the areas were being regularly watered. All leachate was directed to sump and pumped to pond 3. Pressure gauges indicated the system was working well.

Ponds 1 and 2 had good cover, no bubbles were discharging through the crusts, though odour remained strong directly downwind of the ponds, but was not found beyond the boundary along Katotauru Road. Pond 3 had good cover, pond 4 had 7 aerators operating, the D.O probe was showing false readings and was to be investigated. Pond 6 wasn't discharging to the Inaha Stream. The Jackson Transport Limited (JTL) yard was free of spills. The use of a dust suppressant for the area was discussed. All washings were contained within the wash-bay.

Works were continuing on the wastewater treatment plant building. Two irrigators were operating, no ponding or run-off was occurring, and all pasture appeared healthy. The new bore pump had arrived and was being wired up at the time of inspection. The scrubber line from pond 6 had been water jetted to removed blockages, as a process pressures had risen significantly since the works were undertaken. No incidents were reported.

26 March 2019

During the inspection the following was noted. Odour surveys were undertaken beyond the site boundary, these found noticeable 'plant/pond/bio-filter' odours along Katotauru Road. A strong 'putrid' pond odour was also noted along Kohiti Road at the bridge. The bio-filter odour directly around the area was considered very strong, the beds had a wet appearance. Visible emissions were escaping the TBE concentrated sources bed. The leachate from the beds was being directed to pond 3. The drainage channels were conveying leachate into the sump. No fugitive discharges into the Inaha stream were found.

The Inaha stream was very low at 3.02, no surface water was being taken at the time of inspection. Works were continuing on the water take chamber, the pumps and power were yet to be installed. The load in area was considered clean and the doors were shut when not in use. The blood load-in area was not in use during the inspection and all associated equipment was clean, the bund was empty.

The fire pond discharge to the Inaha was clear and no deleterious effects were observed. The fire pit was not lit, though some boxthorn hedge cuttings were being burnt around the farm, no objectionable smoke discharges were found. Irrigation was occurring in paddock 38, the pasture was coping with the application, no ponding or run-off was occurring. Pond 6 wasn't discharging, and was low at 0.3 m, the sludge island in the middle was visible. Pond 4 had 7 aerators operating, surface foam was present, D.O 1.78 mg/L (TBP probe).

29 April 2019

During an inspection the following was noted. No objectionable odours or visible emissions were found during the inspection, noticeable 'putrid pond' type odour was briefly detected along Normanby Road. A gusty variable wind was blowing at the time of inspection. No cooking was occurring. Fallen cattle were stored outside the load-in doors. The catchment area was clean and all factory doors were closed.

The Inaha Stream was in moderate flow and turbid due to overnight rain, the S.G read 3.1. The water take was not operating, the pumps were yet to be installed in the new water take chamber. Pond covers looked good, though a strong putrid odour was around ponds 1 and 2. Bubbles were discharging through the crust of pond 1. Pond 4 had 6 aerators operating and the D.O was 5.6 mg/L. No discharge from pond 6 was occurring. The fire pond looked turbid, though the discharge into the receiving waters was causing no changes to the clarity.

The fire pit was not in use, only pallets present at the time of inspection. No visible emissions were leaving the bio-filters, the leachate drain was conveying the liquid into the receiving sump. Irrigators were operating in paddocks 14 and 29, no ponding or run-off was occurring. FDE systems were satisfactory. The new bore pump had been installed and was operational. No recent burial of product had occurred. No incidents were reported.

22 May 2019

During an inspection the following was noted. No objectionable odours or visible emissions were found beyond the site boundary during the inspection. A noticeable 'pond' odour was present along Kohiti Road. The discharge from the fire pond was clear and free of any hydrocarbon sheen (though the pond had a turbid brown appearance). No fugitive discharges were found, no adverse effects were observed within the receiving waters. The S.G was at 3.14.

Visible emissions were discharging across all bio-filters, a localised 'meaty musty' odour was present around the area, though no leachate discharge was occurring. Ponds 1-3 had good cover, bubbles were discharging through the crust of pond 1. A strong putrid odour was present directly downwind. The water intakes were clear of obstructions. Works were continuing on the reverse osmosis plant.

Regurgitated material was stored outside the load-in doors, the doors were shut when not in use. No recent burial of product had occurred. The FDE management looked satisfactory. No irrigation was occurring during the inspection. Pond 6 was not discharging. Pond 4 had 7 aerators operating and the pond appeared well aerated. The fire pit was not in use. No incidents were reported.

19 June 2019

During an inspection the following was noted. No objectionable odours or visible emissions were found beyond the site boundary during the inspection. A noticeable 'putrid pond' type odour was present in the dip along Kohiti Road, also, intermittently noticeable 'bio-filter' odours were found along Normanby Road. The 'bio-filter' odour was considered strong when on-site, immediately around the area. Visible emissions were escaping the beds. The pressure gauges indicated the beds were functioning well.

The load-in doors were closed when not in use. Regurgitated material was stored outside the doors. The blood load-in area was tidy and the bund was empty. The water take from the Inaha stream was not operating, the pumps were yet to be installed in the reservoir.

The fire pond had a turbid appearance with some wind-blown surface scum, however, no adverse effects were observed within the receiving waters. Pond 6 not discharging at the time and had 5 aerators operating, pond 4 had 7 aerators operating and lots of surface foam was present on the pond. Pond 3 had a good cover. The waste management area appeared tidy. The fire pit was not in use, and no prohibited materials were present. FDE contingency pond at the lower farm was full, at the time contractors were on-site lowering the pond and spreading the scraped solids.

Two travelling irrigators were operating at the time of inspection, no ponding or run-off was occurring, and all receiving pasture appeared healthy. The transport yards were tidy, all truck washings were contained and directed to the pond system. The Inaha stream was running turbid throughout the length of the site. Investigations found forestry operations occurring up the valley, from the lower cowshed were discolouring the tributary which flowed into the Inaha Stream. The discharge and receiving water samples were taken during the inspection. No incidents were reported.

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 37.

Table 37 Requirement for reports and plans imposed by 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	Audit report received 12 June 2019
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 28 May 2019
Monthly report under section 3.2 of management plan on daily activities log, weather, bio-filter performance	4058-4 (7)	Monthly	Reports received, late on 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 28 May 2019
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 occasion
Wastewater to land			
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 28 May 2019
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

2.6.1 Air discharge certification

The forth 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 26 March and 3 April 2019. 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 bio-filter systems.

The report, including the recommendations are appended to this report, Appendix II. Please note that TBP is committed to undertaking all report related recommendations.

2.7 Incidents, investigations, and interventions

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.

For all significant compliance issues, as well as complaints from the public, the Council maintains a database record. The record includes events where the individual/organisation concerned has itself notified the Council. Details of any investigation and corrective action taken are recorded for non-compliant events.

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 individual/organisation is indeed the source of the incident (or that the allegation cannot be proven).

Table 38 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the Company activities during the 2018-2019 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 38 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
12/07/2018	IN/36588 Odour surveys were undertaken in response to a complaint received regarding objectionable odour discharging beyond the site boundary. Although the complainant wanted to remain anonymous it was outlined that the odour was being experienced on Ahipaipa Road. No factory or infrastructure odour was found on Ahipaipa Road. Strong/putrid pond odour were noted on the bridge at Kohiti Road. Wastewater irrigation was occurring in paddock 6, along Ahipaipa Road; weak wastewater odour was found when in the paddock directly downwind of the irrigator. The odour was not considered strong or objectionable.	Y	No	No further action required. Inspection found no non-compliance.
13/10/2018	IN/37176 An odour complaint regarding TBP was received from Manu Road, Okaiawa. Odour surveys were conducted at Okaiawa due to the complaint regarding TBP. The survey found still conditions. Detected no objectionable and or offensive odour or even noticeable at complainant's property.	Y	No	No further action required. Inspection found no non-compliance.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
09/01/2019	IN/37402 Odour surveys undertaken in response to a complaint received regarding objectionable odour discharging beyond the site boundary. Odour surveys undertaken at the complainants property found no odour attributable to site activities; the wind had change direction from when the complaint was made. Odour surveys undertaken around the site perimeter found noticeable 'pond' type odours at the bridge in the valley along Normanby Road and in the valley along Kohiti Road, the odour was considered strong at Kohiti Road.	Y	No	No further action required. Inspection found no non-compliance.
22/01/2019	IN/37497 A complaint was received concerning odour emanating from a rendering plant at Okaiawa. An odour survey was carried out and the Company was found to be in breach of consent conditions.	No	Yes	Infringement notice issued
25/01/2019	IN/37501 A complaint was received concerning and odour emanating from a rendering plant near Okaiawa. An odour survey and inspection was undertaken. This identified non-best practice and offensive odour.	No	Yes	Infringement notice issued
26/01/2019	IN/37503 A complaint was received concerning an odour emanating from a rendering plant near Okaiawa. An investigation found that there was a consistent offensive/objectionable odour beyond the boundary and extending well into the township of Okaiawa	No	Yes	Infringement notice issued

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
15/02/2019	IN/37596 A complaint was received concerning odour discharging from Taranaki By-Products in Okaiawa. The complainant advised that the odour had been offensive all week within Okaiawa township. A 30 minute odour survey in the Okaiawa township found that a strong, intermittent, distinct to strong odour was present. The strong odour was associated with a negative hedonic tone and a 'dead rotten cow' character. This strong odour, although intermittent, was found to be offensive, even in periods of short duration.	No	Yes	14 day letter of explanation sent and infringement notice issued

Officer's note:

A significant number of odour related complaints occurred within a short time period at the Company facility this monitoring period. Four complaints were confirmed to be consent breaches.

The main reason for these complaints was due to issues with the cooling water system, the Company were not able to gain the requisite amount of cooling water due a problem with a groundwater abstraction pump. This caused a knock on effect, as the exhaust gases which are drawn from the factories on site to a specific bio-filter (concentrated sources) were elevated in temperature.

