Taranaki By-Products

Monitoring Programme

Annual Report

2020-2021

Technical Report 2021-91

Working with people | caring for Taranaki

Taranaki
Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

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Executive summary

Taranaki By-Products Ltd (TBP/the Company) 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), previously owned by TBP, also operate from the site.

During the monitoring period, TBP demonstrated an overall good level of environmental performance.

This report for the period July 2020 to June 2021 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company'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 the Company's activities.

TBP holds 10 resource consents, which include a total of 127 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, two consents to discharge emissions into air at the site, three consents to discharge to the Inaha Stream and a tributary, and two consents to discharge to land.

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, and groundwater surveys, and facilitates community engagement meetings.

The Council's monitoring programme for the year under review included 6 inspections, 119 water samples collected for physicochemical analysis, and two biomonitoring surveys of receiving waters. In addition, two community meetings were also held. Hapu engagement had been on-going with the Company as part of the consent renewal process. Though no specific Hapu meeting was held this year.

The monitoring showed that water abstraction from both the Inaha Stream and groundwater bore were again within compliance limits for the full monitoring year. Cooling water discharge analysis and Company provided analysis identified the bore water discharge contained measurable ammonia from the formation extracted water.

The ammonia from the bore water is likely contributing to increased nitrogen in the form of nitrate to surface water. This increase occurs irrespective of the facility discharging to land or water. The Inaha Stream was graded as attribute state C as defined by the National Policy Statement for Freshwater Management (NPS-FM). Whereby the facility is further increasing the concentration of nitrate nitrogen within the Inaha Stream by 1-1.5 g/m^3. While the increase of nitrate to surface water from the operation of the facility is contributing to the elevated nitrate, the Stream remains within attribute state C, as defined by the NPS-FM.

Biological monitoring of the Inaha Stream did not indicate any recent significant impacts from the Company operations, however a minor decrease in species was recorded at one site, below the discharge location within the Inaha Stream.

Surface water monitoring of the Northern tributary of the Inaha Stream indicated it does not achieve the national bottom line for nitrate nitrogen, as defined by the NPS-FM and was graded as attribute state C. The Western tributary remains below the national bottom line for nitrate nitrogen. However recent results suggest an improvement with a decrease in concentration, though it remains at attribute state D for nitrate nitrogen.

The stormwater discharge remains a source of measurable ammonia, *E.coli* and oxygen demand, while the bore water discharge contains measurable ammonia and oxygen demand. Both of these discharge into the fire pond, where there is also measurable nitrate recorded. The fire pond discharges into the Inaha Stream year round, irrespective of the flow conditions in the Inaha Stream.

The dilution rate of the wastewater discharge to the Inaha Stream was compliant for the duration of the discharge. The analysis of the oxygen and the sodium absorption ratio of the wastewater were compliant when assessed.

The application of wastewater and fertiliser to land was limited to below 250 kg N/ha across all irrigation paddocks. The combined volume of nitrogen discharged to land decreased by 3,983.75 kg N this monitoring period.

Groundwater monitoring indicated the concentration of nitrate nitrogen with the drinking water source, Te Koponga Spring, continues to decrease. Five monitoring wells have concentration of nitrate nitrogen in excess of 50 g/m^3, though they are beginning to plateau, which suggests the mitigation undertaken by the Company is starting to take effect. This also aligns were the reduction in elevated nitrate recorded in the Western tributary of the Inaha stream.

Emissions to the air this monitoring period drew two complaints from members of the public, however, no objectionable odour was recorded.

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

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% 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 remains at a good or high level.

This report includes recommendations for the 2021-2022 year,

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2020 to June 2021 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 29th 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 2021-2022 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' in as much 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 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% 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 more than 17 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 2015-2016 monitoring year, has been retained by the facility. However the collection and processing of poultry is limited to deliveries from within the Taranaki region.

Photo 1 Aerial imagery of Taranaki By-Products and Taranaki Bio-Extracts

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.

The facility is evolving its wastewater and stickwater discharge. In order to achieve this the Company has installed a vibratory shear enhanced processing technology (VSEP) within the TBE and TBP plants. The VSEP systems utilise membrane filtration system to provide filtration at varying grades to concentrate solids and associated contaminants, for reuse back in the processing plant. Significant investment was required to bring this on line.

The results of the system have significantly reduced the quantity of stickwater put to land and the facility is currently expanding the process to its wastewater discharge, whereby a reduction of 45% of the current wastewater produced is proposed when functioning.

In addition to the VSEP technology, the facility has also expanded its water recycling ability, in a bid to reduce water usage around the facility. The Company installed a reverse osmosis plant, this is to enable a portion of their wastewater stream, post VSEP, to be recycled and utilised in the Company boilers.

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. The 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.

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 2020-2021 monitoring year TBP engaged Golder Associates to undertake the certification of the process. This was the fourth occasion this certification of apparatus associated with odour control has been undertaken by Golder Associates.

1.3 Resource consents

The Company holds 10 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 in 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*
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				
2051-4.1	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
*indicates the consent is under the renewal process at present				

1.4 Monitoring programme

1.4.1 Introduction

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

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

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

1.4.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- 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 six 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. This included 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 1). The pond 6 discharge is either directly to the Inaha Stream under a 300:1 minimum 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 1). 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 1) 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 2) which may result in surface water interaction. Surface water analytes are provided in Table 4 also.

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-processable 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 2).

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

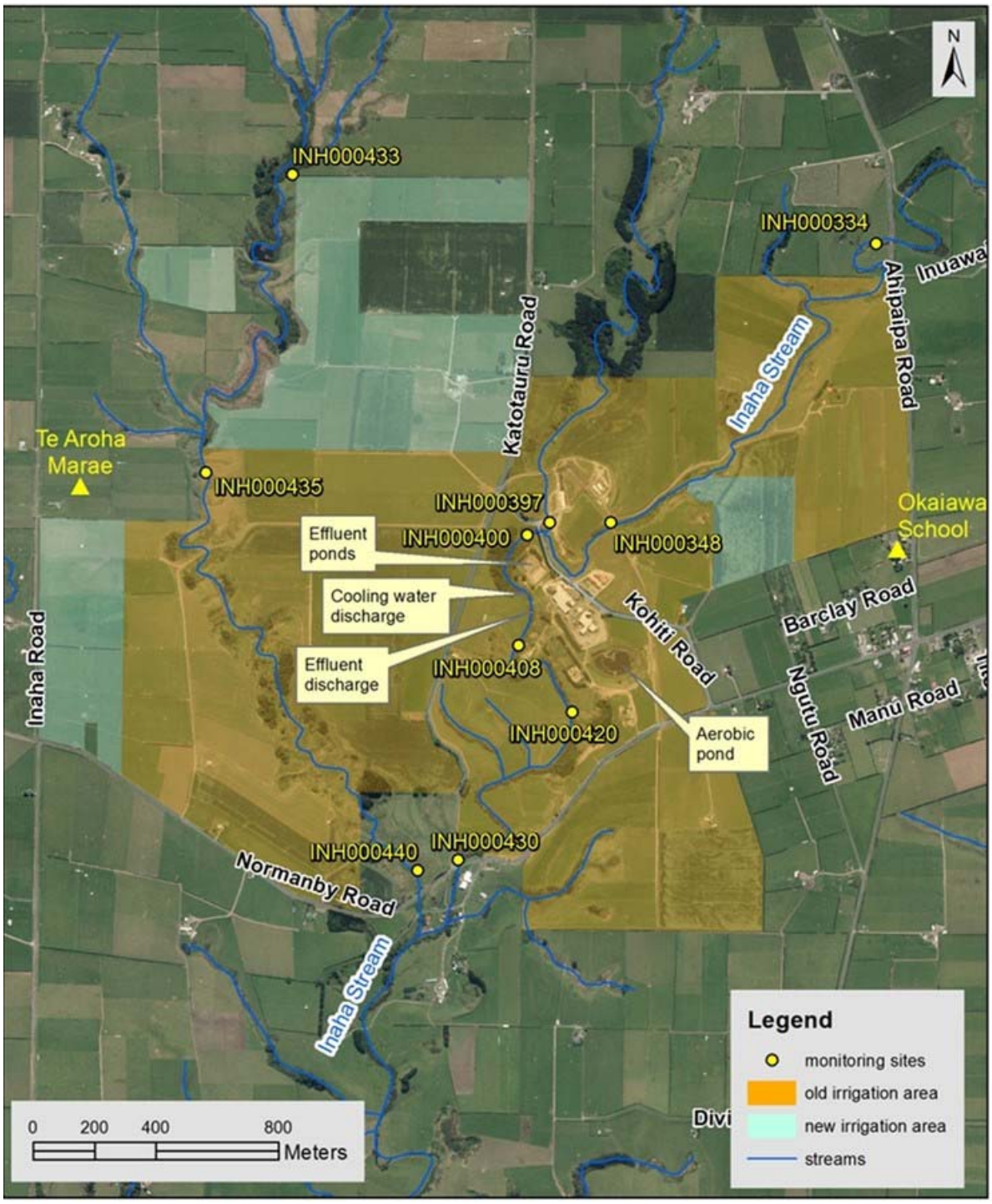

Figure 1 Inaha Stream and tributary surface water monitoring locations

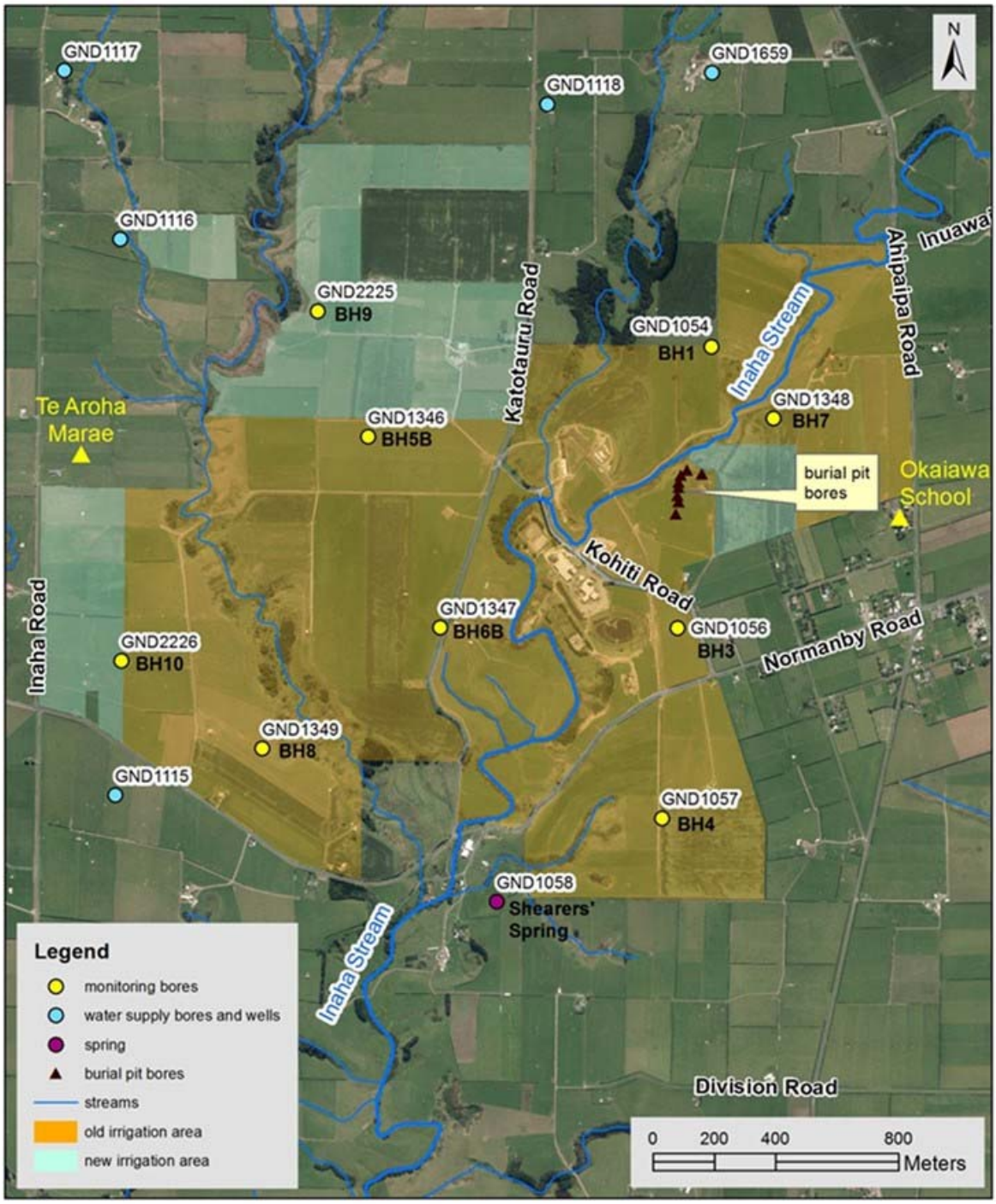

Figure 2 The locations of the associated groundwater monitoring wells

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 @ 25°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, \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 instream 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 prepared separately and are available on request.

1.4.6 Monitoring by Taranaki By-Products

The Company regularly supplies the Council with monthly reports. These reports provide information detailed in the irrigation management plan as required by consent 3941-1 condition 3. The monthly reports provide discharge information, including location, duration, stream flow (L/s), nitrogen wastewater strength, method of application and loading information.

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 six occasions during the 2020-2021 monitoring period as part of the annual monitoring programme.

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.

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 biennial 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). This is proposed to be a biannual meeting, to discuss odour both prior and post summer.

2 Results

2.1 Water

2.1.1 Inspections

Compliance monitoring inspections were undertaken on six occasions throughout the monitoring period. Inspections pertaining to water related matters were undertaken in conjunction with air quality inspections (Section 2.5.1).

The 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 if required.

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 Results of abstraction monitoring

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, 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.