This increase in temperature was above the thermal preference for the bio-filter to undertake its process and resulted in the bio-filter effectively overheating and then perishing. This negated the bio-filter's ability to process exhaust air.

As communicated by TBP during the May 2019 community meeting, this took some time to identify, as there were no relevant gauges to assess the bio-filters. Once it was confirmed to be the source of the odour issues it then took longer to fix.

The bio-filter was finally put back into service in November 2019. All of the bio-filters are now fitted with gauges which are automated to stop the flow if the temperature reaching the bio-filters exceeds 50°C. To prevent this from occurring again.

Two additional groundwater pumps have acquired to negate the effect of a future occurrence of a pump malfunction.

3 Discussion

3.1 Discussion of site performance

Performance will be discussed by consent.

To take water from the Inaha Stream for a rendering operation (2051-4)

The maximum abstraction limit was complied with for the whole monitoring period. This is an improvement from the 2017-2018 monitoring period, where one exceedance was recorded. The minimum flow of 25 l/s was maintained in the stream for the duration of the monitoring period. The consent is under the renewal process at present.

To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream (2049-4)

The Company ceased discharging wastewater to the Inaha stream on 10 October 2018. There were no wastewaters discharged to the stream for the remainder of the monitoring period. Four surface water monitoring rounds were undertaken during the period of land application of wastewater only.

The minimum dilution rate (300:1) was complied with for the time period of the stream discharge (July – October 2018). The discharge to the Inaha stream ceased when the dilution rate could not be achieved. This was communicated to the Council and also Ngati Manuhiakai Hapu.

The thermal limit (no greater than 3°C increase in receiving waters) for discharges to the Inaha stream was not exceeded throughout the monitoring period.

The consent is under the renewal process at present.

To discharge cooling water to an unnamed tributary of the Inaha stream (2050-4)

An assessment of the cooling water indicated measurable ammonia within the cooling water discharge, which is in breach of condition 2 of 2050-4. This consent requires the discharge to not contain a chemical, biological or physical contaminant greater than those found in the abstracted stream water.

Cooling water temperatures were excessive on occasion (>60°C), though due to the discharge reaching the fire pond before the Inaha stream, the thermal effect of the discharge is nullified. The cooling water discharge, as assessed by temperature logger in the fire pond (Section 2.3.2) indicated compliance with the maximum temperature requirement (<35°C).

The consent is under renewal process at present.

To discharge stormwater into an unnamed tributary of the Inaha stream (5426-1)

The quality of the stormwater discharge varied considerably this monitoring period (Section 2.3.3). During an odour complaint inspection (25 January 2019) considerably product was noted to be overflowing from process areas as process of a mechanical breakdown. Blood was poured into the stormwater system. Note, no effects were note on the stream

Overall, a display of below best practice was identified by the inspector, and an infringement notice was issued.

The Company will need to make sure that there is no future potential for waste material or fluids to become entrained in the stormwater system as this eventually feeds the Inaha stream through the fire pond.

Separating clean from contaminated stormwater would potentially limit the elevated ammonia, E-coli and excessive BOD, as recorded during the June 2019 monitoring round.

The consent is under the renewal process at present.

To discharge emissions to air from rendering operations (4058-4)

Emissions to air this monitoring period drew seven complaints from the public. Four complaints identified objectionable odour beyond the site boundary.

The source of the odour was identified in three cases as a malfunction is one of the main site bio-filters. The exhaust gases which reach the bio-filter were above the thermal tolerance of the device and it 'cooked' the bio-filter, negating its ability to function. This was conveyed to the community during the second (22 May 2019) community meeting. Since this malfunction the company have installed automated gauges at the bio-filters to measure the temperature reaching the device. If the thermal limit is exceeded, the source will automatically stop. The bio-filter was returned to service in November 2019.

On one occasion a breakdown in the plant processing had led to product being stored outside with doors open or removed. This led to objectionable odour beyond the site boundary.

These issues resulted in a letter of explanation sent to the Company and four infringement notices issued.

In this monitoring period the Company undertook the third party biennial audit of odour control systems. The recommendations of which will be implemented by the Company.

To discharge treated wastewater to land (3941-2)

The consent holder provided data with respect to wastewater and fertiliser (stickwater) application areas, including loading information. The objective to maximise discharges to land was undertaken this period, TBP undertook discharges to surface water for 99 days, for the remaining 266 days the wastewater was irrigated to land.

The dissolved oxygen of the final wastewater pond 6 was below the requisite 1.0 g/m^3 for dissolved oxygen on three of four occasions. The sodium absorption ratio (SAR) was below the limit (<15 SAR) on all four occasion.

No ponding of wastewater was identified during inspections. There was no exceedance in wastewater nitrogen loading which is defined as 300 kg/N/ha. The most elevated application of wastewater was recorded as 299 kg/N/ha in paddock 35.

There were, however, four paddocks (7, 20, 23 and 35) which received a combined total nitrogen loading rate in excess of 300 Kg/N/ha. The additional nitrogen was in the form of fertiliser (stickwater) which has no limit. Paddock 20 received a combined application of 386 Kg/N/ha.

The total volume of wastewater put to land increased by 10,011 Kg/N when compared to the previous monitoring period with 43,738 Kg/N discharged in the 2018-2019 monitoring period. The total volume of stickwater to land deceased by 1,416 Kg/N in comparison to the previous monitoring period, with 10,067 Kg/N put to land in 2018-2019. Combined nitrogen loading records indicated the total volume put to land increased by 8,595 Kg/N with a combined total of 53,805 Kg/N in the 2018-2019 monitoring period.

The consent holder utilised a greater area of land (322 Ha) than the previous monitoring period with an increase of 20 Ha.

The consent is under the renewal process at present.

To discharge wastes from meat rendering into land by burial (5495-1)

No material was required to be buried in this monitoring period. The last time this consent was utilised by the consent holder was during the 2017-2018 monitoring period for the burial of sand trap waste.

The burial pit area has a requirement by consent for a minimum of eight functioning monitoring wells. Currently there five active to the burial pit area. A further three wells are required to installed. Or the other damaged wells, of which there are five, could be re-drilled.

The consent is under the renewal process at present.

To place a culvert in the Inaha stream (6431-1)

No performance issues noted from the exercise of this consent in this monitoring period.

To take and use groundwater for industrial water supply (9756-1)

The abstraction of groundwater was undertaken this period. The daily limit was complied with for the duration of the monitoring period and data was provided as required.

The pump associated with drawing groundwater malfunctioned this period. This had a knock on effect in reducing the quality of ground cooled water to various plant processes, which resulted in elevated temperature exhaust emissions to a bio-filter.

To discharge emissions in to the air from the burning of pallets, paper and cardboard (10054-1)

The fire pit was noted to have been used during inspections. Only allowable materials were observed when the fire was lit. A staff member was supervising to manage the operation while the fire pit was in use. No issues were noted during the inspections.

3.2 Environmental effects of exercise of consents

Environmental effects will be discussed by consent.

To take water from the Inaha Stream for a rendering operation (2051-4)

No environmental effects were noted as a process of the abstraction of water from the exercise of this consent.

To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream (2049-4)

Biological monitoring indicated that there was no evidence that discharges from the facility had impacted the macroinvertebrate communities of the Inaha Stream. In stream monitoring indicated that the thermal impact was within consent conditions for the entirety of the monitoring period.

Surface water monitoring was undertaken on four occasions when the facility was not discharging wastewater from the pond system. These four rounds did not indicate the continuous discharge from the fire pond was causing an effect that was more than minor.

To discharge cooling water to an unnamed tributary of the Inaha stream (2050-4)

An increasing ammonia concentration was recorded throughout the monitoring period. This may indicate that the closed loop cooling water system may be influenced by a plant process. This consent requires the discharge to not contain a chemical, biological or physical contaminant greater than those found in the abstracted stream water.

While excessive cooling water temperatures were recorded on the discharge to the fire pond, the overall discharge was compliant with its thermal limit. The June 2019 monitoring round recorded an elevated BOD, which further lends weight to the cooling water system being compromised by a plant process.

To discharge stormwater into an unnamed tributary of the Inaha stream (5426-1)

The quality of the stormwater discharge varied considerably this monitoring period.

The most elevated conductivity in this data set was recorded, as well as significant E-coli counts and an increasing ammonia concentration. Suspended solids within the discharge were in excess of the consent defined limit (100 g/m^3) on one occasion, however the mixing in the fire pond negated this discharge from impacting surface waters.

Separating clean from contaminated stormwater would potentially limit the elevated ammonia, E-coli and excessive BOD, as recorded during the June 2019 monitoring round.

The stormwater system receives contribution from the whole plant area and any spills from deliveries will enter the fire pond. While there were elevated contaminants noted in the stormwater monitoring, the overall effect on the receiving waters was minimal.

To discharge emissions to air from rendering operations (4058-4)

Emissions to air resulted in four substantiated odour complaints. On all four occasions significant objectionable odour was observed by the inspecting officer beyond the site boundary. Three were the result of the bio-filter overheating and as a process negating its ability to operate as required. One occasion the emissions to air were the result of a mechanical breakdown with significant material left outside and doors removed from the main buildings.

To future proof the bio-filter issue, gauges have been fitted to measure inflow temperatures, these are fitted with an automatic cut off, should the inflow temperatures exceed a set range.

To discharge treated wastewater to land (3941-2)

Groundwater monitoring of the irrigation area indicated that four of 12 wells held a value for NNN of greater than 55 g/m^3. Of these four, three remained above 55 g/m^3 throughout the monitoring period.

As well as elevated NNN in the groundwater, the main effect as a process of the discharge of wastewater to land in the Inaha catchment is on the western tributary. This was particularly evident throughout the monitoring period with the most elevated nitrate recorded of (NNN) 13.9 g/m^3 (30 January 2019). The greatest increase in this analyte down the length of the western tributary was observed (17 January 2019) to be 8.17 g/m^3.

Nitrate values within rivers are classified in the National Policy Statement for Freshwater Management (Freshwater NPS). The draft for comment, guide to attributes[3], is a document of proposed guidelines aimed at assessing nutrient concentrations within rivers through a grading system.

Utilising the grading system it can be discerned that the upper site (INH000433) within the catchment sits within grade B for nitrate values. While the mid-catchment site (INH000435) is firmly in grade C. The lower site (INH000440) is below the national bottom line for nitrate defined as grade D (>6.9 g/m^3).

In terms of the main stem, the largest increase down the catchment was observed to be in the region of a 2 g/m^3 increase in NNN concentration. This was generally observed just below the confluence with the western tributary at site INH000450. In terms of grading, the main stem of the Inaha stream fluctuates between attribute state B and state C. State B is observed in the upper reaches of the irrigation area, with a gradual increase in NNN concentrations down catchment. It is noted that this is well above the national bottom line.

To discharge wastes from meat rendering into land by burial (5495-1)

This consent has not been actioned in this monitoring period. However the monitoring indicated that two wells (GND1066 and GN1069) recorded impacts to groundwater from the exercise of the consent.

Significant ammonia and chemical oxygen demand were recorded in these two wells throughout the monitoring period.

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[3] Ministry for the Environment. 2018: *A Guide to Attributes in Appendix 2 of the National Policy Statement for Freshwater Management (as amended 2017).* Wellington: Ministry for the Environment.

The nearest receptor to these impacted wells is the Inaha Stream. This was assessed in Section 2.4.3.1. INH000348 is the stream monitoring location situated below the burial pits. No significant increases in analysed parameters were noted during the instream monitoring of this location (INH000348).

Of note was a slight increase in EC values between the two sites of INH000334 and INH000348 (Figure 23) as well NNN concentration (Figure 24). However there is considerable distance between these two monitoring locations and the Company do irrigate to land further up the catchment, on both sides of the Stream, thus the slight increases may not be solely an effect of the waste burial consent.

This consent is under renewal at this time and additional investigations have been undertaken by a third party consultant as part of this renewal process. The investigations did not indicate that the elevated ammonia within the groundwater in the specific location of the burial pits was adversely impacting the Inaha stream.

To place a culvert in the Inaha stream (6431-1)

No environmental effects were noted from the exercise of this consent in this monitoring period.

To take and use groundwater for industrial water supply (9756-1)

The abstraction of groundwater was undertaken during this period. The daily limit was complied with for the duration of the monitoring period and data was provided as required.

A malfunction of the pump which drew water from the Inaha stream resulted in less cooling water available for plant processes. This in turn led to an increase in the exhaust gases to a specific bio-filter which in turn led to odour impacts.

Two new pumps have been sourced to prevent this from occurring in future.

To discharge emissions in to the air from the burning of pallets, paper and cardboard (10054-1)

Minimal effects were noted from the exercise of this consent.

3.3 Site developments

TBP are aware that their actions are causing effects to groundwater, in the irrigation areas and surface water, in the case of the western tributary. In order to mitigate these effects TBP is developing its wastewater system. The development will see a reduction in water usage around the facility, with process wastewater planned to be filtered and then further processed through reverse osmosis. The aim is to reuse water within the site process, with the main goal being the gradual reduction in the requirement to discharge to land or surface water in the long term.

By undertaking a gradual reduction in the requirement to discharge to land and water the company will be able to better balance irrigation of wastewater to land. In the past three years the loading rates have observed a better balance. For context 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 the 2016-2017 monitoring period the highest total loading was found to be paddock 23, with 264 kg N/ha. The 2017-2018 monitoring period reported one paddock in excess of 300 kg N/ha with a value of 306 kg N/ha. In the period covered by this report four paddocks were in excess of 300 kg N/ha.

Included in this refinement of irrigation is the gradual reduction in the fertiliser (stickwater). It is planned to eventually reprocess this fertiliser, which will negate the requirement to apply to land.

Currently six resource consents are being renewed, these require an assessment of effects which will seek to further mitigate well understood effects of the exercise of these consents.

Emissions to air were also a cause for complaint throughout the monitoring period. The reason for the odour impacts, which were treated with enforcement from the Council this monitoring period (on four confirmed occasions), is understood. The Company undertook the biennial audit of odour control systems and the recommendations of this audit will be put into effect. Progress is apparent, though when there is a malfunction, impacts to air are evident. The continued effort to evolve in this area is paramount moving forward.

3.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 39-52.

Table 39 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 (2049-4)***		
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	Yes
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 of monthly monitoring of effluent for nitrogen. Some monitoring in management plan undertaken by Council	Yes
6. Minimum discharge dilution rate	Monitoring results	Yes
7. No discharge of stickwater, and consult with Council before increasing cow herd	Site inspection	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 28 May 2019	Yes

Purpose: *To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream (2049-4)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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
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	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 40 Summary of performance for consent 2050-4

Purpose: *To discharge cooling water to Inaha tributary (2050-4)*		
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	No Ammonia in cooling water Section 2.3.2
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	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 consent under renewal
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 41 Summary of performance for consent 2051-4

Purpose: *To take water from the Inaha Stream for a rendering operation (2051-4)*		
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	Review of data	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	Not required under consent renewal
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 42 Summary of performance for consent 5426-1

Purpose: *To discharge stormwater to Inaha tributary (5426-1)*		
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 compliance with this consent condition	Yes
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	Not required consent under renewal
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 43 Summary of performance for consent 4058-4

Purpose: *To discharge emissions to air (4058-4)*		
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. Audit undertaken in March and April 2019, recommendations to be implemented	No Complaint inspections identified non-best practice on one occasion and four breaches of odour permit
2. No offensive or objectionable odour beyond boundary	Odour surveys undertaken by Council during inspections and by TBP. Further investigations were undertaken in respect of complaints received from the public. Seven odour complaints were received this period of which four were substantiated. Four infringement notices and a letter of explanation sent	No Four confirmed objectionable odour incidents
3. Definition of noxious, offensive or objectionable odour		N/A
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 26 March and 3 April 2019	Yes
7. Preparation of Air Discharge Management Plan	Submission of Plan, on 3 July 2012, reviewed plan received 28 May 2019	Yes
8. Operation in accordance with Air Discharge Management Plan	Inspection by Council	No Odour impacts identified
9. Annual review of Air Discharge Management Plan by 31 May	Liaison. Reviewed by TBP and submitted to Council 28 May 2019	Yes
10. Limits on dust deposition rate	Inspections disused dust in the JTL, no specific dust monitoring undertaken	N/A
11. Newsletter production, and community liaison meetings	Newsletter produced. Community liaison meeting held 22 May 2019	Yes

Purpose: *To discharge emissions to air (4058-4)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
12. Optional review provision to deal with significant adverse effects	Recent audit undertaken in March 2017. Recommendations to be implemented	
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Poor** **Good**

Table 44 Summary of performance for consent 3941-2

Purpose: *To discharge treated wastewater to land (3941-2)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Irrigation to defined area	Inspection by Council	Yes
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 22 May 2018	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 through filtration, pending	Yes
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 on 1 of 4 occasions sampled	No
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

Purpose: *To discharge treated wastewater to land (3941-2)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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	Yes
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	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
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 Ranagatapu Marae 27 October 2018	Yes
21. Notification prior to Inaha discharge	Imposed by review of 21 December 2005. Liaison with TBP and Ngati Manuhiakai	Yes

Purpose: *To discharge treated wastewater to land (3941-2)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
22. Provisions for contamination of groundwater or water supply	Monitoring and sampling of groundwater	Significant nitrate impacts in groundwater identified and communicated to TBP in previous monitoring periods. Four wells contain NNN concentrations greater than 55 g/m^3. Elevated Nitrogen in Western Tributary. Remedial actions undertaken by TBP. Suitably qualified Environmental Consultant engaged and aiding in wastewater management. Ongoing for two years. Still ongoing
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	Consultant appointed
25. Optional review provision for nitrogen treatment and disposal	Review not required at this stage, consent set for renewal in 2018-2019 period	Consent under renewal
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 45 Summary of performance for consent 5495-1

Purpose: *To discharge wastes from meat rendering by burial (5495-1)*		
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
2. Waste burial management plan to be followed	Inspection by Council, and review of TBP records. No burial undertaken in this monitoring period	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, no burial undertaken in this monitoring period	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, no burial in this monitoring period	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, currently five bores active, while five bores have been destroyed. Three additional bores required	No
17. Optional review provision for operational requirements	Not sought by TBP	N/A

Purpose: *To discharge wastes from meat rendering by burial (5495-1)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
18. Optional review provision for environmental effects	Due to expire 1 June 2019. Renewal currently on going	Not required Renewal currently on going
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 46 Summary of performance for consent 6431-1

Purpose: *To place culverts in Inaha Stream (6431-1)*		
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

Purpose: *To place culverts in Inaha Stream (6431-1)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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 47 Summary of performance for consent 7234-1

Purpose: *To disturb and realign Inaha Stream (7234-1)*		
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

Purpose: *To disturb and realign Inaha Stream (7234-1)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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 48 Summary of performance for consent 7329-1

Purpose: *To discharge stormwater and sediment from re-contouring land and realigning Inaha Stream (7329-1)*		
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
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 49 Summary of performance for consent 9756-1

Purpose: *To take and use groundwater for industrial water supply (9756-1)*		
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
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 50 Summary of performance for consent 10054-1

Purpose: *To discharge emissions into the air from the burning of pallets, paper and cardboard (10054-1)*		
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

Purpose: *To discharge emissions into the air from the burning of pallets, paper and cardboard (10054-1)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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
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 51 Company consent compliance table 2018-2019

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	High	High
2050-4	To discharge cooling water to Inaha tributary	High	High
5426-1	To discharge stormwater to Inaha tributary	High	High
4058-4	To discharge emissions to air	Poor	Good
3941-2	To discharge treated wastewater to land	Improvement required	High
5495-1	To discharge wastes from meat rendering by burial	Good	High
6431-1	To place culverts in Inaha Stream	High	High
7234-1	To disturb and realign Inaha Stream	Not exercised	

Consent Number	Description	Environmental compliance	Administrative performance
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 52 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	

Year	Consent no	High	Good	Improvement req	Poor
	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	
	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	
	3941-2			1	
	5495-1		1		
	6431-1	1			
	9756-1	1			
	10054-1		1		
2016-2017	2051-4	1			
	2049-4		1		
	2050-4	1			
	5426-1		1		
	4058-4			1	
	3941-2			1	
	5495-1	1			
	6431-1	1			
	9756-1	1			
	10054-1	1			
2017-2018	2051-4		1		
	2049-4		1		
	2050-4	1			

Year	Consent no	High	Good	Improvement req	Poor
	5426-1	1			
	4058-4		1		
	3941-2			1	
	5495-1	1			
	6431-1	1			
	9756-1	1			
	10054-1	1			
Totals		30	20	17	2

During the year, TBP demonstrated an improvement required level of environmental and good level of administrative performance with the resource consents as defined in Section 1.1.4.