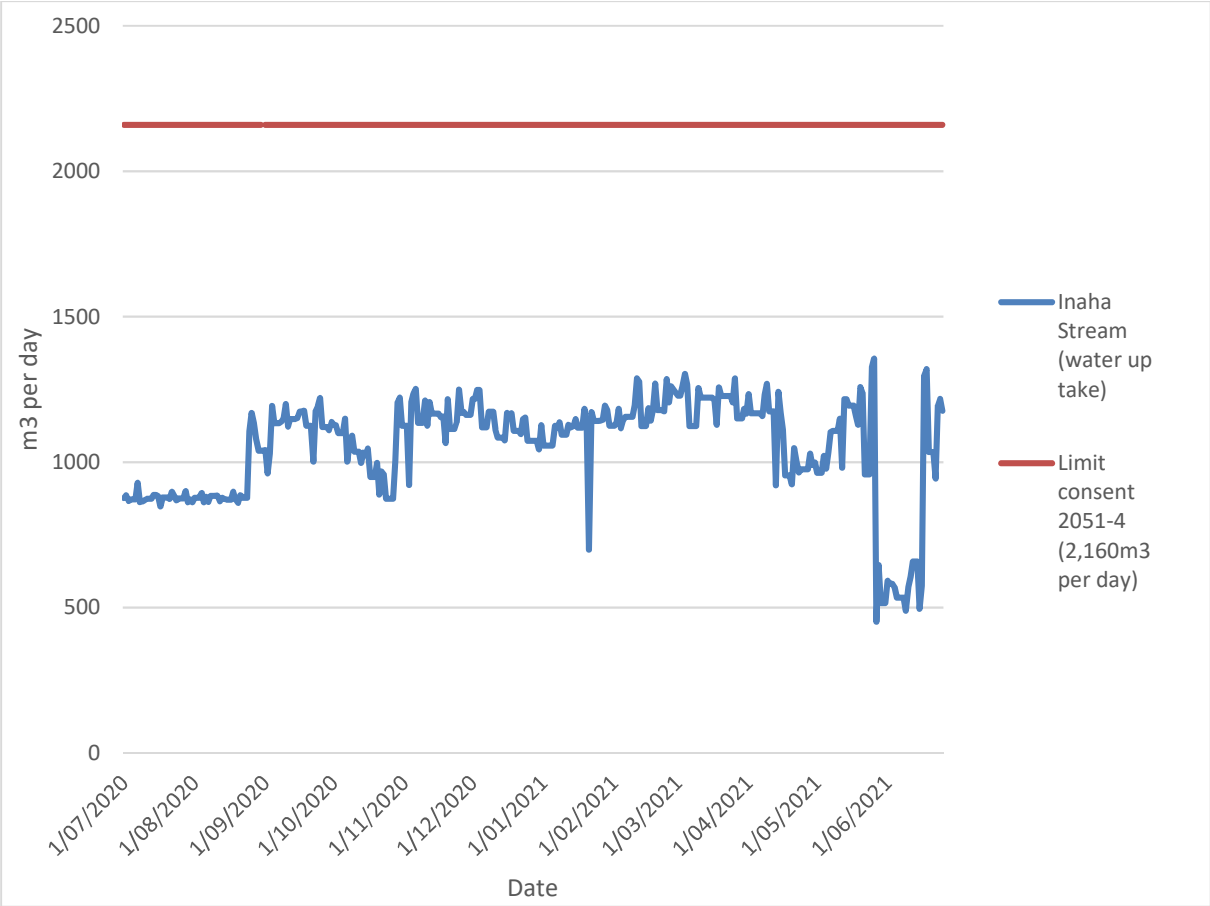

Figure 3 Consent 2051-4 abstraction data 2020-2021

The records provided by the Company (Figure 3) indicated that the consented abstraction daily maximum of 2,160 m^3 was complied with for the entirety of the 2020-2021 monitoring period. This is the third consecutive year this has been compliant for the duration.

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 2021 is presented in the following Figure 4.

The analysis provided in Figure 4 indicated that the daily maximum limit of 1,970 m^3 was not exceeded for the whole of the monitoring period. The rate of abstraction was also complied with for the duration, with no exceedance of the 22.8 L/s instantaneous limit.

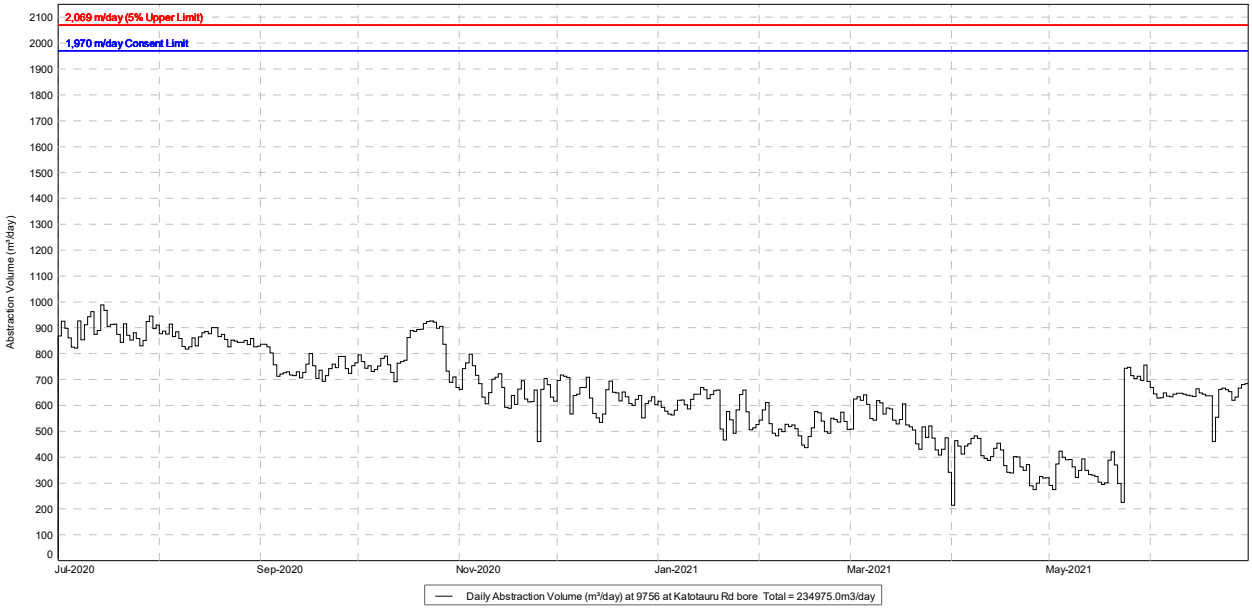

Figure 4 Daily groundwater abstraction volumes consent 9756-1 2020-2021

2.3 Wastewater discharge

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).

Three samples were collected from pond 6 (IND004004) in the 2020-2021 monitoring period. The analysis indicated the following:

- Potassium absorption ratio ranged steady across the three rounds, ranging 2-3 mmol/l.
- In terms of turbidity, results ranged 121-420 NTU.
- Bicarbonate in the wastewater ranged 161-310 g/m^3.
- Chemical oxygen demand (COD) ranged 390-1,110 g/m^3.
- Chloride ranged 220-290 g/m^3.
- Dissolved carbonaceous biochemical oxygen demand ($CBOD_5$) ranged <3-6.7 g O_2/m^3.
- Total biochemical oxygen (un-filtered) ranged from below the limit of detection to 110 g O_2/m^3.
- Dissolved reactive phosphorus (DRP) remained quite steady across the three rounds, ranging 34-38 g/m^3.
- Electrical conductivity (EC) ranged 236-295 mS/m.
- *E. coli* ranged from below the LOD through to 609 MPN/100 ml.
- In terms of nitrogen within the wastewater:
    - Free ammonia ranged 0.33-1.28 g/m^3.
    - Nitrate nitrogen ranged 16.6-106 g/m^3.
    - Nitrite nitrogen ranged 0.85-57 g/m^3.
    - Nitrite / nitrate nitrogen ranged 74-124 g/m^3.

  - Ammoniacal nitrogen ranged 89-115 g/m^3.
  - Total nitrogen ranged 198-230 g/m^3.
  - Total kjeldahl nitrogen (TKN) 103-124 g/m^3.
- Oil and grease ranged from below the LOD through to 17 g/m^3.
- pH ranged 7.2-7.4 pH.
- The temperature ranged 12-29°C across the three rounds.
- Sodium absorption ratio ranged 8.3-9.8 SAR. The limit defined by condition 11 of consent 3941-2 is <15.
- Sulphate ranged 166-184 g/m^3.
- Total alkalinity ranged 132-250 g/m^3 as $CaCO_3$.
- Total calcium ranged 22-37 g/m^3.
- Total magnesium remained relatively stable across the three rounds, ranging 12.5-13.2 g/m^3.
- Total phosphorus ranged 38-48 g/m^3.
- Total potassium ranged 115-156 g/m^3.
- Total sodium ranged 210-270 g/m^3.
- The total sulphide screen results were below the LOD on all three occasions.
- Total suspended solids ranged 187-880 g/m^3.

In terms of nitrogen concentration within pond 6 (IND004004), the following figure shows the concentration of total nitrogen (TN) since November 2001. The analysis indicated that the TN concentration within this source has remained relatively stable for the past three years, ranging 194-260 g/m^3.

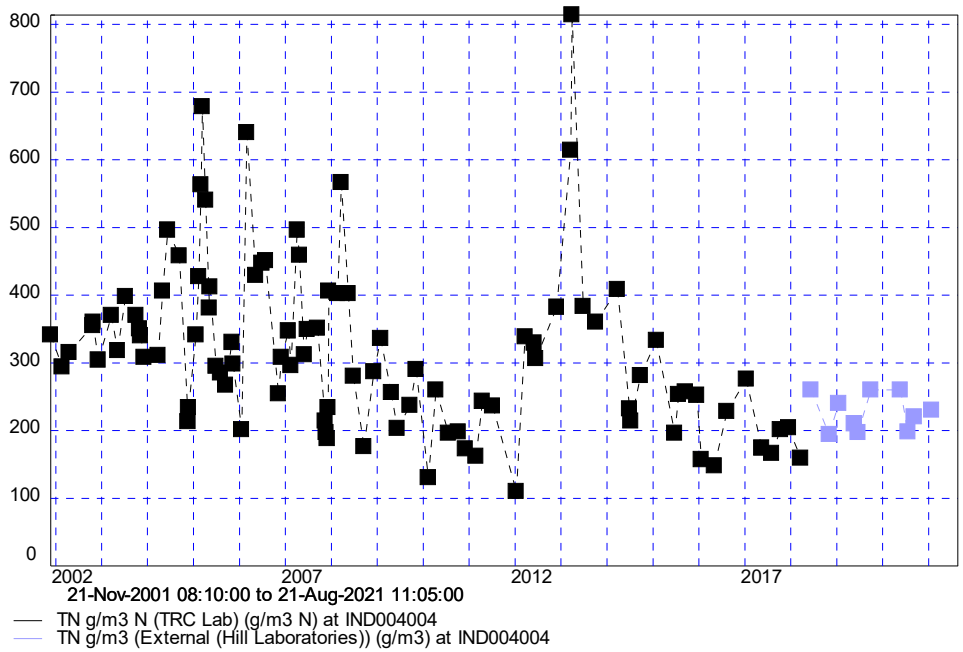

Figure 5 Long term total nitrogen monitoring IND004004

Table 5 IND004004 2019-2020 monitoring period

IND004004/ Parameter	Potassium Absorption Ratio	Turbidity	Bicarbonate	Chemical Oxygen Demand (COD), screen level	Dissolved C-Biochemical Oxygen Demand ($CBOD_5$)	Total Biochemical Oxygen Demand ($TBOD_5$)	Free Ammonia as N	Total Ammoniacal-N	Total Kjeldahl Nitrogen (TKN)	Total Nitrogen	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	Oil and Grease	pH
Date	mmol/L	NTU	g/m^3 at 25°C	$g\ O_2/m^3$	$g\ O_2/m^3$	$g\ O_2/m^3$	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	pH Units
20 Jul 2020	2	420	310	1,110	3.3	<20	0.33	89	124	198	16.6	74	57	17	7.2
08 Sep 2020	3	121	200	400	6.7	55	1.19	115	116	220	106	107	0.85	<9	7.4
26 Jan 2021	3	133	161	390	<3	110	1.28	91	103	230	85	124	39	<6	7.3

IND004004/ Parameter	Sample Temperature	Sodium Absorption Ratio (Total)	Sulphate	Total Alkalinity	Dissolved Reactive Phosphorous	Escherichia coli	Electrical Conductivity (EC)	Chloride	Total Magnesium	Total Calcium	Total Phosphorus	Total Potassium	Total Sodium	Total Sulphide Screen	Total Suspended Solids
Date	°C		g/m^3	g/m^3 as $CaCO_3$	g/m^3	MPN/100 ml	mS/m	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
20 Jul 2020	12	8.3	166	250	34	<100	236	220	13.2	37	48	115	230	<0.05	880
08 Sep 2020	21	8.8	176	168	37	404	250	230	12.6	22	38	136	210	<0.05	220
26 Jan 2021	29	9.8	184	132	38	609	295	290	12.5	35	39	156	270	<0.05	187

NR= no result

2.3.2 Cooling water analysis IND002004

The cooling water discharge (IND002004) to the firewater pond was sampled on three occasions this monitoring period. The analysis is provided in the following Table 6. It should be noted note that there are two cooling water discharges, these relate to the surface water abstraction and the bore water extraction. In this monitoring period both sources were assessed. On certain occasions only one may be discharging, thus only one of the sources is analysed. Bore water extraction discharge is detailed as BW below.

Table 6 Cooling water discharge IND002004

IND002004	Electrical Conductivity (EC)	pH	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity
Collected	mS/m	pH Units	g/m^3	$g\ O_2/m^3$	NTU
20 Jul 2020	22.6	7.7	0.033	0.7	10.6
08 Sep 2020	23.6	7.5	0.031	0.4	9.9
26 Jan 2021/BW	34.3	7.5	1.8	4	12.5
26 Jan 2021	27.6	7.7	0.07	0.6	3.6

The analysis indicated the following:

- Electrical conductivity ranged 22.6-34.3 mS/m. The electrical conductivity was noted to be more elevated in the bore water than the surface water abstraction.
- pH remained weakly alkaline, ranging 7.5-7.7 pH.
- Total ammoniacal nitrogen ranged 0.031-1.8 g/m^3.Noting that higher concentrations of ammonia were recorded in the bore water sample.
- The measurable ammonia in the discharge from the bore water is a result of the ammonia within the groundwater abstracted by the bore, rather than caused by the facility.
- Ammonia from the surface water take was within the same concentration range as the preceding water conditions.
- Total biochemical oxygen demand ranged 0.4-4 $g\ O_2/m^3$, with the elevated oxygen demand (4 g O2/m3) a characteristic of the bore water.
- Turbidity ranged 3.6-12.5 NTU.

2.3.3 Stormwater analysis STW001075

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 three times during this monitoring period. The results of the sampling are provided in the following Table 7.

It should be noted that this system has recently been upgraded (2019-2020), to allow the capture of the first flush from the stormwater system to be sent to the ponds on site, rather than discharging into the firepond.

Table 7 Stormwater discharge STW001075

STW001075	TEMP	Electrical Conductivity (EC)	Escherichia coli	pH	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Total Suspended Solids	Turbidity - ISO 7027 Method
Collected	**°C**	**mS/m**	**MPN/100 ml**	**pH Units**	**g/m³**	**g O_2/m³**	**g/m³**	**FNU**
21 Jul 2020	11.2	128.2	>24,200	6.9	8.7	13	121	61
08 Sep 2020	No discharge							
26 Jan 2021	18.7	134	>2,420	7	3.1	18	52	23

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

- pH between 6-9.
- Suspended solids below 100 g/m³.
- Oil and grease below 15 g/m³.

Each of these parameters were assessed twice. pH and suspended solids are analysed from the stormwater discharge prior to the firepond. This sample is also visually assessed for oil and grease. The second assessment is undertaken at monitoring location IND001015 which is the fire pond discharge to the Inaha Stream, discussed in the next section 2.3.4.

The analysis of the three rounds indicated the following:

- The temperature ranged 11.2-18.7°C.
- The electrical conductivity ranged 128.2-134 mS/m.
- *E. coli* ranged from 2,420->24,200 MPN/100 ml.
- Total ammoniacal nitrogen ranged 3.1-8.7 g/m³.
- Total biochemical oxygen demand ranged 13-18 g O_2/m³.
- Total suspended solids ranged 52-121 g/m³.
- Turbidity ranged 23-61 FNU.

The site stormwater system remains a source of ammonia, oxygen demand and *E.coli*

2.3.4 Inaha Tributary at plant site IND001015

The Council collected three 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 the following Table 8.

Table 8 Inaha tributary/ fire pond IND001015

IND001015	TEMP	Chloride	Free Ammonia as N	Total Ammonia cal-N	Nitrate-N	Nitrite-N	Nitrate-N + Nitrite-N	Electrical Conductivity (EC)
Collected	°C	g/m^3	g/m^3 at temp	g/m^3	g/m^3	g/m^3	g/m^3	mS/m
20 Jul 2020	12.5	31	0.0084	1.26	2.3	0.035	2.3	30.7
08 Sep 2020	30.5	28	0.032	0.9	2.3	0.034	2.4	29
26 Jan 2021	22.1	34	0.021	0.25	2.4	0.068	2.5	31.8
IND001015	**Escherichia coli**	**Oil and Grease**	**pH**	**Total Alkalinity**	**Dissolved Reactive Phosphorus**	**Total Biochemical Oxygen Demand ($TBOD_5$)**	**Total Suspended Solids**	**Turbidity**
Collected	MPN/100 ml	g/m^3	pH Units	g/m^3 as $CaCO_3$	g/m^3	g O_2/m^3	g/m^3	NTU
20 Jul 2020	645	<4	7.5	85	0.054	1.5	5	8.2
08 Sep 2020	135	<4	7.6	84	0.07	0.5	5	7.9
26 Jan 2021	135	5	8.3	84	0.014	3.1	11	8

The analysis of IND001015 indicated the following:

- The temperature of the firepond ranged across the three samples 12.5-30.5°C.
- Chloride concentrations ranged 28-34 g/m^3.
- Dissolved reactive phosphorus (DRP) ranged 0.014-0.07 g/m^3.
- Electrical conductivity (EC) remained quite stable across the three monitoring rounds, ranging 29-31.8 mS/m.
- *E. coli* ranged 135-645 MPN/100 ml.
- In terms of nitrogen:
  - Free ammonia (NH_3) ranged 0.0084-0.032 g/m^3.
  - Nitrate nitrogen ranged 2.3-2.4 g/m^3.
  - Nitrite nitrogen ranged 0.034-0.068 g/m^3.
  - Nitrate / nitrite nitrogen (NNN) ranged 2.3-2.5 g/m^3.
  - Total ammoniacal nitrogen ranged 0.25-1.26 g/m^3.
- On one occasion the concentration of unionised ammonia exceeded >0.025 g/m^3. The concurrent analysis from the surface water monitoring did not indicate any Inaha Stream exceedance for un-ionised ammonia.
- Oil and grease within the fire pond ranged from the LOD-5 g/m^3 across the three rounds. The limit imposed by consent 5426-1 is for no more than 15 g/m^3.

- pH remained stable and weakly alkaline, ranging 7.5-8.3 pH.
- Total alkalinity ranged 84-85 g/m^3.
- Total biochemical oxygen demand ranged 0.5-3.1 g O2/m^3.
- Suspended solids ranged 5-11 g/m^3. The limit defined by consent 5426-1 is set at <100g/m^3.
- Turbidity ranged 7.9-8.2 NTU.

The Inaha Tributary within the fire pond is fed from four different sources, as previously discussed. Two of these sources, the bore water (Section 2.3.2) and the stormwater discharges (Section 2.3.3), provide the fire pond with concentrations of certain contaminants (NH4, NH3, NNN, BOD, DRP and *E.coli*).

In the case of the bore water discharge, this is a consistent source of certain contaminants (NH4 and BOD). While in the case of the stormwater, the contamination is dependent on site processes (clean-up operations from spillages, housekeeping and rainfall).

The actual Inaha Tributary source concentrations are not known, as such it is unknown whether there may be some contribution to the contamination concentrations recorded in the firepond.

Owing to the setup of the fire pond discharge, this discharge point continuously discharges to the Inaha Stream. This includes when the main surface water discharge from pond 6 (IND004004, Section 2.3.1) has been switched to land application (November 2020). The concentrations of contaminants in the firepond discharge will be contributing to the increases in surface water nitrate and to a certain extent ammonia throughout the year (end of Section 2.4.3.1).

An effect of the facility during periods of non-waste water discharge to the Inaha Stream can be observed in Section 2.4.3.1, during surface water round 3, which was conducted during January 2021 (Table 11). During this round, slight elevations of NH4, NH3 and NNN were observed below the fire pond discharge at sites INH000408 and INH000420. The effect on the instream communities of the Inaha Stream is discussed in the second of the two biomonitoring surveys (Section 2.4.6). This late summer survey communicated the following :

'However, there was evidence that the discharge from Taranaki By-Products had contributed to the lowered SQMCI score at site 2d. '

While this is not a significant impact to the instream communities, SQMCI drops 17% in the November 2020 survey between the sites 1 (INH000400) and 2d (INH000420) and 14.8% in the March 2021 survey. A reduction of 20% SQMCI or more is considered an ecologically meaningful change[2] and a significant adverse effect.

While the reductions noted by the Council's biologist were below the 20% threshold, some level of impact has occurred at site 2d (INH000420).

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 gauging taken at the staff gauge site. The Council undertook three

[2] https://www.horizons.govt.nz/HRC/media/Media/One%20Plan%20Documents/Appendix-4-Advicefrom-John-Stark-on-QMCI-Standard.pdf?ext=.pdf

stream gaugings in the 2020-2021 reporting period. These were undertaken on 25 August 2020, 16 November 2020 and the 3 May 2021.

The hydrograph for 2020-2021 monitoring period, drawn from the staff gauge readings at Kohiti Road is provided in the following Figure 6. Included to this graph is a plot of the rate of the wastewater discharge to the stream, as measured at the v-notch weir at the outlet of Pond 6.

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

The results from the monitoring of wastewater and receiving water discharge rates by TBP show that the limit on the minimum dilution rate of 300:1 fold was achieved for the whole of the 2020-2021 period (Figure 7). The discharge ceased on the 17 November 2020, and no discharge to the Inaha Stream occurred till the 21 June 2021. This was a period of 216 days when the wastewater discharge was irrigated to land.

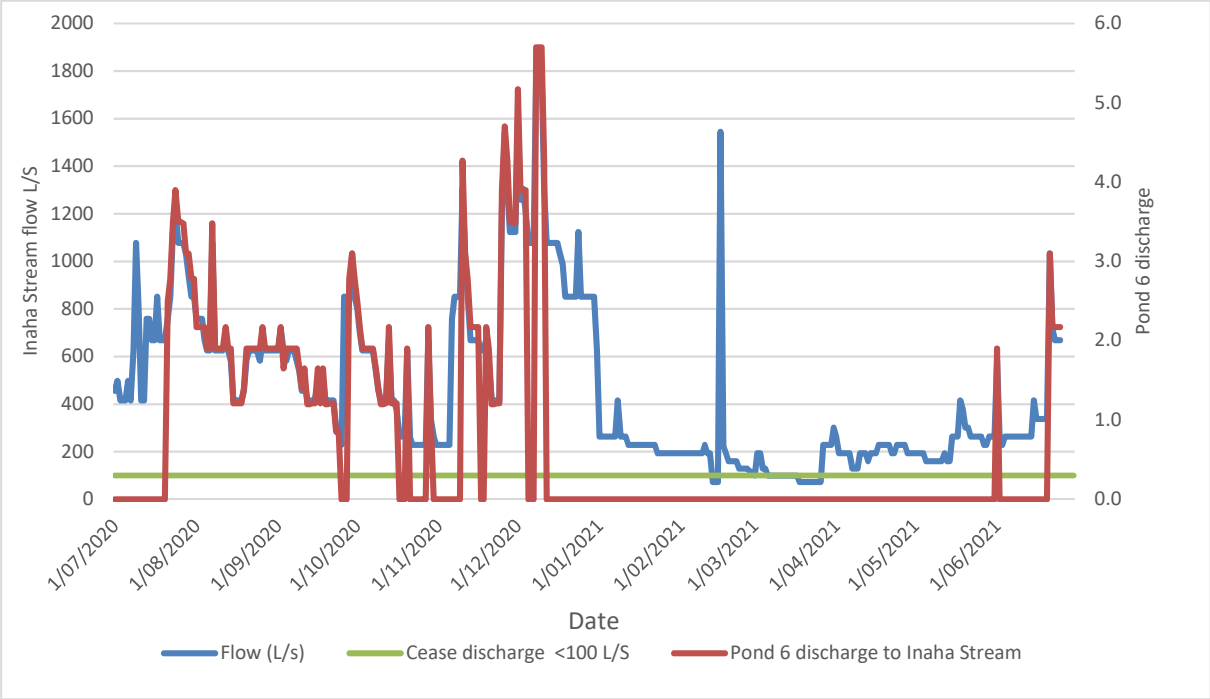

Figure 6 Hydrograph Inaha Stream flows and pond 6 discharge rate 2020 -2021 monitoring period

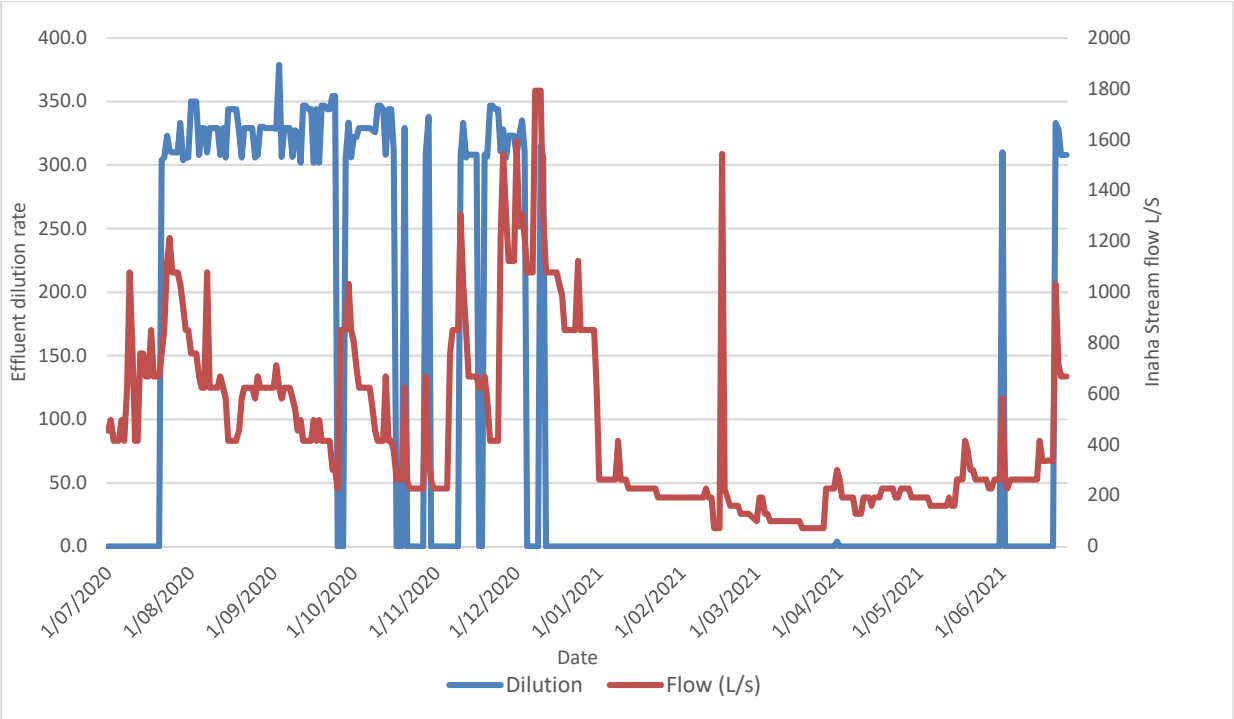

Figure 7 Dilution rate 2020-2021 monitoring period

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 2020-2021 monitoring period for the temperature of cooling water discharged, and the increase in Inaha Stream temperature, is given in Figure 8 and Figure 9. The error (uncertainty of measurement) 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 8) the limit was not exceeded, marking the eighth year TBP has been in compliance with this cooling water temperature condition.