3.5 Recommendations from the 2017-2018 Annual Report

In the 2017-2018 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at TBP in the 2018-2019 year continue at the same level as in 2017-2018 with the inclusion of surface water monitoring site INH000450 to the four monitoring rounds of surface water planned for the upcoming period.
2. THAT groundwater monitoring well integrity testing should be undertaken to make sure the groundwater is not adversely affected from a compromised monitoring well. Certain wells have reported E-Coli in this monitoring period.
3. 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.

Recommendation 1 was undertaken.

Recommendation 2 was not undertaken.

Recommendation 3 was not required.

3.6 Alterations to monitoring programmes for 2019-2020

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 2019-2020 monitoring period that the monitoring of the Company site remain unchanged from that undertaken in the 2018-2019 monitoring period.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site 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 2019-2020.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at the TBP facility in the 2019-2020 year continue at the same level as in 2018-2019
2. THAT should there be issues with environmental or administrative performance in 2019-2020, 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 25°C and expressed in µS/cm.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m^3s^{-1}).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
D/s	Downstream.
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/$metre^2$/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.
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.
MPN	Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample.
NZMWG	New Zealand Macroinvertebrate Working Group.
µS/cm	Microsiemens per centimetre.
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).
Pb*	Lead.
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.
T/h	Tonnes per hour.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
U/s	Upstream.
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 a Science Services Manager.

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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)

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

Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

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. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

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

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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 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

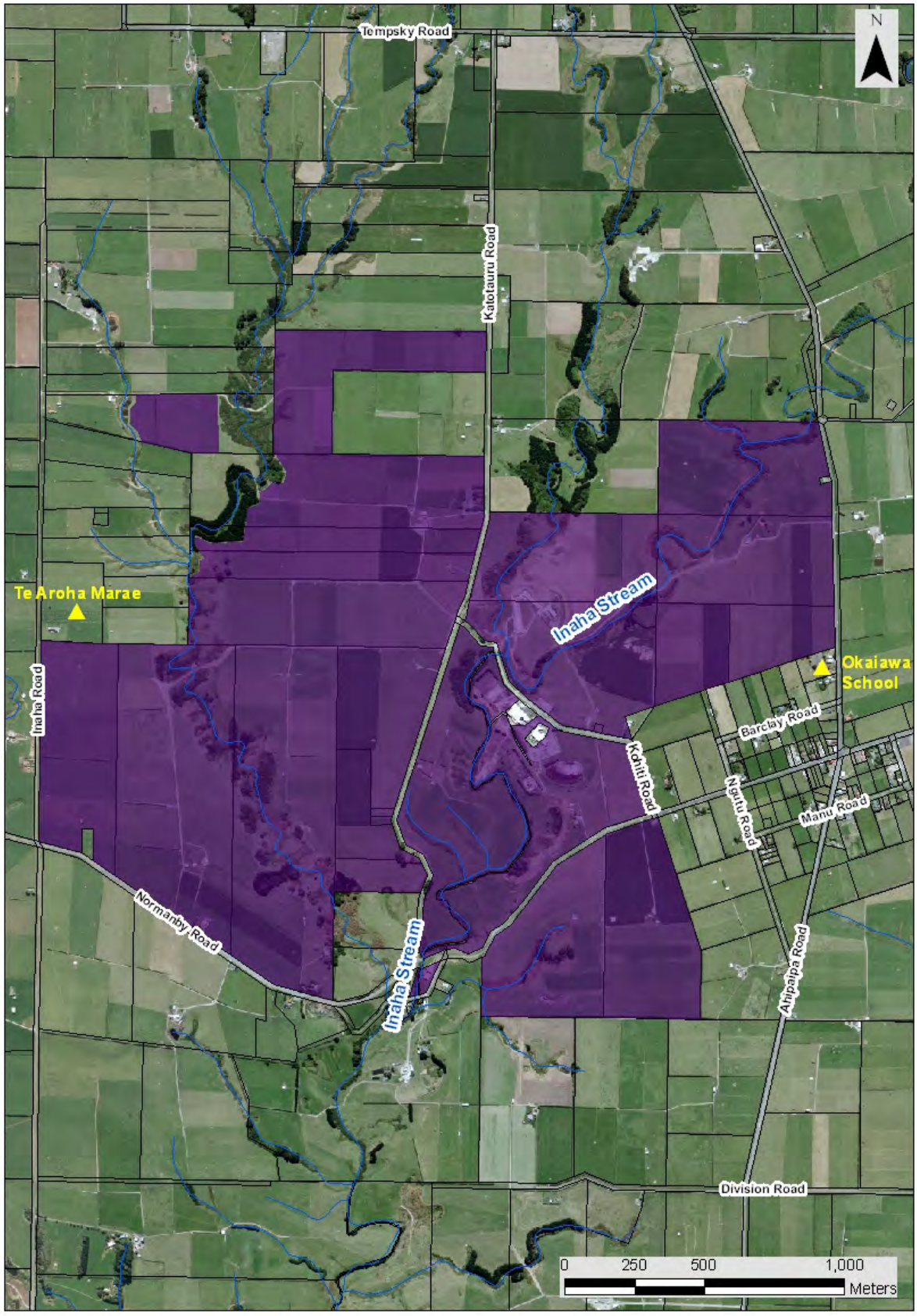

Figure 1 Location of the authorised area to receive wastewater, via spray irrigation, onto and into land

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

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

_____

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

Biennial audit odour control systems consent 4058-4 condition 6.

REPORT

TBL Audit Report - Odour Control System Audit 2019

Taranaki By-Products Limited

Submitted to:

Paul Drake
PO Box 172
Hawera 4640

Submitted by:

Golder Associates (NZ) Limited
Level 1, 214 Durham Street, Christchurch 8011, New Zealand

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1530864-7403-005-R-Rev0

May 2019

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FIGURES

APPENDICES

1.0 INTRODUCTION

This report 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 26 March and 3 April 2019, 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 collection of temperatures and flows, analysis of site data and report preparation was supported by Matthew Wilson (Air Quality Consultant, 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. Matthew has qualifications of a BSc in Chemistry and has over 6 years environmental experience in industry and consultancy.

4.0 AUDIT APPROACH

This audit repeats the engineering review of ducts and biofilters as per previous audits by Golder in 2013, 2015 and 2017. 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

This section restates the rendering processes operated by TBL and TBE as described by Golder (2017) and notes changes made since that time.

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. They have separate surge bins, pre-cookers, solids press, dual decanters, shared tallow recovery plant (liquid phase tank and three tallow separators), and three shared indirect steam dryers (TST-100, TST-100 and TST150) and 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.
- Two waste heat evaporators (WHEs) are operated and receive hot dryer exhaust streams from the chicken, blood processing and bovine rendering lines to evaporate and concentrate the stick liquor streams. Note the third WHE is used as a second effect evaporator, i.e., using the vapours generated from the evaporation of stick liquor water in WHE 1 and 2 to drive further stick liquor evaporation (see Figure 1A, Appendix B).

5.3 Taranaki Bio-Extract

TBE operates an edible (food grade) gelatine bone chip recovery plant that nominally processes 160-180 tonnes/day of bone and associated material and includes the following process stages.

- Melting plant (holding 20 tonnes 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 (TST 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 systems that are operated by TBL are summarised below.

Point Source Extraction System (PSES): The TBL site operates a point source extraction system (PSES) that targets concentrated odour sources across all rendering lines (i.e., the two bovine, chicken and feather rendering lines and associated tallow recovery and meal processing plants). See Figure 1, Appendix B.

This has been upgraded since the 2017 audit. The extraction is now driven by a 2-stage fan system (TBL concentrated sources fan #1 and #2). The first fan pulls the concentrated sources air stream and non-condensable gases (NCGs) (i.e., associated with the meal dryer exhausts) and pushes this combined flow through to the 2-stage water spray scrubbing tower. The second fan helps pull the mixed flow through the scrubbers and has the primary role of pushing the cooled concentrated sources air through to the TBL concentrated source biofilter.

The water scrubber system's primary function is to pre-cool the mixed concentrated sources and NCG stream.

The concentrated sources duct has two sub-manifolds – a 600 mm diameter duct that has connections to the two bovine lines and a second branch with connections to chicken line concentrated 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 its 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 meal bin

- Bovine meal discharges exiting the mill cyclones
- **Upgrade to the PSES:** The TBL PSES is expected to have a higher concentrated sources flowrate than in 2017 due to the new dual concentrated source fan system. This system was designed to enable a total flow of up to 30,000 m^3/hr of air against a 2.5 kPa system back pressure (duct losses + biofilter). However, the PSES still allows for significant fugitive process emissions, which will be significantly improved once the cooling system upgrade allows it to be operated at higher airflow extraction rate. These fugitive emissions are effectively collected by the building air system, which subsequently exhibits a relatively high air flow temperature.

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 hot non-condensable dryer exhaust gases (NCGs) that are drawn into the 2-stage water scrubber system via the new 2-stage fan system (see Figure 1A, Appendix B).

Cooling Upgrade: This 2-stage scrubber system is currently supplied with cooling water from the final wastewater treatment pond at the site. Therefore, the evaporative cooling from the pond surface restricts the scrubbers cooling duty and this is subject to increased cooling duty from the upgraded TBE concentrated sources cooling circuits. As such, TBL are planning to install additional scrubber water cooling capacity, via a new cooling tower to enable indirect cooling of recirculating scrubber tower water, via a shell and tube heat exchanger.

Blood Room and Bovine Meal Bins: The blood processing room is well sealed and blood dryer exhaust extracted to WHE #2 with the chicken dryer exhaust stream. Scrubbed building air from the blood room and bovine meal bins are co-extracted by the Factory Air extraction system as shown in Figure 2, Appendix B.

Building Air Ventilation: TBL have modified the Factory Air 1 and 2 systems so they act as a common building air extraction system (including the fallen stock pre-breaker bin). This new arrangement is shown in Figure 2, Appendix B.

Concentrated Sources Cooling: The TBL concentrated sources cooling system has been described above. This effectively consists of the WHE plant and the 2-stage water scrubber towers shown in Figures 1A and 1, Appendix B.

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 Biofilter: This biofilter consists of a 1.2 m deep bark bed with 3 cells of 30 m x 40 m (4,300 m^3 media in total). The inlet air flow was measured at 86,000 m^3/hr at 46 °C during the audit. This infers a biofilter bed loading rate of inlet air at 20 $m^3_{air}/hr/m^3_{media}$. This is also the recommended maximum loading rate for bark-bed biofilters used to treat warm concentrated sources air (i.e., around 40 °C). It is considered that the Factory Air #1 air flow is relatively warm and humid compared to normal building air flows and this is indicative of the high level of fugitive process emissions within the TBL rendering building. The temperature of 46 °C is surprisingly high and should be checked.

The Factory Air #2 Biofilter: This biofilter consists of a 1.5 m deep bark bed with a total area of 30 m x 25 m (1,125 m^3 media in total). The inlet flow to this bed was measured at 59,000 m^3/hr and 39 °C during the audit. This infers a biofilter bed loading rate of inlet air at 52 $m^3_{air}/hr/m^3_{media}$. This is well above the guideline value of 20 $m^3_{air}/hr/m^3_{media}$ for bark-bed biofilters treating concentrated source. However, this is a reasonable rate for treatment of building air. As noted from the previous audits (Golder, 2017), this flow has a small rise in temperature between the fan inlet and discharge. During the audit the air temperature within the lateral was

measured 40 °C. The discharge of untreated air along one side of the bed that was identified in 2017 has been resolved with addition of more bark to the bed.

TBL Concentrated Sources Biofilter: This TBL concentrated sources biofilter consists of a 40 m x 30 m x 1.2 m deep bark bed (i.e., 1,440 m^3 media in total). The inlet flow to this bed was measured at 17,000 m^3/hr and 37 °C during the audit. This infers a biofilter bed loading rate of inlet air at 12 $m^3_{air}/hr/m^3_{media}$. This is a low loading rate and the total flow has not changed despite the upgrade to the concentrated sources fan system. It is our view that the flow needs to be restricted to this level until more cooling of the concentrated sources flow can be enabled by via the planned new cooling tower for cooling the 2-stage scrubber water circuit.

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 direct gas-fired Duskie dryer's discharge fan is used to push dryer air through a dedicated water scrubber and biofilter bed system (TBE Duskie dryer biofilter). The Duskie fan also extracts/receives two process air streams that are discharged from two product separation cyclones.

A separate PSES is used to extract concentrated sources and the indirect steam dryer exhaust flow (see Figure 3 and Figure 4, Appendix B). The PSES arrangements for targeting concentrated sources, the steam and gas-fired dryers were installed post the 2017 audit. This includes a new concentrated sources fan that receives the TST dryer exhaust and other process concentrated sources and discharges the combined flow to a dedicated biofilter.

Concentrated Sources Cooling: The various concentrated sources within the TBE process and the steam dryer exhaust air streams are now cooled via a shell & tube heat exchanger (steam dryer exhaust) and then dedicated water spray scrubber tower for cooling the mixed stream. This utilises water from the final wastewater polishing pond. Likewise, the Duskie dryer exhaust air flow is cooled via its own dedicated water scrubber tower that also utilises water from the final wastewater polishing pond.

5.6 TBE Biofilters

TBE Concentrated Sources Biofilter: This biofilter consists of a single raised soil-bark bed with a depth of 0.7 m and dimensions of 20 m x 25 m (i.e., giving 350 m^3 media). The bed treats the TBE concentrated air flow (TBE Duskie Dryer flow is segregated out from this now), which was measured at 6,000 m^3/hr during the 2019 site audit. This equates to a media air loading rate of 17 $m^3_{air}/hr/m^3_{media}$ which is below a recommended maximum loading of 35 $m^3_{air}/hr/m^3_{media}$ for treatment of concentrated sources via a soil-bark filter. The inlet air was measured at 33 °C and is saturated.

TBE Duskie Dryer Biofilter: This biofilter consists of a second single raised soil-bark bed with a depth of 0.7 m and dimensions of 20 m x 25 m (i.e., giving 350 m^3 media). The bed treats the Duskie Dryer exhaust air flow, which was measured at 19,000 m^3/hr during the 2019 site audit. This equates to a media air loading rate of 54 $m^3_{air}/hr/m^3_{media}$ which is above a recommended maximum loading of 35 $m^3_{air}/hr/m^3_{media}$ for treatment of concentrated sources via a soil-bark filter. The inlet air was measured at 38 °C and saturated.

6.0 PHYSICAL CONDITION OF THE PLANT

6.1 Air Extraction and Discharge Ducts

All process equipment, extraction ducts, cooling equipment, fans and biofilters were found to be in a good physical and functioning state as previously reported by Golder (2017).

The steel ducts that go from the TBL and TBE concentrated source extraction systems and fans are still in a good engineering condition.

The 1,200 mm diameter TBL Factory Air #2 (FA2) discharge duct (constructed in corrugated iron) continues to exhibit rust at its inlet to the FA2 biofilter bed. This duct is operating at a more reasonable pressure of 2.1 kPa compared 2017 (i.e., 3.3 kPa gauge).

The stainless steel 990 mm diameter TBL Factory Air 1 (FA1) discharge duct is in good condition and still exhibits minor corrosion at the point it enters the concrete access chamber (opposite the FA2 fan). This duct is operating at a reasonably high pressure of 2.7 kPa gauge (unchanged from 2017).

6.2 Fans

All concentrated source fans operated at TBE (one new fan and Duskie dryer fan) and TBL (new dual fan system), as well as the two TBL factory air fans are all operating without leaks and are well maintained. Since 2017, new fans have been installed at both TBE and TBL to bolster the containment of concentrated sources at each plant.

6.3 Cooling Equipment

All of the concentrated and dryer exhaust air stream cooling systems are in very good working order. This plant includes:

- the TBE concentrated source single stage water scrubber and shell & tube heat exchanger that cools the TST dryer exhaust.
- the TBL 2-staged water scrubber for cooling concentrated sources, the vapour condensing convective air cooler for 2nd effective WHE #3, blood room scrubber; and
- All associated water supply and scrubber recirculation pumps and associated pipework.

It is noted that concentrated source cooling capacity is insufficient at TBL and subsequently there are plans to install a new cooling tower to support the 2-stage scrubber system.

6.4 Biofilters

In this section the physical state of the five biofilters including support structures, pipework and bed media are discussed.

TBL Concentrated Sources: This biofilter is an in-ground type system with earth walls that is a southern cell extension to the FA1 bark biofilter (Figure 1). The high level of airflow variation across the bed surface that was identified during the 2017 audit was far less apparent in 2019. The inlet pressure of 1.4 kPa is slightly lower than that measured 2017, which is in line with slightly lower air flow loading to the bed of 12 $m^3_{air}/hr/m^3_{media}$. This is a high pressure drop for this loading rate and is a result of high heat and moisture

loading to the bed. As such the bottom layer of the bed was very wet, compacted and broken down. This needs replacement with similar bark to the new 500 mm top layer of the bed. When additional cooling is installed at the 2-stage scrubber and this bed is remediated then approximately twice the current concentrated source flow rate could be effectively treated.

Figure 1: Photograph of the TBL concentrated source biofilter (April 2019).

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 were not visible across the bed surface as observed in 2017.

The inlet duct pressure was measured at 2.7 kPa (unchanged from 2017) and is very high given the moderate bed air loading rate of 20 $m^3_{air}/hr/m^3_{media}$. The bed has a Magnehelic pressure gauge connected the end of the lateral within the bed and this showed a media pressure of 0.7 kPa. The media is in reasonable condition and is not excessively wet, which is in line with the lateral pressure. This suggests that the inlet duct pressure of 2.7 kPa could be due to water logging within the air inlet manifold system or the laterals. This aside, the bed is effectively removing odour from TBL rendering building air at 86,000 m^3/hr.

Figure 2: Photograph of the TBL Factory Air #1 biofilter (April 2019).

Factory Air #2: The inlet duct pressure to the FA2 biofilter has reduced to 2.1 kPa and down from 3.3 kPa measured during the 2017 audit, and 4.0 kPa (measured in 2015). This current inlet duct air pressure is especially low when considering the 55 % increase in the inlet air flow from 38,000 m^3/hr (2017) to 59,000 m^3/hr in 2019. This results in a bed loading rate of 52 $m^3_{air}/hr/m^3_{media}$. Overall the bed is in good shape and is operating effectively.