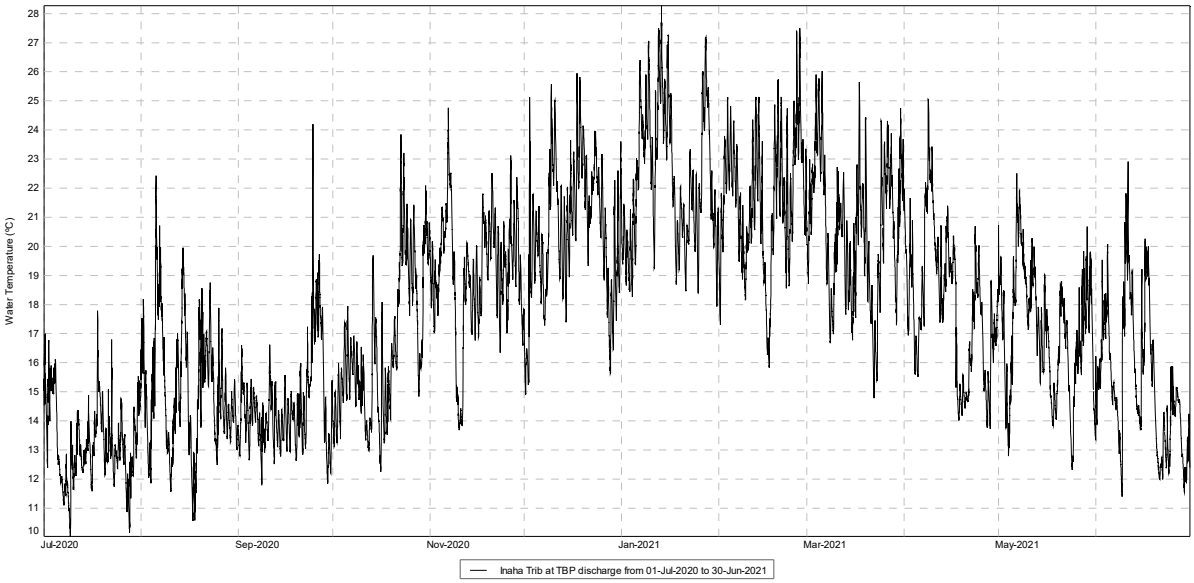

Figure 8 Cooling water temperature Inaha tributary 2020-2021

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 9 indicate compliance with this condition.

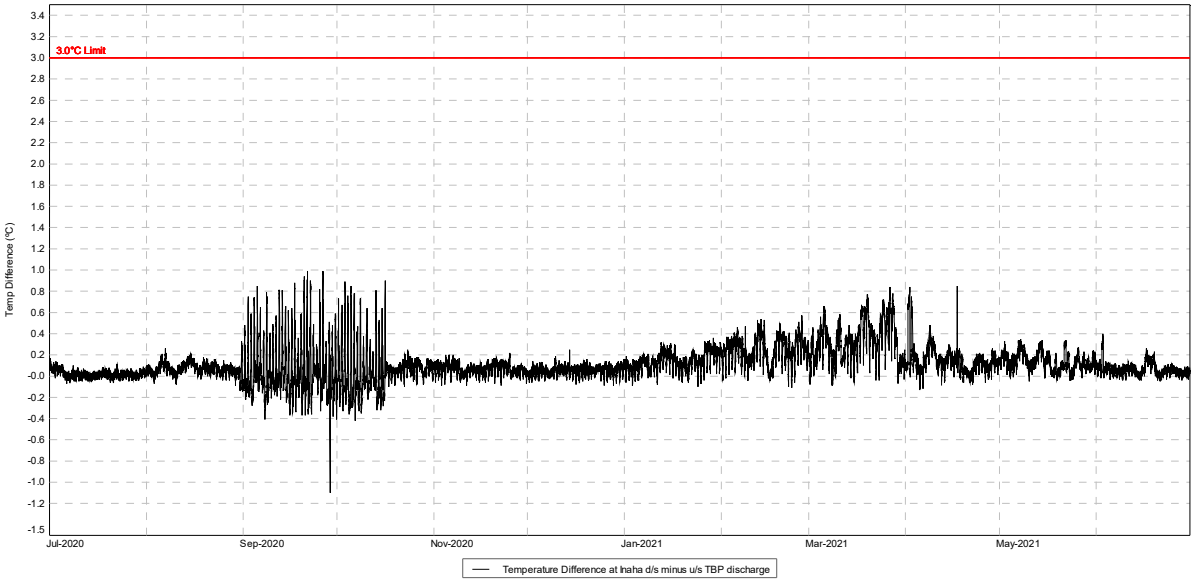

Figure 9 Inaha Stream temperature post the discharge 2020-2021

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 three rounds of surface water sampling were undertaken. These rounds were conducted on the following dates: 20 July 2020, 8 September 2020, and 26 January 2021.

Consent 2049-4 authorises the discharge of treated wastewater to the Inaha Stream under certain conditions. Condition 9 (below) of this consent defines effects which should not occur as a process of this discharge or in conjunction with any other discharges originating from the Company.

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.

The analysis of the three rounds of surface water monitoring is provided in the following Tables 9-11.

Table 9 Inaha Stream surface water monitoring (1) 20 July 2020

Inaha Stream SW 1 20 July 2020		DO	PERSAT	TEMP	Chloride	Dissolved C-Biochemical Oxygen Demand ($CBOD_5$)	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Collected	g/m^3	%	°C	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN/100 ml
INH000334	10:35	11.52	103.5	10.6	21	-	0.02	20.9	228
INH000348	10:46	11.41	103.3	10.8	23	-	0.02	21.1	160
INH000400	11:00	11.25	101.7	10.8	49	< 1.0	0.013	37.2	253
INH000408	11:45	11.47	104.9	11.2	25	< 1.0	0.022	23	203
INH000420	12:00	11.25	103.6	11.5	25	< 1.0	0.022	22.8	148
INH000430	13:25	10.90	101.3	12	26	< 1.0	0.024	22.8	168
INH000450	13:40	11.10	102.9	11.9	27	< 1.0	0.025	23.4	262
INH000470	13:50	10.57	98	11.8	30	-	0.033	24.8	122

Inaha Stream SW 1 20 July 2020		Free Ammonia as N	Total Ammoniacal-N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	pH	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity - ISO 7027 Method
Site	Collected	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	pH Units	g O_2/m^3	FNU
INH000334	10:35	0.00005	0.013	3.3	3.3	0.008	7.3	<0.4	13.3
INH000348	10:46	0.0001	0.015	3.4	3.4	0.01	7.5	0.5	18.7
INH000400	11:00	0.00005	0.016	5.1	5.1	0.007	7.2	0.7	9.6
INH000408	11:45	0.00012	0.056	3.3	3.3	0.01	7	3	14.7
INH000420	12:00	0.00033	0.048	3.3	3.3	0.011	7.5	1.1	13.1
INH000430	13:25	0.00017	0.045	3.4	3.4	0.013	7.3	1.3	14.8
INH000450	13:40	0.0001	0.04	3.4	3.4	0.015	7.1	0.9	13.5
INH000470	13:50	0.00016	0.036	3.5	3.5	0.018	7.3	0.6	14

The analysis of the 20 July 2020 surface water monitoring round indicated the following:

- The wastewater discharge to the Inaha Stream was occurring during this round.
- Dissolved oxygen (DO) ranged 10.57-11.52 g/m^3.
- The associated oxygen saturation ranged 98-104.9%. The consent limit requires the saturation to be greater than 80%.

- Surface water temperatures ranged 10.6-12°C. Remaining below the 3 °C limit.
- Chloride ranged 21-49 g/m^3 and demonstrated an increasing concentration down catchment.
- Dissolved (filtered) carbonaceous biochemical oxygen demand (CBOD5) was recorded below the laboratory limit of detection (LOD) of <1.0 g O_2/m^3 throughout the monitoring period. This was in compliance with condition 9 (b) of consent 2049-4
- Dissolved reactive phosphorus ranged 0.013-0.033 g/m^3 and demonstrated an increasing concentration down gradient.
- Electrical conductivity (EC) ranged 20.9-37.8 mS/m.
- *E. coli* ranged from 122-262 MPN/100 ml.
- Free ammonia ranged <0.0001-0.00033 g/m^3.
- Nitrate nitrogen ranged 3.3-5.1 g/m^3 and demonstrated an increasing concentration down catchment. Comparisons to the National Policy Statement for Freshwater Management (NPS-FM 2020) are provided at the end of the section. There was notable increase in nitrate concentration at site INH000400.
- Nitrite nitrogen ranged 0.007-0.018 g/m^3.
- Nitrate/ nitrite nitrogen (total oxidised nitrogen) ranged 2.5-5.1 g/m^3 and demonstrated an increasing concentration down catchment.
- pH remained stable an weakly alkaline, ranging 7.0-7.5 pH.
- Ammonia ranged 0.013-0.056 g/m^3. This is below the NPS-FM 2020 bottom line, annual maximum (<0.4 g/m^3).
- Total biochemical oxygen demand (non-nitrogen inhibiting) ranged from below the LOD to 3 g O_2/ m^3. The elevated concentration was recorded at INH000408, 50 m downstream of the discharge location.
- Turbidity ranged 9.6-18.7 FNU.

Table 10 Inaha Stream surface water monitoring (2) 8 September 2020

Inaha Stream SW 2 8 September 2020		DO	PERSAT	TEMP	Chloride	Dissolved C-Biochemical Oxygen Demand ($CBOD_5$)	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Collected	g/m^3	%	°C	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN/100 ml
INH000334	12:12	NR	NR	9.2	23		0.028	21.7	408
INH000348	10:20	NR	NR	9.2	24		0.029	21.8	10,460
INH000400	09:32	NR	NR	8.9	25	< 1.0	0.027	23.3	602
INH000408	09:45	NR	NR	9.1	26	< 1.0	0.085	23.9	512
INH000420	09:58	NR	NR	9.2	26	< 1.0	0.095	24.6	240
INH000430	11:48	NR	NR	10.4	26	< 1.0	0.093	24.3	1187
INH000450	11:57	NR	NR	10.4	31	< 1.0	0.072	26.4	3440
INH000470	20:27	NR	NR	12.1	31		0.081	26.3	369

Inaha Stream SW 2 8 September 2020		Free Ammonia as N	Total Ammoniacal-N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	pH	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity - ISO 7027 Method
Site	Collected	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	pH Units	g O_2/m^3	FNU
INH000334	12:12	0.00004	0.014	3.4	3.4	0.011	7.2	< 0.4	13
INH000348	10:20	0.00008	0.011	3.6	3.6	0.013	7.6	0.4	15.3
INH000400	09:32	< 0.00009	< 0.010	3.5	3.6	0.01	7.7	0.9	12.4
INH000408	09:45	0.00165	0.24	3.9	3.9	0.024	7.6	1.1	13
INH000420	09:58	0.0033	0.26	3.9	3.9	0.029	7.9	1.5	12.3
INH000430	11:48	0.0036	0.22	3.9	4	0.035	7.9	0.8	13.2
INH000450	11:57	0.0011	0.157	4.5	4.5	0.031	7.6	1.3	12.1
INH000470	20:27	0.00086	0.1	4.2	4.2	0.046	7.6	1	12.9

The analysis of the 8 September 2020 surface water monitoring round indicated the following:

- The wastewater discharge to the Inaha Stream was occurring during this round.
- No dissolved oxygen readings were not collected in this monitoring round.
- Temperature ranged 8.9-12.1°C. The temperature increase must be no greater than 3°C. The increase between INH000400 and INH000470 was 3.2°C. However immediately below the discharge at INH000408 and INH000420, the increase was 0.3°C. This is the mixing zone
- Chloride concentrations ranged 23-31 g/m^3, and indicated an increasing concentration down catchment.
- Dissolved (filtered) carbonaceous biochemical oxygen demand (CBOD5) was recorded below the laboratory limit of detection (LOD) of <1.0 g O_2/m^3 throughout the monitoring period.
- Dissolved reactive phosphorus ranged 0.027-0.095 g/m^3.
- Electrical conductivity ranged 21.7-26.4 mS/m, and demonstrated an increase down catchment.
- *E. coli* ranged 240-10,460 MPN/100 ml. The higher end of the results were recorded above the Company site at INH000348.
- Free ammonia ranged from below the LOD to 0.0036 g/m^3, recorded at site INH000430, which is just downstream from the site discharges.

- Nitrate nitrogen ranged 3.4-4.5 g/m^3, and demonstrated an increasing concentration down catchment. Comparisons to the National Policy Statement for Freshwater Management (NPS-FM 2020) are provided at the end of the section.
- Nitrite nitrogen ranged 0.01-0.046 g/m^3.
- Nitrate/ nitrite nitrogen (total oxidised nitrogen) ranged 3.4-4.5 g/m^3 and demonstrated an increasing concentration down catchment.
- pH ranged stable and weakly alkaline, ranging 7.2-7.9 pH.
- Ammonia ranged from below the LOD to 0.26 g/m^3. This is below the NPS-FM 2020 bottom line, annual maximum (<0.4 g/m^3). Though this result was not adjusted for equivalent toxicity assessment.
- Total biochemical oxygen demand ranged from below the LOD through to 1.5 g O_2/m^3.
- Turbidity ranged 12.1-15.3 FNU.

Table 11 Inaha Stream surface water monitoring round (3) 26 January 2021

Inaha Stream SW 3 26 January 2021		DO	PERSAT	TEMP	Chloride	Dissolved C-Biochemical Oxygen Demand ($CBOD_5$)	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli
Site	Collected	g/m^3	%	°C	g/m^3	g O_2/m^3	g/m^3	mS/m	MPN/100 ml
INH000334	09:16	10.24	108.4	17.4	27	-	0.039	24.5	727
INH000348	09:27	9.22	98	17.9	26	-	0.036	25	291
INH000400	09:51	9.31	98.3	18	29	< 1.0	0.029	26.5	461
INH000408	10:50	9.16	99.2	19.1	29	< 1.0	0.028	27.1	548
INH000420	11:05	9.06	99.6	19.4	29	< 1.0	0.029	27.2	461
INH000430	12:25	9.13	105.4	21.2	30	< 1.0	0.029	27.6	488
INH000450	12:41	8.81	98.7	20.6	34	< 1.0	0.025	30.2	579
INH000470	12:45	9.15	102.2	20.4	39	-	0.033	31.4	649

Inaha Stream SW 3 26 January 2021		Free Ammonia as N	Total Ammoniacal-N	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	pH	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity - ISO 7027 Method
Site	Collected	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	pH Units	g O_2/m^3	FNU
INH000334	09:16	< 0.0003	< 0.010	2.6	2.6	0.006	7.9	0.6	3
INH000348	09:27	< 0.0003	< 0.010	3.1	3.1	0.006	7.9	0.4	4
INH000400	09:51	0.0015	0.077	3.1	3.1	0.012	7.8	< 0.8	2.9
INH000408	10:50	0.002	0.077	3.5	3.5	0.015	7.8	0.8	3.7
INH000420	11:05	0.0016	0.068	3.5	3.5	0.017	7.8	< 0.8	3.2
INH000430	12:25	0.001	0.032	3.6	3.6	0.017	7.9	0.9	3.3
INH000450	12:41	0.0007	0.022	4.6	4.6	0.016	7.9	0.9	3.3
INH000470	12:45	0.0006	0.014	4.5	4.5	0.012	8.1	0.6	6.2

The analysis of the 26 January 2021 surface water monitoring round indicated the following:

- The wastewater discharge to the Inaha Stream was not occurring during this round.
- Dissolved oxygen (DO) ranged 8.81-10.24 g/m^3.
- The associated oxygen saturation ranged 98-108.4% the consent limit requires the saturation to be greater than 80%.

- Surface water temperatures ranged 17.4-21.2°C. Within the mixing zone the temperature variation equated to a 1.4°C increase between sites INH000400 and INH000420.
- Chloride ranged 26-39 g/m^3 and demonstrated an increasing concentration down catchment.
- Dissolved (filtered) carbonaceous biochemical oxygen demand ($CBOD_5$) was recorded below the laboratory limit of detection (LOD) of <1.0 g O_2/m^3 throughout the monitoring period.
- Dissolved reactive phosphorus ranged 0.025-0.039 g/m^3
- Electrical conductivity (EC) ranged 24.5-31.4 mS/m.
- *E. coli* ranged from 248-980 MPN/100 ml.
- Free ammonia ranged 0.006-0.017 g/m^3.
- Nitrate nitrogen ranged 2.6-4.6 g/m^3 and demonstrated an increasing concentration down catchment.
- Nitrite nitrogen ranged 0.004-0.031 g/m^3.
- Nitrate/ nitrite nitrogen (total oxidised nitrogen) ranged 2.6-4.6 g/m^3 and demonstrated an increasing concentration down catchment.
- pH remained stable an weakly alkaline, ranging 7.8-8.1 pH.
- Ammonia ranged <0.010-0.077 g/m^3.
- Total biochemical oxygen demand (non-nitrogen inhibiting) ranged from below the LOD to 0.9 g O_2/ m^3.
- Turbidity ranged 2.9-6.2 FNU.

Surface water discussion Inaha Stream

Surface water monitoring indicated that dissolved (filtered) carbonaceous biochemical oxygen demand (oxygen consumption) remained below the limit of detection of <1.0 g O_2/m^3 with no breaches of consent this year.

Temperature monitoring remained within specification by not increasing the Inaha Stream by more than 3°C in the receiving waters, below the mixing zone. There was one occasion (Table 10) that the temperature increased between sites INH000400 and INH000470 by 3.2°C. It should be noted that INH000470 is located some 2.5 km to the south, as such, the increase is unlikely to have been caused by the Company discharge to surface water. The remaining increases were within consent conditions.

There were no recorded reductions in Inaha Stream pH units greater than 0.5 pH units.

Dissolved oxygen monitoring was undertaken on two of three occasions. On the two occasions the percentage of oxygen saturation did not reduce to below 80% saturation.

There are measurable concentrations of nitrate in the preceding surface waters of the Inaha Stream, prior to the Company irrigation areas. Nitrate nitrogen results indicated a steady increase in concentration down the length of the monitoring sites.

Figure 10 demonstrates that prior to the Company irrigation areas at site INH000334, the preceding surface water concentration of nitrate nitrogen ranged 1.97-4.2 g/m^3 across 11 samples rounds, spanning three years. During the time period of Figure 10, the largest increase of nitrate, influenced by the Company operation, from the top site (INH000334) to the most elevated site (INH000450), was 2.13 g/m^3, recorded in January 2019.

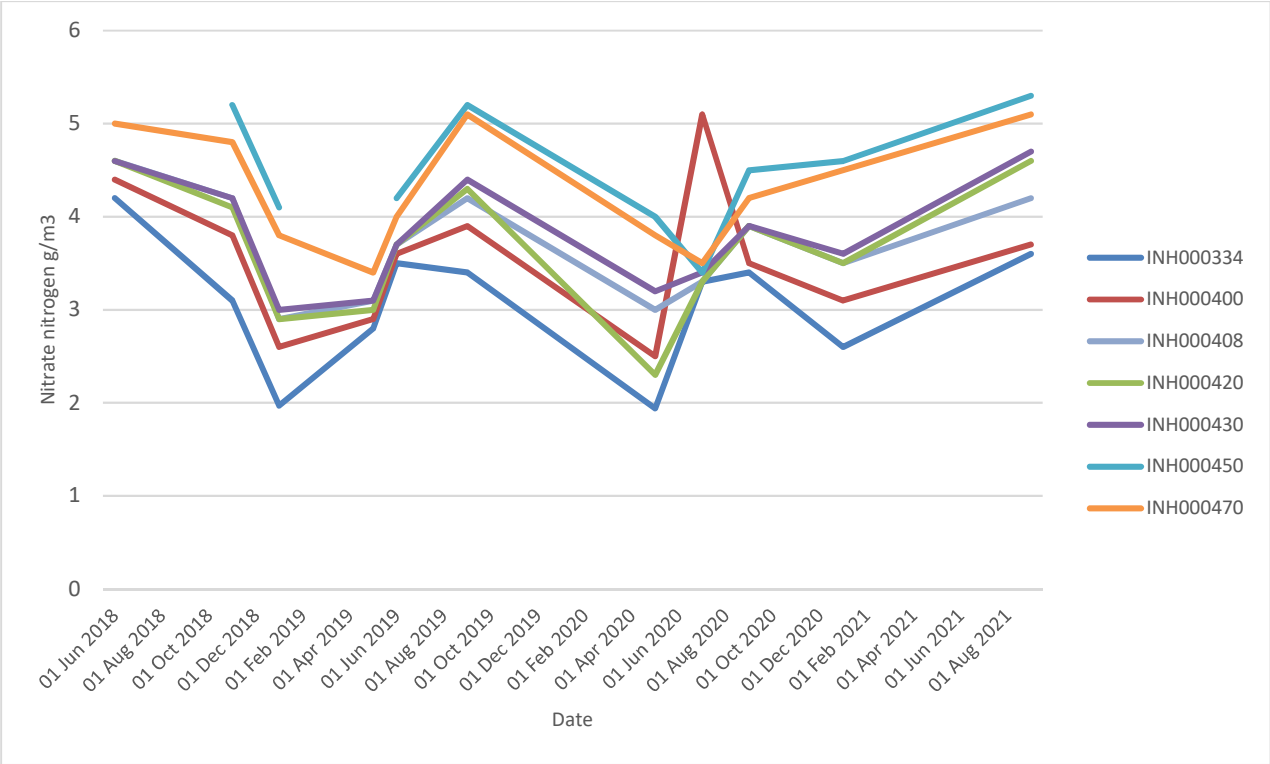

Figure 10 Nitrate nitrogen at Inaha Surface water sites 2018-2021

In order to compare the surface water nitrate concentrations with the NPS-FM, the median and the 95th percentile must be calculated, in order to associate the concentration to the guideline attribute state for nitrate (Table 12).

Table 12 National Policy Statement for Freshwater Management 2020 (NPS-FM) Nitrate nitrogen

Value (and component)	Ecosystem health (Water qualit	
Freshwater body type	Rivers	
Attribute uni	mg NO_3 – N/L (milligrams nitrate-nitrogen per litre)	
Attribute band and description	**Numeric attribute state**	
	Annual median	Annual 95th percentile
A High conservation value system. Unlikely to be effects even on sensitive specie	≤1.0	≤1.5
B Some growth effect on up to 5% of species.	>1.0 and ≤2.4	>1.5 and ≤3.5
National bottom line	**2.4**	**3.5**
C Growth effects on up to 20% of species (mainly sensitive species such as fish). No acute effects	>2.4 and ≤6.9	>3.5 and ≤9.8
D Impacts on growth of multiple species, and starts approaching acute impact level (that is sensitive species at higher concentrations (>20 mg/L).	>6.9	>9.8
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 may be more stringent.		

The median concentrations were calculated for the sites on the Inaha Stream utilising data from 11 monitoring rounds, across a three year period (Figure 11). The resultant tabulation demonstrates that all sites were above the national bottom line for nitrate nitrogen. When compared to the attribute state (Table

12), all sites were graded as state C. At these concentrations, as defined by the policy statement, growth effects on up 20% of sensitive species, such as fish can occur, but no acute effects are likely.

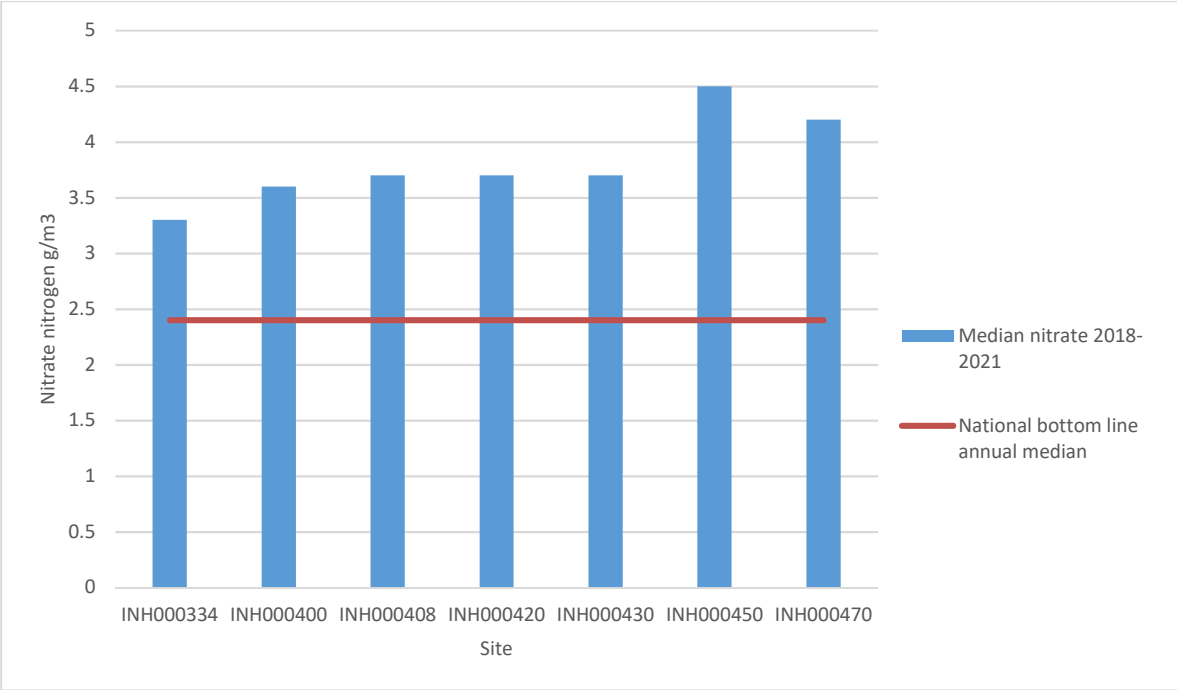

Figure 11 Median nitrate concentrations by site 2018-2021

The policy statement also require a 95% percentile calculation utilising the Hazen calculator. The resultant calculation (Figure 12) demonstrated that all sites were above the national bottom line, as defined by the NPS-FM 2020. All sites were graded as attribute state C, in similarity to the median calculation (Figure 11 and Table 12).

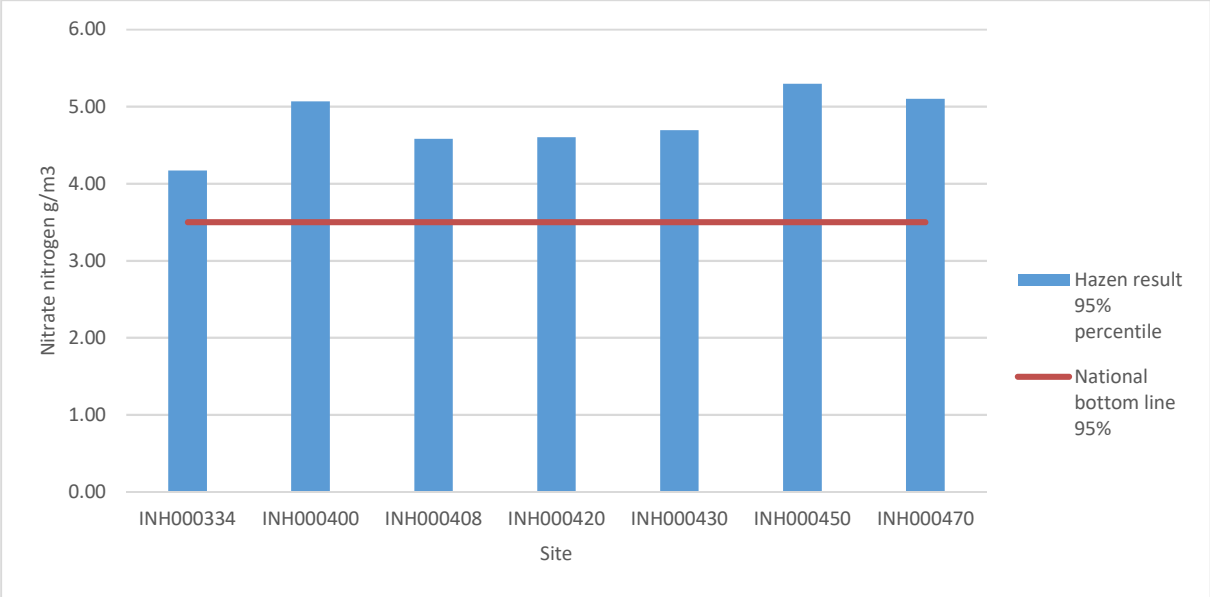

Figure 12 95% percentile calculation Hazen calculator

The above figures demonstrate the effect of the Company operations, on the surface water of the Inaha Stream. The operations of the Company lead to an increase of 1-1.5 g/m^3 nitrate nitrogen when compared to the preceding water conditions, as defined by site INH000334. The largest concentration of nitrate

nitrogen is observed at site INH000450, which is below the confluence of the Western Tributary. This tributary is discussed in the following section 2.4.3.3. While the increase in nitrate from a median and 95% percentile perspective was of low concentration between INH000334 and INH000450. The overall concentration within the Inaha Stream has the potential to impact on 20% of the most sensitive species. This is 80% protection.