TBE Duskie Dryer: The Duskie dryer biofilter has sections of old broken-down media. This is a very fine composted material, which needs discarding. The bottom layer of media is very wet due to high moisture loadings from the Duskie exhaust. There is a large flow of water associated with the cooled Duskie dryer exhaust flow that enters the concrete chambers at the northern end of the bed (see Figure 3 below). This indicates there may be excessive carry over of scrubber water that is sprayed into the top of the tower. The inlet pressure of 1.7 kPa is on the high side (ideally <1.5 kPa) and indicative of the high bed air loading rate of 54 $m^3_{air}/hr/m^3_{media}$ as well as the high moisture content within the bed media. Removal of the product cyclonic air flows from the inlet to the Duskie exhaust will help reduce the bed loading and potential for scrubber water carry over.

TBE Concentrated Sources: The TBE concentrated sources biofilter also contains sections of old broken-down media, which needs discarding and replacement with new bark. The sections of media that are relatively new and in good state, are not overly wet as is the case for the Duskie biofilter bed. The inlet pressure of 0.3 kPa is low and a result of the low bed air loading rate of 17 $m^3_{air}/hr/m^3_{media}$ as well as maintaining an appropriate moisture content within the bed media. Addition of the cyclonic air flows (removed from the inlet to the Duskie exhaust) can be readily accommodated by this bed.

Figure 3: Leachate sump for TBE concentrated source biofilters showing large inlet flow.

7.0 INSTRUMENTATION

At the time of the 2019 audit, TBL had installed replacement industrial grade temperature and pressure gauges throughout the concentrated sources system. These replace existing gauges that have been previously checked by Golder in 2017 using a Fluke 50D thermometer and the Dwyer digital manometer (Model AQTI-WDPM-005). Concentrated sources temperature gauges were compared to Golder's Fluke meter during the 2019 audit. Temperature gauges were typically within 0.6 °C of the Fluke, and a few were within 4.0 °C.

As per recommendations made previously by Golder (2017), this audit confirmed that TBL have now installed industrial grade pressure/vacuum gauges to allow for more routine checks upon biofilter bed pressure drops. These Magnehelic type gauges are installed into the end of laterals and so measure lateral plus media air pressure drops. We also recommend stainless or plastic tubing 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 routine media pressure drop measurements.

Industrial grade gauges have also been installed on the TBL concentrated sources system to enable fan and scrubber pressure drops to be monitored. Many of these pressure gauges instruments have since seized up and need replacement. It is understood that TBP suspect the vibration of the ducts within the concentrated source system is the cause of the failures. From our audit, it appeared many of these dials were inundated with water and which suggests the use of pigtails between the duct and dial maybe necessary to protect the gauges from water damage. Many of the existing pressure and temperature gauges with the TBL concentrated sources system are therefore not working and require replacement.

The TBE concentrated source and Duskie dryer extraction and cooling systems require pressure and temperature gauges to be installed both up-stream and down-stream of their respect scrubber towers.

8.0 DESIGN ASPECTS

8.1 Odour Extraction System

Taranaki By-Products: 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 enables far more effective control over fugitive rendering process emissions into the building. However, this capacity cannot be utilised for this purpose until additional capacity for pre-cooling the extracted TBL concentrated source and WHE NCGs is implemented.

Regarding the ventilation of the bovine meal dryer exhaust streams, it was noted during the audit that the common duct for Dryer 1 and 2 exhaust involved a section a reduced diameter that could exacerbate the loss of fugitive exhaust emissions. This is shown in Figure 4 below, where following the joining the two separate dryer exhaust ducts, there is a significant reduction in diameter, where in practice this should increase.

Figure 4: Bovine dryer 1 and 2 common exhaust duct.

The interconnected FA1 and FA2 building air system continues to effectively contain the building odour from the TBL rendering building. The elevated temperature of the building air extracted by the FA1 fan confirms this system is containing the fugitive emissions from the chicken and bovine rendering lines. This results in this building air exhibiting temperatures similar to pre-cooled concentrate sources, e.g., having a maximum temperature of 44 °C and 99.9th percentile temperature of 34 °C and 35 °C respectively for FA2 and FA1 over the 12-month period (see Table 1). The systems are now integrated therefore exhibiting almost identical temperature statistics.

Taranaki Bio-Extracts: Following the upgrade to the concentrated sources system since the 2017 audit, the TBE plant has room to significantly improve its concentrated odour sources extraction and treatment. During the 2019 audit, the total flow to the TBE concentrated source biofilter was only 6,000 m^3/hr. Even with the addition of helicone flows (currently connected to the Duskie fan inlet), this flow can be approximately doubled.

The enclosed area containing the raw material bin was identified as a source of significant odour (as per discussions with operational staff during the audit) in 2017. Some of the increased extraction flow (approximately 3,000 m^3/hr) can be allocated to this area, and the remaining capacity allocated to the new protein solids recovery building.

Upgraded PSES: The new configuration for separate extraction, cooling and treatment of Duskie dryer air and concentrated sources air from TBE is shown in Figure 3 (Appendix B) with suggested modifications. This arrangement should provide improved control of odours from TBE, which have not been an issue historically.

8.2 Cooling Systems

The data summarised in Table 1 indicates the degree of cooling imparted on the concentrated sources from TBE and TBL has been sufficient on most occasions (based on average values) during 2018 and up to February 2019. However, the 99.9th percentile temperatures are too high (i.e., 47 °C and 48 °C respectively for the TBE concentrated source, Duskie dryer and 58 °C for the TBL concentrated sources flow). As previously identified (Golder, 2017), these temperatures could be a result of reduced cooling water flow due to the suspended solids in the final wastewater pond blocking the pump intake filter or blocking the scrubber nozzles.

The addition of a new evaporative cooling tower will provide additional capacity for cooling TBL concentrated source and NCG flows (via the 2-stage scrubber system). This will also reduce the heat loading to the site's final wastewater pond, which will assist the performance of water scrubber cooling towers that are applied to the TBE Duskie dryer and concentrated source flows.

The potential for carry over of spray water within the Duskie dryer scrubber tower will be reduced with recommended changes to the helicone flow connections (Figure 3, Appendix B). Furthermore, a tuning of the Duskie dryer exhaust to recycle air flow balance should also be considered to optimise the dryer efficiency. This could also help resolve the carry-over of spray water with the exiting air flow and therefore improve the scrubbers cooling performance.

Overall, the design and configurations of cooling systems employed by TBE and TBL (i.e., spray water scrubbers, indirect shell and tube heat exchanges, and convective cooling fans) to cool concentrated source and NCG flows prior to biofilter treatment are appropriate. Increased use of evaporative cooling plant is a logical step to improve the performance of this existing concentrated sources cooling plant.

8.3 Biofilters

The building air and concentrated source biofilters employed by TBL are in-ground bed designs (FA1 and concentrated source) a simple above ground design with no walls for FA2. The first two beds types are most prone to water logging, however the slope of the beds and open ends on their western side should allow for good drainage. All of TBL beds use Novaflo type drainage pipes for air distribution and these are more prone to air-slot blinding and therefore relative high pressures within the air supply manifold. This is overcome at the site by the use of relatively large fans and correspondingly high electricity use.

The TBE biofilter beds are a more modern above ground design and less prone to water logging. These beds are now operated separately for hot moist dryer air and relatively dry concentrated sources air streams. Both are appropriate designs.

9.0 AIR FLOW DATA

The following Table 1 provides air flow rates measured by Golder in 2019 and 2017. Percentile values for flow temperature and pressure are obtained from TBL (Feb 2018 to 2019) and TBE's (July 2018 to Feb 2019) own daily records. Further data collected during the Golder 2019 and 2017 audits are summarised in Table 2.

Table 1: Biofilter Inlet Air Flows, 2019 with 2017 in brackets.

Biofilter	Source(s)	Flow rate (m^3/hr)	Inlet duct pressure (kPa)		Inlet air temperature °C	
		2019 Audit	Avg.#	99%ile+	Avg.#	99%ile+
TBE Conc. Source*	Concentrated sources and TST dryer exhaust	6,000 (14,000)	0.3	0.7	30	47
TBE Duskie dryer*	Duskie dryer exhaust and shaker screens	19,000 (ND)	1.2	3.1	36	48
TBL Conc. Source	Conc. sources, mills and dryer NCGs	17,000 (18,500)	1.1	1.7	40	58
TBL Factory Air 1	Rendering Building Air	86,000 (90,500)	3.1	3.6	34	44
TBL Factory Air 2	Rendering and Blood Building Air	59,000 (38,000)	2.2	3.8	35	44

** TBE measurements from July 2018 onward following change in configuration to separate systems installed for Duskie Dryer exhaust and concentrated source extraction, cooling and biofiltration. Prior to this date these streams were mixed and treated together.*

Table 2: Measured Air Stream Parameters 2019 and 2017 in brackets – Golder Data.

Location	Gauge Pressure (kPa)		Temperature (°C)		Humidity %RH	
TBL conc. sources 1st scrubber inlet before fan	-1.2		72		100	
TBL conc. sources 1st scrubber inlet after fan	-0.7	(-1.0)	74	(64)	100	(100)
TBL conc. sources 2nd scrubber inlet	-0.95		52	(55)	100	(100)
TBL conc. sources fan - Inlet Duct	-1.5	(-1.6)	40	(43)	100	(100)
TBL conc. sources fan – Outlet Duct (Opposite Sump)	1.4	(1.6)	37	(42)	100	(100)
Factory Air 1 Fan – Inlet Duct	-2.1	(-1.6)	40	(38)	42	(52)
Factory Air 1 Fan – Outlet Duct (Opposite Sump)	2.7	(2.7)	46	(42)	47	(52)
Factory Air 2 Fan – Inlet Duct (Opposite Sump)	-2.1	(-1.5)	33	(28)	60	(58)
Factory Air 2 Fan – Outlet Duct (Opposite Sump)	2.1	(3.3)	39	(38)	38	(58)
TBE conc. sources fan – Outlet Duct (River Crossing)	0.1		33		100	
TBE Duskie dryer fan – Outlet Duct (River Crossing)	0.75		38		100	

10.0 CONCLUSION AND RECOMMENDATIONS

Following Golder's 2017 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 generally maintained and operated in a sound engineering state. Design and remedial measures are recommended below.