It is noted that the long term goal for the Company is to reduce and eventually remove the requirement to discharge to the Inaha Stream. If this were to occur, the Inaha Stream would still be classified at attribute state C, due the preceding water condition for nitrate. This elevation is in part related to dairy shed effluent discharges which are still consented to water, further up catchment. These will be removed by 2028. Post the removal of the dairy effluent consents to discharge to water, it is envisaged that the base loading for nitrate will decrease.

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 analyses of the samples collected in this monitoring period are provided in Table 13.

Table 13 Northern tributary INH000397

INH000397/ parameter	DO	PERSAT	TEMP	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	pH
Collected	g/m^3	%	°C	g/m^3	g/m^3	mS/m	MPN/100 ml	pH Units
20 Jul 2020	11.02	99.1	10.6	32	0.018	28.2	158	7.4
08 Sep 2020	NR	NR	9.1	31	0.018	27.6	231	7.6
26 Jan 2021	9.09	94.6	16.6	35	0.01	31.7	980	7.5
INH000397/ parameter	**Free Ammonia as N**	**Nitrate-N**	**Nitrate-N + Nitrite-N**	**Nitrite-N**	**Total Ammoniacal-N**	**Total Biochemical Oxygen Demand ($TBOD_5$)**	**Turbidity - ISO 7027 Method**	
Collected	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g O_2/m^3	FNU	
20 Jul 2020	0.00009	2.6	2.6	0.007	0.02	< 0.4	5.8	
08 Sep 2020	0.00009	3.3	3.3	0.006	0.013	< 0.4	6.2	
26 Jan 2021	0.0028	2.9	3	0.031	0.28	0.6	4.4	

The analysis indicated the following:

- Dissolved oxygen remained above the consent limit of 80 % saturation across the three monitoring rounds and the associated concentrations ranged 9.96-12.34 g/m^3.
- Surface water temperature ranged 9.1-16.6°C.
- Chloride ranged 31-35 g/m^3.
- Dissolved reactive phosphorus (DRP) ranged 0.01-0.018 g/m^3.
- Electrical conductivity (EC) ranged 27.6-31.7 mS/m.
- *E. coli* ranged 158-980 MPN/100ml.
- pH remained weakly alkaline, ranging 7.4-7.6 pH.
- Free ammonia was recorded at trace concentrations, ranging 0.00009-0.0028 g/m^3.
- Nitrate nitrogen and nitrate/nitrite nitrogen ranged 2.6-3.3 g/m^3. The calculated median (11 samples over a three year period) indicated a concentration of 3.3 g/m^3. This indicates the water body of the Northern tributary is in attribute state C (Figure 12) as defined by the NPS-FM 2020.

- Nitrite was recorded at low concentrations, ranging 0.006-0.031 g/m^3.
- Total ammoniacal nitrogen ranged 0.013-0.28 g/m^3.
- Total biochemical oxygen demand ranged from below the LOD to 0.6 g O_2/m^3.
- Turbidity ranged 4.4-6.2 FNU.

Noted over the past few monitoring periods has been a steady increase in the concentration of nitrate nitrogen at this monitoring location (Figure 13). The long term monitoring of this site (Figure 13) indicated a rise in nitrate concentrations in the 2010 monitoring year. Concentrations, bar one sample, have been above 2 g/m^3 since.

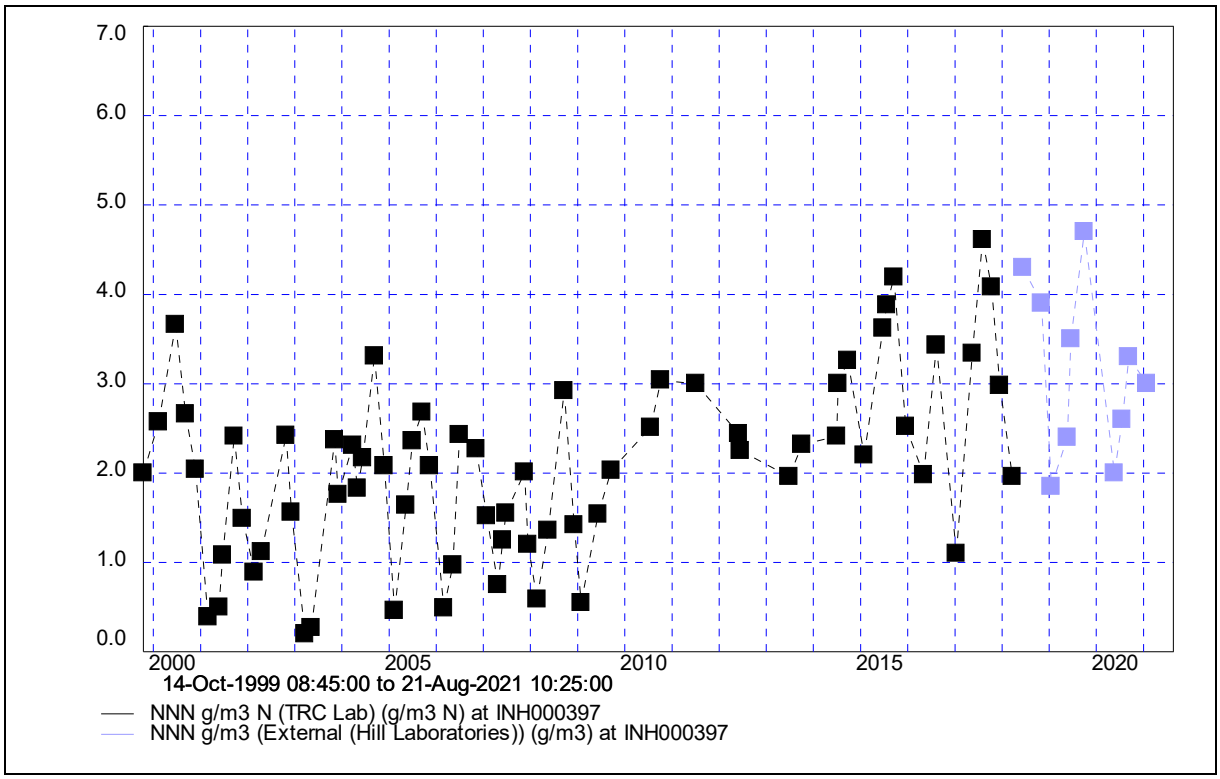

Figure 13 Long term nitrate nitrogen monitoring INH000397 1999-2021

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 between 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 before the irrigation area was extended, is situated 2.5 km above the Inaha confluence 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 Western tributary (which includes three monitoring sites: INH000433, 435 and 440) were monitored on three occasions (Tables 14-16), following the Inaha Stream sample collection. In addition, seven extra samples were collected from INH000440, Table 17.

Table 14 Western tributary 20 July 2020

20 July 2020	DO	PERSAT	TEMP	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N
Site	g/m^3	%	°C	g/m^3	g/m^3	mS/m	MPN / 100ml	g/m^3
INH000433	10.7	96.7	10.8	41	0.009	33.6	160	0.00008
INH000435	10.83	97.5	10.7	45	0.011	34.8	148	<0.00006
INH000440	10.6	99.8	10.6	25	0.021	22.5	231	0.00008
SW1	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	pH	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity - ISO 7027 Method	
Site	g/m^3	g/m^3	g/m^3	pH Units	g/m^3	$g\ O_2/m^3$	FNU	
INH000433	2.5	2.5	0.006	7.5	0.013	0.7	30	
INH000435	3.2	3.2	0.007	7.4	<0.010	0.4	7.0	
INH000440	3.2	3.2	0.008	7.4	0.016	0.5	18.9	

Table 15 Western tributary 8 September 2020

8 September 2020	DO	PERSAT	TEMP	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N
Site	g/m^3	%	°C	g/m^3	g/m^3	mS/m	MPN /100 ml	g/m^3
INH000433	NR	NR	9.2	37	0.009	30.6	120	<0.00005
INH000435	NR	NR	9.3	41	0.011	32.6	171	<0.00007
INH000440	NR	NR	11.2	44	0.012	34.5	201	<0.00010
SW2	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	pH	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity - ISO 7027 Method	
Site	g/m^3	g/m^3	g/m^3	pH Units	g/m^3	$g\ O_2/m^3$	FNU	
INH000433	2.9	2.9	0.003	7.4	<0.010	<0.4	12.6	
INH000435	4.1	4.1	0.004	7.6	<0.010	<0.4	3.6	
INH000440	6.0	6.0	0.004	7.7	<0.010	0.6	9.6	

Table 16 Western tributary 26 January 2021

26 January 2021	DO	PERSAT	TEMP	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	Free Ammonia as N
Site	g/m³	%	°C	g/m³	g/m³	mS/m	MPN /100 ml	g/m³
INH000433	8.44	87.5	16.7	34	0.009	31.0	248	<0.00012
INH000435	8.68	93.7	18.8	40	0.009	34.2	649	<0.00017
INH000440	9.17	98.6	18.1	47	0.008	40.2	649	<0.00015

SW2	Nitrate-N	Nitrate-N + Nitrite-N	Nitrite-N	pH	Total Ammoniacal-N	Total Biochemical Oxygen Demand ($TBOD_5$)	Turbidity - ISO 7027 Method
Site	g/m³	g/m³	g/m³	pH Units	g/m³	g O_2/m³	FNU
INH000433	2.1	2.1	0.003	7.6	<0.010	<0.4	15.6
INH000435	3.7	3.7	0.004	7.7	<0.010	0.5	7.4
INH000440	8.8	8.8	0.004	7.6	<0.010	<0.4	6.8

The analysis of the three monitoring rounds of the Western tributary indicated the following:

- Dissolved oxygen analysis recorded good oxygen saturation across the two rounds where dissolved oxygen was collected. This was found to be across all three sites, ranging 87.5-99.8 %, the corresponding concentrations ranged 8.44-10.83g/m³.
- Surface water temperatures ranged 9.2-18.8°C.
- Chloride concentrations ranged 25-47 g/m³, and generally increased in concentration down the length of the western tributary.
- Dissolved reactive phosphorus (DRP) ranged from 0.09-0.021 g/m³.
- Electrical conductivity (EC) ranged 22.5-40.2 mS/m, and generally increased in conductivity concentration down catchment.
- *E. coli* was measurable across all samples on all three sites, ranging 120-649 MPN/100 ml.
- Free ammonia ranged from below the LOD – 0.00008 g/m³.
- Nitrate nitrogen as well as nitrate/nitrite nitrogen results ranged from 2.1-8.8 g/m³. On each sampling round the concentration increased down the reach of the tributary, with the elevated concentration (8.8 g/m³) recorded in the January 2021 monitoring round.
- Nitrite nitrogen remained at low concentrations across all sites, ranging at trace concentrations, from 0.003-0.008 g/m³.
- pH results of the surface water ranged from 7.4-7.7 pH.
- Total biochemical oxygen demand ranged <0.04-0.7 g O_2/m³.
- Turbidity ranged 3.6-30 FNU.

In this monitoring period the Council collected an additional seven samples from the lower site (INH000440). The analysis is provided in Table 17.

Table 17 Spot sample lower site INH000440 western tributary 2020-2021 monitoring period

INH000440	DO	PERSAT	TEMP	Chloride	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Escherichia coli	
Date/unit	g/m³	%	°C	g/m³	g/m³	mS/m	cfu / 100 ml	
20 Jul 2020	10.77	95.6	10.1	50	0.011	37.2	210	
18 Aug 2020	NR	NR	9.1	46	0.01	36.7	80	
16 Nov 2020	9.59	94.4	14.7	43	0.010	36.9	530	
12 Jan 2021	9.69	100.7	17.2	45	0.013	38.5	550	
19 Feb 2021	9.72	90.6	12.5	52	0.007	42.3	500	
9 April 2021	8.38	82.3	14.6	56	0.011	45	450	
3 Jun 2021	10.72	92.5	8.9	51	0.014	40	300	
INH000440	**Free Ammonia as N**	**Nitrate-N**	**Nitrate-N + Nitrite-N**	**Nitrite-N**	**pH**	**Total Ammoniacal-N**	**Total Biochemical Oxygen Demand ($TBOD_5$)**	**Turbidity - ISO 7027 Method**
Date/unit	g/m³	g/m³	g/m³	g/m³	pH Units	g/m³	g O_2/m³	FNU
20 Jul 2020	0.00006	5.1	5.2	0.007	7.4	0.013	0.6	9.2
18 Aug 2020	0.00007	6.8	6.8	0.005	7.5	0.012	0.8	6.9
16 Nov 2020	<0.00012	6.0	6.0	0.005	7.6	<0.010	0.5	7.0
12 Jan 2021	< 0.00014	7.6	7.6	0.004	7.6	< 0.010	0.6	8.7
19 Feb 2021	< 0.00009	9.3	9.3	0.002	7.6	< 0.010	0.6	2.5
9 April 2021	< 0.00007	10.7	10.7	0.008	7.4	< 0.010	0.8	8.6
3 Jun 2021	0.00011	7.7	7.7	0.011	7.6	0.017	1.7	13.6

- Dissolved oxygen ranged 8.38-10.77 %, with the corresponding concentrations ranging 82.3-100.7 g/m³.
- Temperature ranged 8.9-17.2°C.
- Chloride ranged quite stable across the five samples, ranging 45-56 g/m³.
- Dissolved reactive phosphorus ranged from 0.007-0.014 g/m³.
- EC ranged 36.7-45 mS/m.
- *E. coli* ranged 80-550 cfu/100 ml
- Free ammonia was recorded below the LOD to 0.00011 g/m³.
- Nitrate and nitrate/nitrite nitrogen ranged 5.1-10.7 g/m³ with the elevated result (10.7 g/m³) reported in the April 2021 monitoring round.
- Nitrite nitrogen was recorded at low concentrations, 0.002-0.011 g/m³.
- pH remained weakly alkaline, and ranged 7.4-7.6 pH.
- Ammoniacal nitrogen ranged from below the LOD to 0.017 g/m³.