10.1 Recommendations - TBL

- Increased use of evaporative cooling plant is a logical step to improve the performance of this existing concentrated sources cooling plant. Lack of cooling water is the key issue and restriction to the effective us of the existing biofilter systems at both TBL and TBE sites.
- The TBL concentrated source biofilter has significant redundant capacity for treating addition air flow. However, this can only be utilised once additional capacity for pre-cooling the extracted TBL concentrated source and WHE NCGs is implemented.
- The TBL PSES currently allows significant fugitive process emissions to occur, which will be significantly improved once the cooling system upgrade enables it to be operated at higher airflow extraction rate.
- The installation of pressure measurement lines that are open to atmosphere and terminate within the gravel/stone layer of each biofilter bed; located near existing inlet air manifold or lateral pressure Magnehelic gauges (on the outside wall of the bed); to enable routine media pressure drop monitoring and comparison to the inlet duct and lateral pressures.

- Many of the existing pressure and temperature gauges within the TBL concentrated sources system are not working and require replacement. These should be installed with pigtails to prevent water ingress.
- The bottom layer of the TBL concentrated sources biofilter bed (below 500 mm deep) needs replacement with similar bark to the top layer of the bed.

10.2 Recommendations - TBE

- The TBE concentrated sources biofilter is receiving a light air flow loading and therefore has capacity for increased extraction flow (by approximately 6,000 m^3/hr). This spare capacity can be allocated to air flows from the raw material reception room, the inclusion of helicone flows (currently connected to the Duskie fan inlet) and the new protein solids recovery building.
- There appears to be an excessive carry over of scrubber water from the Duskie dryer water scrubber tower. Optimisation of the Duskie recycle to exhaust air ratio following the disconnection of air flows from the two helicones is recommended as the first approach for resolving this issue.
- The Duskie dryer and concentrated sources biofilters have sections of old broken-down media. This is a very fine composted material which needs replacing with new media.
- For all site biofilters, installing tubing that allows for checks upon the media air pressure drop within the biofilter beds, as well as the duct and lateral side pressures in recommended.

11.0 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. July 2015

Golder 2017. TBP Audit Report – Odour Control System Audit 2017 - report prepared by Golder Associates (NZ) Limited for Taranaki By-Products Limited. Document No. 1578104138_003_R_Rev0. April 2017

APPENDIX A

Report Limitations

Report Limitations

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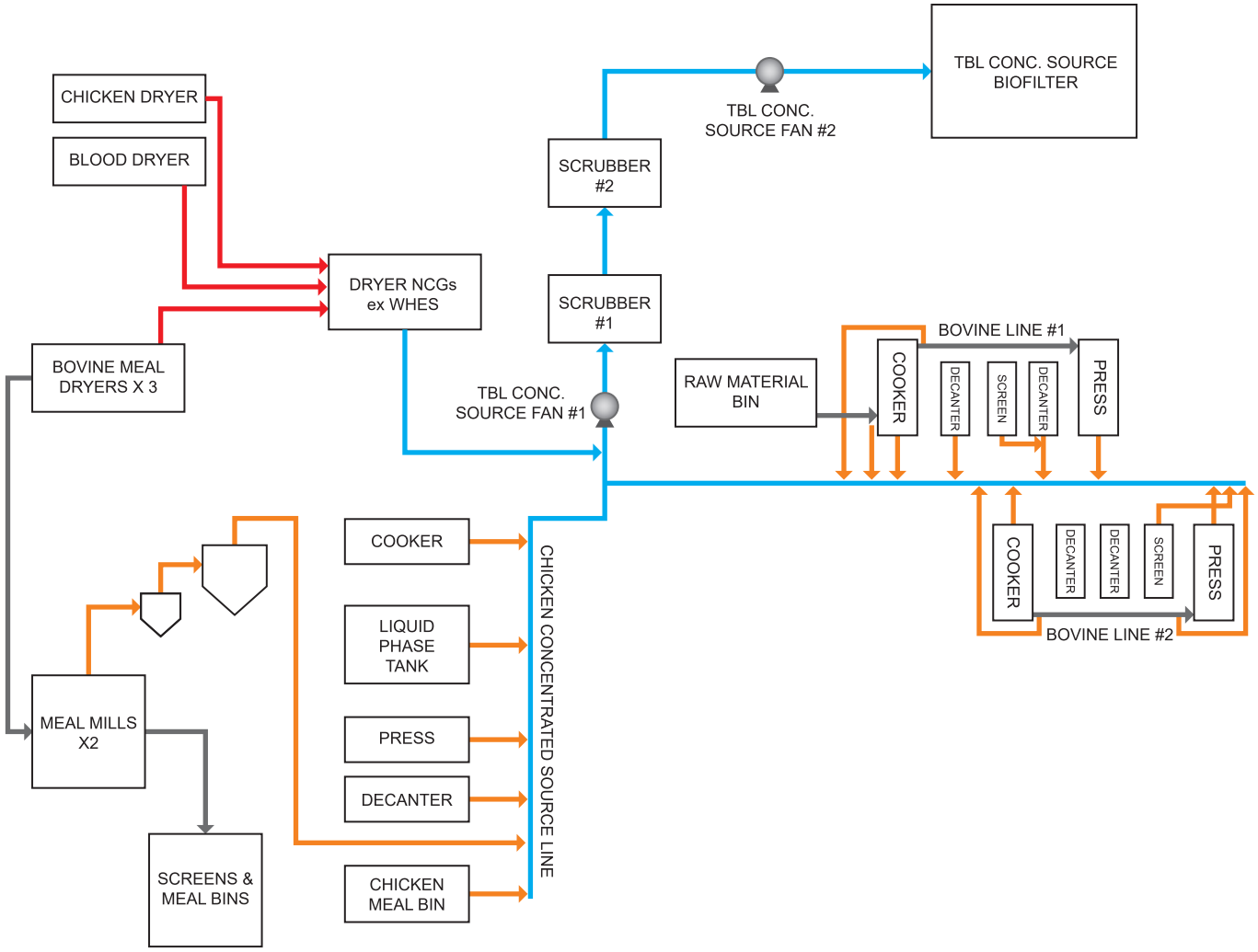
APPENDIX B

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 (2019)

TITLE
SCHEMATIC DIAGRAM OF POINT SOURCE EXTRACTION SYSTEM (PSES) FOR THE TBL BY-PRODUCTS RENDERING PLANT

CONSULTANT

GOLDER

YYYY-MM-DD	2019-05-30
PREPARED	AA/ZM
REVIEW	AE
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3

25 mm

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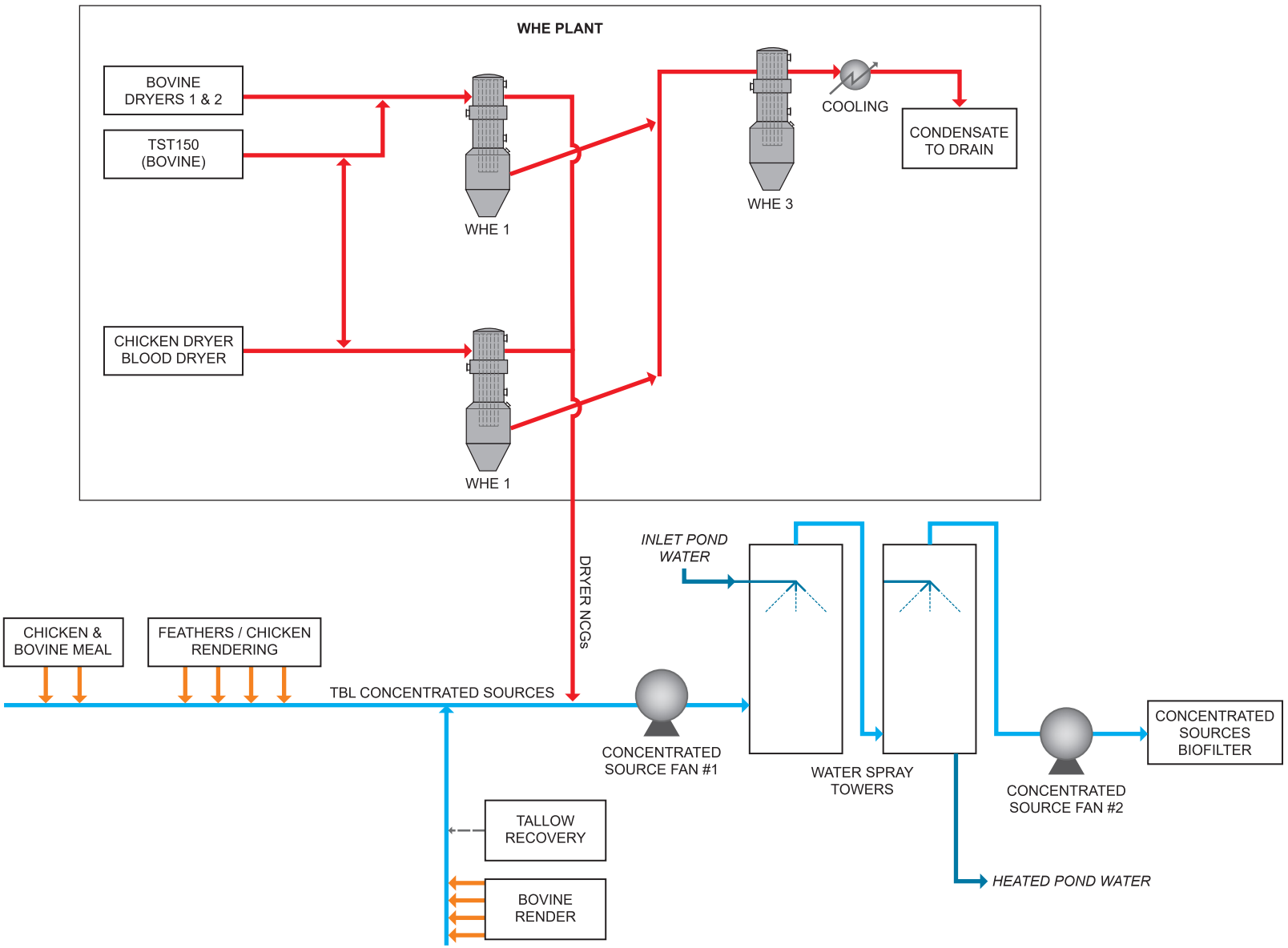

LEGEND

- Equipment items
- Cyclones
- 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 (2019)

TITLE
SCHEMATIC DIAGRAM OF CONCENTRATED SOURCES EXTRACTION (SHOWING DETAILS OF WHE'S & COOLING TOWERS)

CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-30
PREPARED	AA / ZM
REVIEW	AE
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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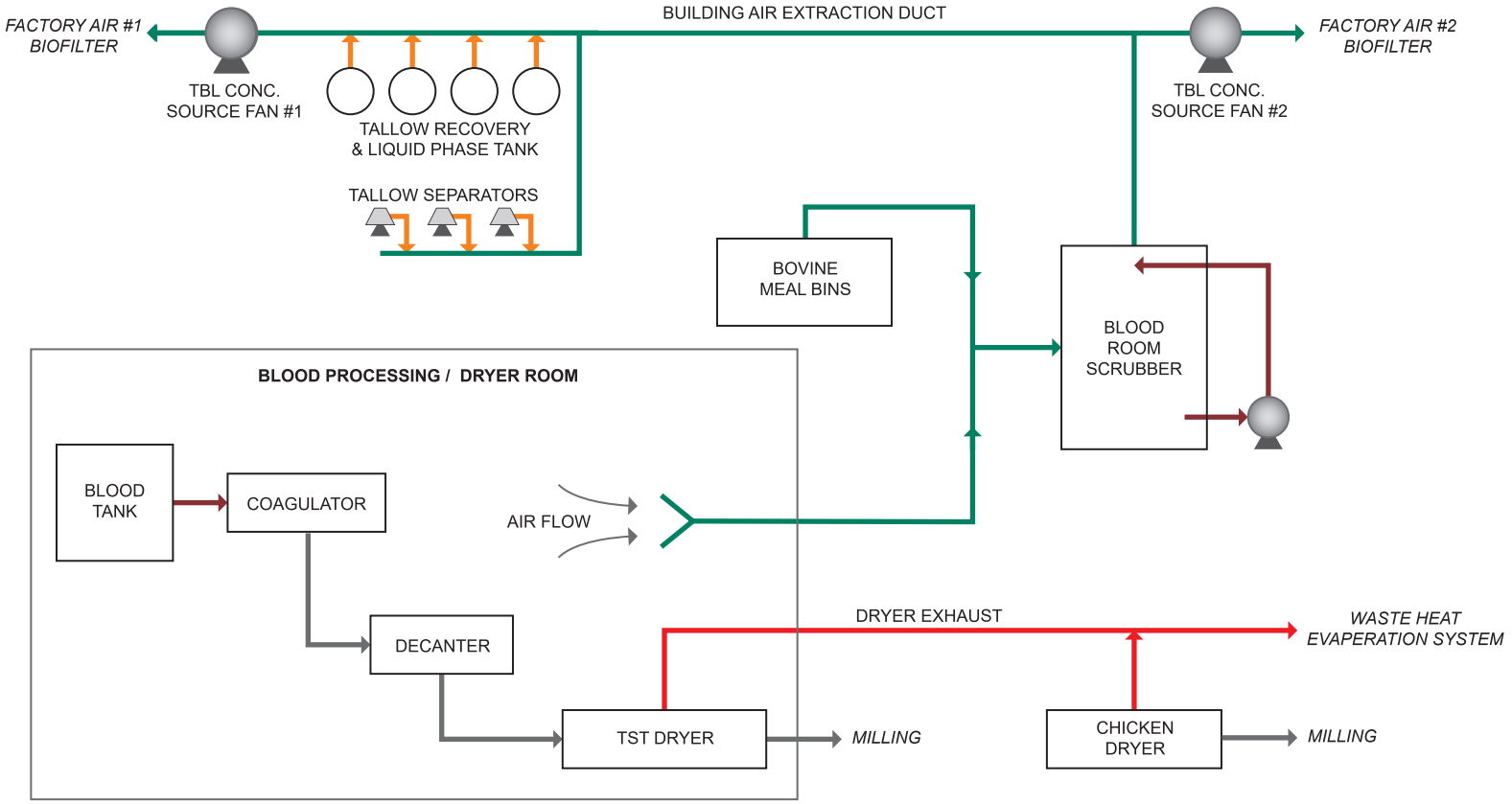

LEGEND

- 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

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CLIENT
TARANAKI BY-PRODUCTS

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2019)

TITLE
SCHEMATIC DIAGRAM OF TBL BUILDING AIR VENTILATION & BLOOD DRYER EXHAUST SYSTEM

CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-30
PREPARED	AA / ZM
REVIEW	AE
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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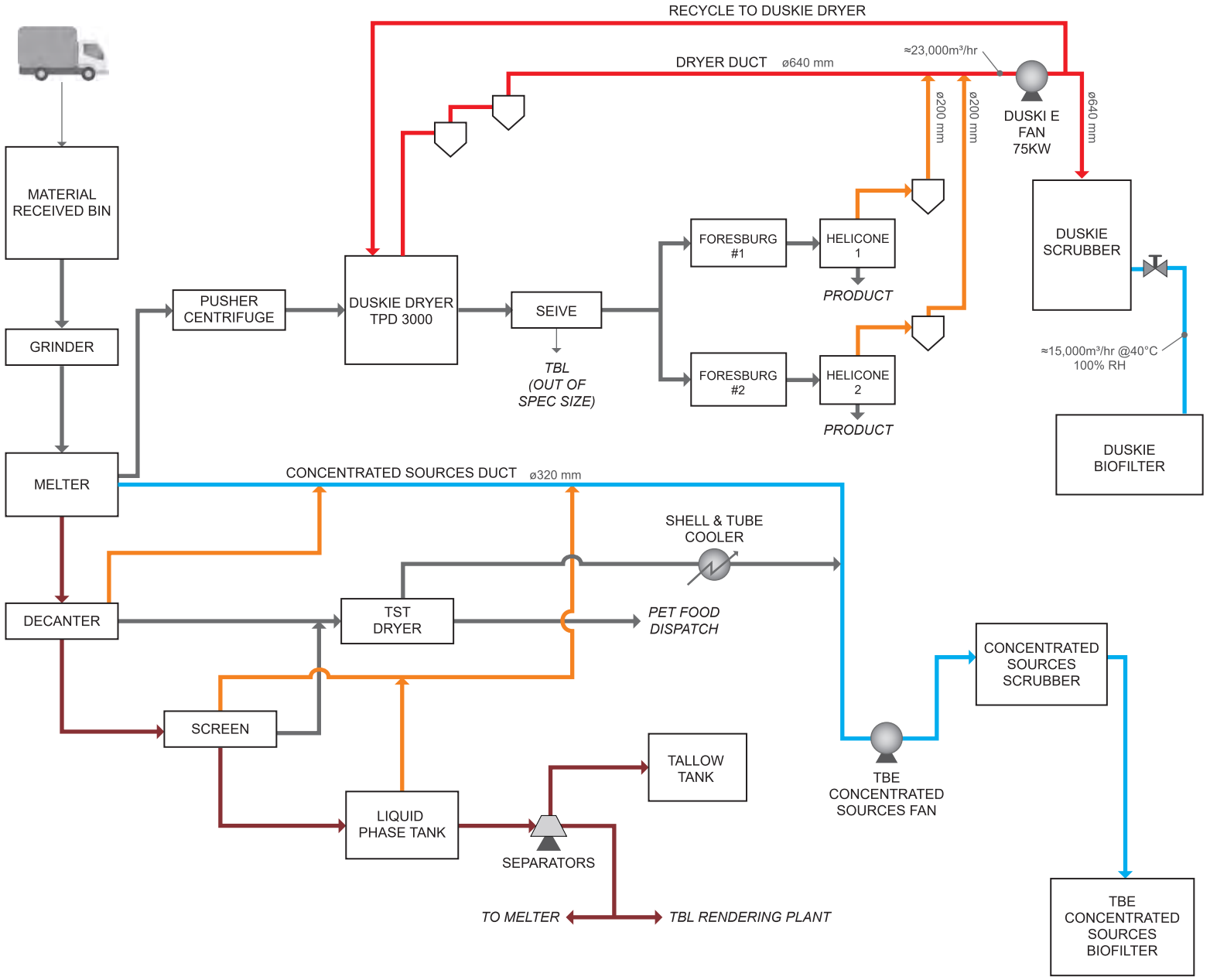

LEGEND

- 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

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CLIENT
TARANAKI BIO-EXTRACTS

PROJECT
ODOUR CONTROL SYSTEM AUDIT (2019)

TITLE
SCHEMATIC DIAGRAM OF POINT SOURCE EXTRACTION, COOLING AND BIOFILTER SYSTEMS FOR THE TARANAKI - EDIBLE EXTRACTS PLANT

CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-30
PREPARED	AA/ZM
REVIEW	AE
APPROVED	RC

PROJECT NO.	REPORT	REV.	FIGURE
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