Long term monitoring of nitrate/ nitrite nitrogen at the lowest site, INH000440, is provided in the following Figure 14. The analysis in the 2020-2021 monitoring period indicated a fluctuating, though decreasing trend in concentrations of this target analyte. The July 2020 monitoring result for nitrate (as NNN, Table 15), recorded the lowest concentration for this analyte (3.2 g/m³) since July 2013.

These preliminary results suggest a positive outcome from the Company's investment in better management of their wastewater land discharge, coupled with a decrease in fertiliser application, which has reduced the total nitrogen applied to land.

The median was calculated for this site from 37 samples collected since February 2018. The median was calculated as 8.4 g/m^3. This concentration exceeded the national bottom line, and was placed at attribute state D, for nitrate nitrogen in surface water, as defined in Figure 12.

Further monitoring of this location will determine over time, whether the Company's undertakings have been successful. The recent results are encouraging.

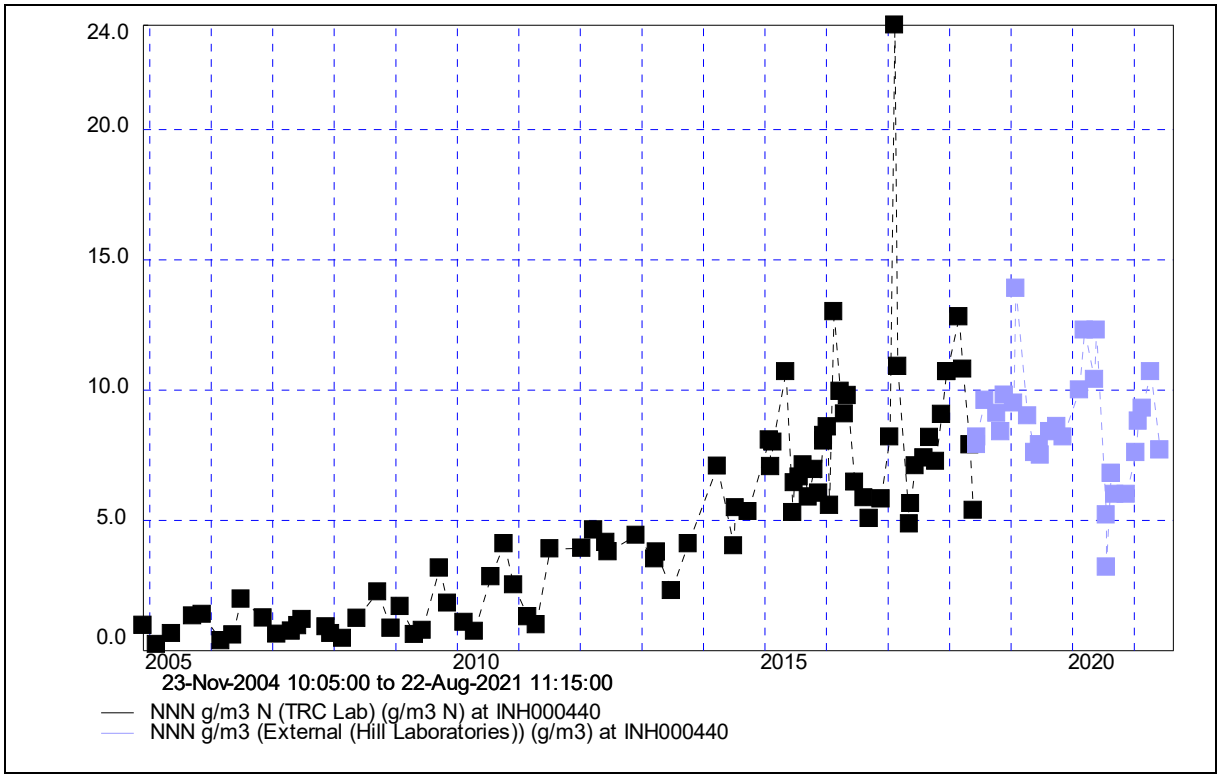

Figure 14 Long term monitoring INH000440 nitrate/nitrite 2005-2021

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 and sampling from the groundwater bores installed around the irrigation areas and 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 refer to Section 2.4.4.1 Technical Report 2018-70, referenced later in this report.

Previous years and current year loading rates

Table 17 provides a comparison of wastewater and fertiliser loading rates to land over the past three monitoring periods. The sources of data were compiled by the Company and provided to the Council as monthly reports.

Table 18 2019-2021 comparison loading rates of wastewater and fertiliser

Parameter	2018-2019 loading rates	2019-2020 loading rates	2020-2021 loading rates
Utilised land application area	322.76 ha	337.91 ha	329.05 ha
Total applied nitrogen (stickwater)	10,067 kg N/pa	2,121 kg N/pa	1,174.25 kg N/pa
Total nitrogen (wastewater)	43,738 kg N/pa	36,994 kg N/pa	34,002.00 kg N/pa
Combined nitrogen	53,805 kg N/pa	39,115 kg N/pa	35,176.25 kg N/pa
Calculated average loading rate	167 kg N/ha/pa	116 kg N/ha/pa	106.90 kg N/ha/pa
Highest application wastewater	Paddock 35 299 kg N/ha/pa	Paddock 13 248 kg N/ha/pa	Paddock 21 246.875 kg N/ha/pa
Highest application stickwater	Paddock 32 205 kg N/ha/pa	Paddock 27 36 kg N/ha/ pa	Paddock 1 45.55 kg N/ha/pa
Highest combined loading rate	Paddock 20 386 kg N/ha/pa	Paddock 13 248 kg N/ha/pa	Paddock 43 171.57 kg N/ha/pa

The data provided by the consent holder for irrigation of wastewater and fertiliser to land indicated the following:

- The total volume of wastewater discharged to land reduced by 2,992 kg N, when compared to the 2019-2020 monitoring period.
- The total volume of the fertiliser, stickwater, decreased by 946.75 kg N.
- The combined wastewater and stickwater discharged to land was reduced by 3,938.75 kg N in this monitoring period, when compared to the 2019-2020 monitoring period.
- No paddock exceeded 250 kg N/ha this monitoring period, Figure 15.
- The highest application was to paddock 2 which received wastewater only, 246.875 kg N/ha, Figure 15.

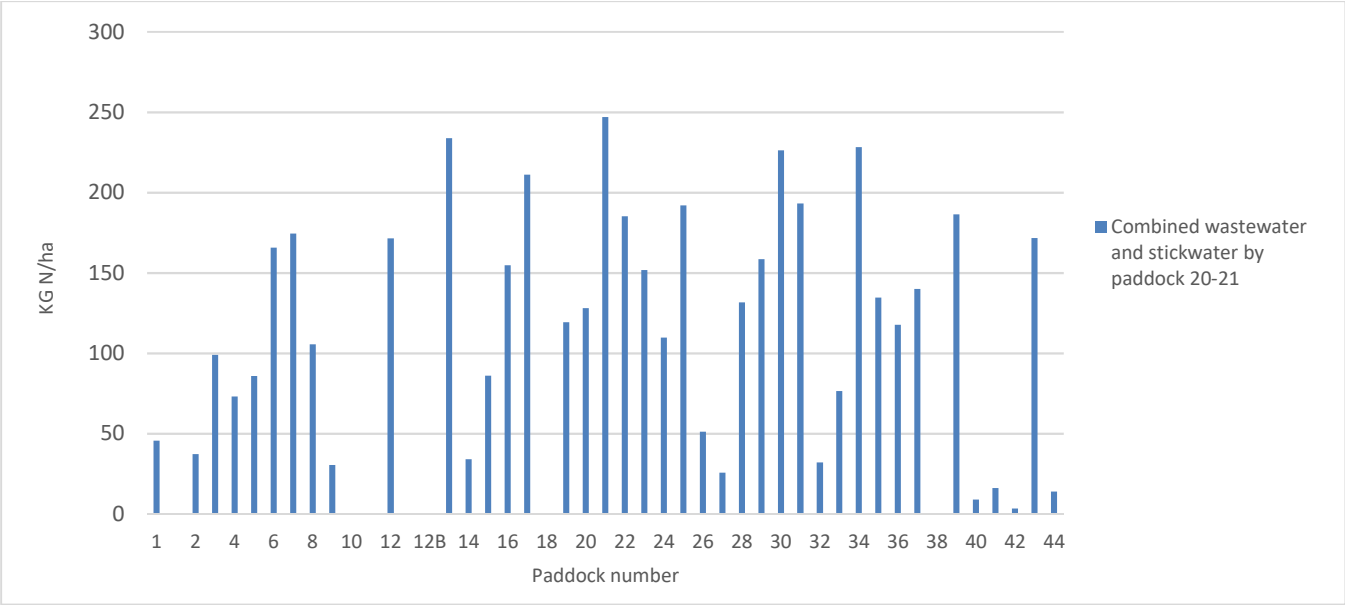

Figure 15 2019-2020 wastewater and fertiliser application kg N / ha by paddock

2.4.4.2 Groundwater monitoring of the irrigation areas

Background

Monitoring of the irrigation area is 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. 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 appears to be leading to an increase in surface water concentrations, specifically in the Western tributary which was discussed in Section 2.4.3.3.

In this monitoring period six rounds of groundwater monitoring were proposed. The results of the six monitoring rounds are provided in the following tables.

Table 19 Irrigation area groundwater monitoring well information

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

GND1054: The control bore. The analysis of the six rounds of monitoring is provided in the following Table 20. Groundwater level ranged 2.06 m across the six rounds. The temperature fluctuated, with a range of 1°C. Chloride analysis remained stable, with a range of 4 g/m^3. Electrical conductivity (EC) also remained stable, with a range of 2.3 mS/m. *E. coli* was below the LOD on four occasions with the highest concentration being 13 cfu/100ml in November 2020. Nitrate/nitrite nitrogen (NNN) indicated a relatively stable trend through the monitoring period, ranging by 0.9 g/m^3. pH results were weakly acidic, with a stable range of 0.2 pH. Total ammoniacal nitrogen results were below the LOD across five of six rounds.

Long term analysis of NNN concentrations are provided in Figure 16. This figure indicates a slow, but steady increase in NNN concentrations over time, though it should be noted that the concentrations of NNN remains below 11 g/m^3.

Table 20 GND1054 2020-2021 monitoring period

GND1054	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	m	8.95	8.64	7.28	6.89	7.5	8.07
TEMP	°C	14.2	14.1	14.3	15.1	14.4	14.6
Chloride	g/m^3	47	49	48	45	45	44
Electrical Conductivity	mS/m	34.8	35.5	37.1	35.7	34.9	34.9
Escherichia coli	cfu / 100 ml	1	<1	13	<1	<1	<1
Nitrate-N + Nitrite-N	g/m^3	9.9	9.9	10.7	9.8	9.8	10
pH	pH Units	6.4	6.6	6.5	6.5	6.5	6.5
Total Ammoniacal-N	g/m^3	< 0.010	0.014	<0.010	<0.010	<0.010	<0.010

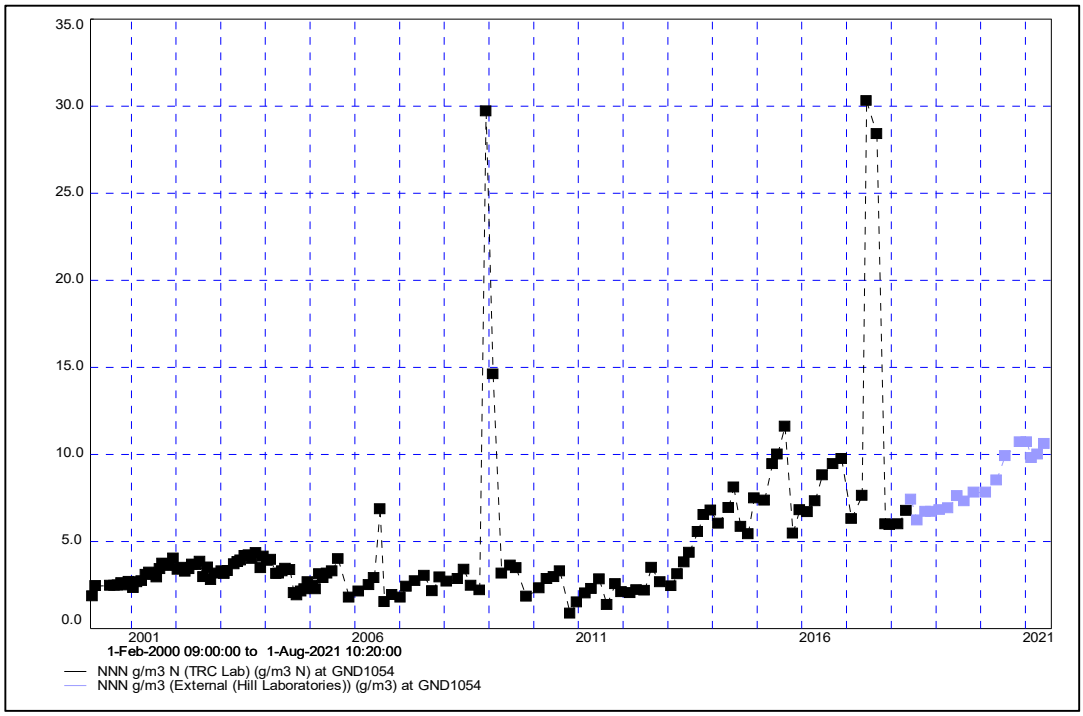

Figure 16 Long term NNN monitoring GND1054 2000-2021

GND1056: Located to the south east of the facility in paddock 12. Paddock 12 received wastewater applications only during this period, at a quantity of 171 kg N per ha. The results of the six rounds are provided in Table 21. Groundwater level fluctuated 2.42 m this monitoring period. The associated temperature ranged 0.9°C. Chloride results varied throughout the monitoring period, ranging 19 g/m^3. Similarly, conductivity ranged 14.5 mS/m, with the highest concentrations in January and February 2021.

E. coli results ranged from below the LOD to 20 cfu/100 ml. Nitrate/nitrite (NNN) nitrogen results remained low but increased during January and February 2021 in this monitoring period, with a range of 10.8 g/m^3. pH results remained stable and weakly acidic, ranging 0.3 pH. Total ammoniacal nitrogen results were below the limit of detection (LOD) across all six rounds.

Long term monitoring of target contaminant NNN is provided in Figure 17. This figure indicates the contaminant remains at a low concentration within this monitoring well.

Table 21 GND1056 2020-2021 monitoring period

GND1056	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	m	10.62	10.44	9.65	8.2	8.7	9.39
TEMP	°C	14.5	14.7	15.3	15.3	15.4	14.9
Chloride	g/m^3	41	42	41	60	60	42
Electrical Conductivity	mS/m	26.2	27.5	27.8	40.7	39.6	29
Escherichia coli	cfu / 100 ml	2	1	<1	20	20	1
Nitrate-N + Nitrite-N	g/m^3	2.8	2.9	3.9	13.6	12.1	5
pH	pH Units	6.5	6.8	6.5	6.5	6.5	6.5
Total Ammoniacal-N	g/m^3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

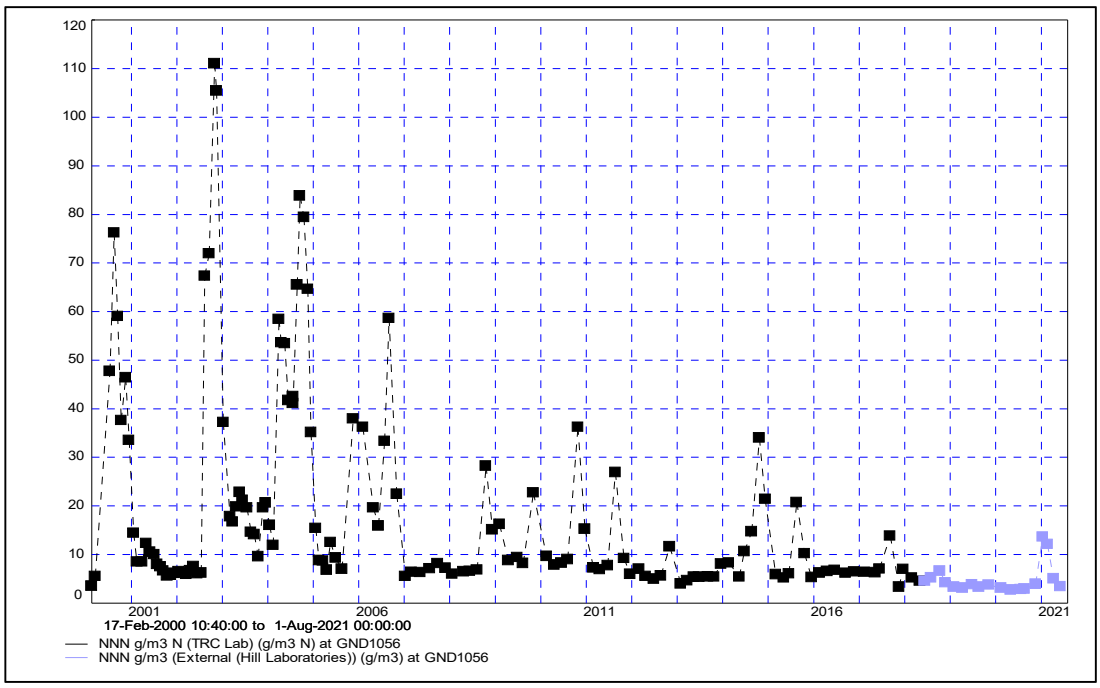

Figure 17 Long term NNN monitoring GND1056 2000-2021

GND1057: Located in paddock 14, which is to the south-south east of the facility. This paddock received 33.9 kg N/ha this monitoring period of wastewater only. The results of the six rounds are provided in Table 22.

Groundwater level fluctuated 1.94 m this monitoring period. The associated temperature range was 0.6°C. Chloride results varied 7 g/m^3, and demonstrated a slight increase in concentration through the monitoring period. Electrical conductivity ranged 15.3 mS/m and also demonstrated an increase through the monitoring period. *E. coli* results were at low concentrations, with a range from the LOD to 2 cfu/100 ml.

Nitrate/nitrite nitrogen (NNN) ranged 18.3 g/m^3, and demonstrated an increase towards January and February and then a decrease in April. Long term monitoring of NNN concentrations is provided in Figure 18. This figure indicates a slight increasing trend with time. pH remained weakly acidic and stable with a range of 0.4 pH. Total ammoniacal nitrogen was below the LOD in all six rounds.

Table 22 GND1057 2020-2021 monitoring period

GND1057	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	**m**	7.58	6.64	6.08	5.64	N/P	6.89
TEMP	**°C**	14.5	14.3	14.5	14.9	14.9	14.8
Chloride	**g/m^3**	49	52	52	55	55	56
Electrical Conductivity	**mS/m**	39.4	42.5	44.7	54.5	54.3	53.3
Escherichia coli	**cfu / 100 ml**	<1	<1	2	1	1	<1
Nitrate-N + Nitrite-N	**g/m^3**	12.7	13.9	17.2	31	31	26
pH	**pH Units**	6.5	6.8	6.5	6.5	6.4	6.4
Total Ammoniacal-N	**g/m^3**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

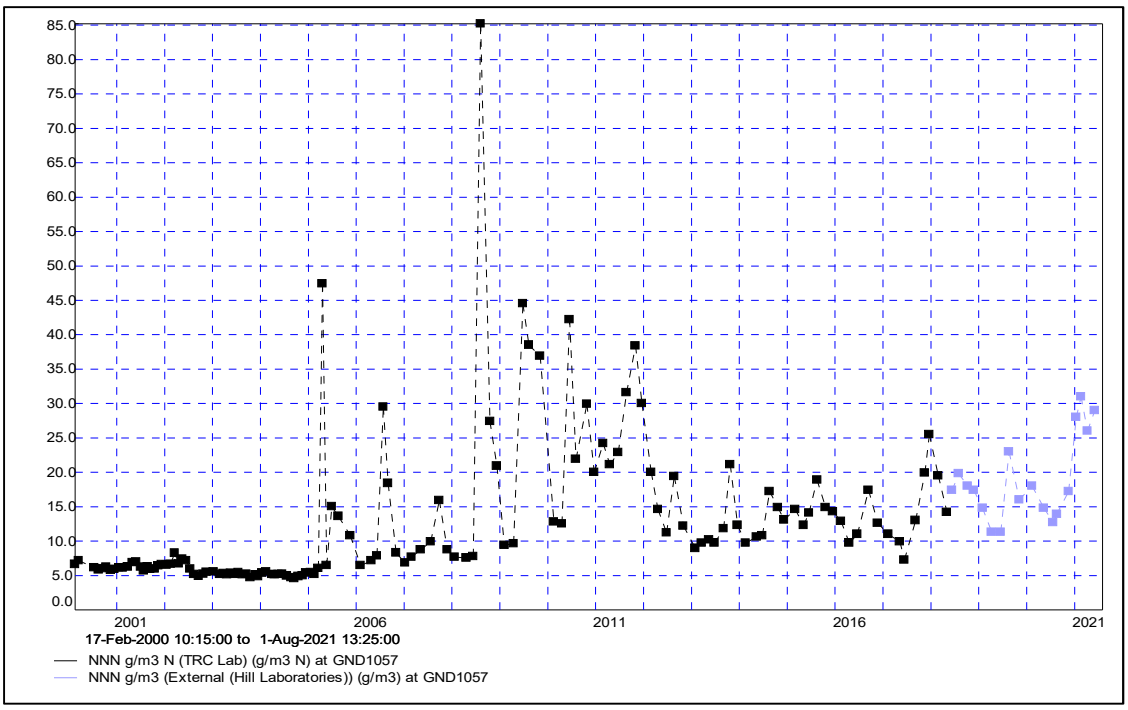

Figure 18 Long term NNN monitoring GND1057 2000-2021

GND1058: This monitoring location is called Te Kopanga Spring. It supplies a number of houses with water in the near vicinity. It also holds significant value for the local Hapu, Ngati Manuhiakai. No water level is obtained from this spring water source. It is located on the boundary of paddock 17 and 16. In this monitoring period, paddock 17 received 211 kg N/ha of wastewater, while paddock 16 received a combined application of 154 kg N/ha.

Temperature of this location ranged 1.6°C. The chloride concentration ranged 4 g/m^3, while the associated conductivity ranged 1.3 mS/m. *E. coli* was below the LOD on all six occasions. Nitrate/nitrite nitrogen demonstrated a stable range of 0.4 g/m^3. pH remained stable and weakly acidic with a range of 0.1 pH units. No ammonia was recorded above the LOD.

Long term monitoring data for key contaminant NNN is provided in Table 19. The analysis has indicated a recent reduction in NNN concentrations. A reduction in NNN concentration in this location was a key requirement bestowed on the Company. So far the actions undertaken by the Company appear to be reducing the NNN concentration in this spring.

Table 23 GND1058 2020-2021 monitoring period

GND1058	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	**m**	N/P	N/P	N/P	N/P	N/P	N/P
TEMP	**°C**	15.4	14.8	15.6	16.4	16	15.9
Chloride	**g/m^3**	54	57	53	54	54	54
Electrical Conductivity	**mS/m**	33.4	34.2	33.3	33.4	32.9	33.6
Escherichia coli	**cfu / 100 ml**	<1	<1	<1	<1	<1	<1
Nitrate-N + Nitrite-N	**g/m^3**	4.1	3.7	3.7	4.1	4.1	3.8
pH	**pH Units**	6.8	6.8	6.7	6.7	6.7	6.7
Total Ammoniacal-N	**g/m^3**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

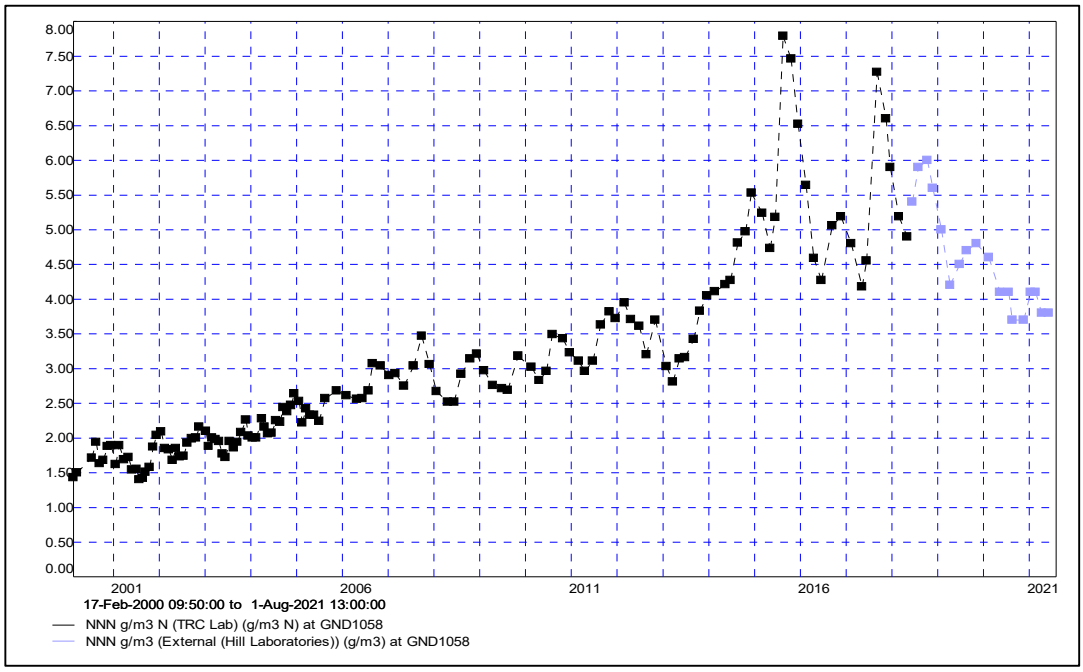

Figure 19 Long term NNN monitoring GND1058 2000-2021

GND1346: This monitoring location is located to the north west of the facility in between paddocks 35 and 36. Paddock 35 received 135 kg N/ha, while paddock 36 received 117 kg N/ha. The results are provided in Table 24. Groundwater ranged 1.6 m. The corresponding temperature ranged 0.3°C across the six rounds. Electrical conductivity remained relatively stable and ranged 7.4 mS/m. *E. coli* was below the LOD on two occasions and had a range of 52 cfu/100 ml.

Nitrate/nitrite nitrogen remained significantly elevated, with all results above 60 g/m^3, with a range of 5 g/m^3. pH remained stable and weakly acidic across the whole six rounds with a value of 6.3 pH units.

Total ammoniacal nitrogen was below the LOD on six occasions sampled.

Long term analysis of NNN in this monitoring location is provided in Figure 20. The recent analysis indicated a slight plateau in NNN concentrations, with the long term figure detailing a cyclical rise and fall of nitrogen concentration.

Table 24 GND1346 2020-2021 monitoring period

GND1346	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	m	4.38	3.81	4.22	4.26	4.94	5.41
TEMP	°C	14.5	14.4	14.4	14.7	14.4	14.6
Chloride	g/m^3	116	115	113	113	113	115
Electrical Conductivity	mS/m	105	101.2	105.3	108.6	108.4	106.9
Escherichia coli	cfu / 100 ml	1	10	52	<1	<1	1
Nitrate-N + Nitrite-N	g/m^3	71	67	69	72	70	71
pH	pH Units	6.3	6.3	6.3	6.3	6.3	6.3
Total Ammoniacal-N	g/m^3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

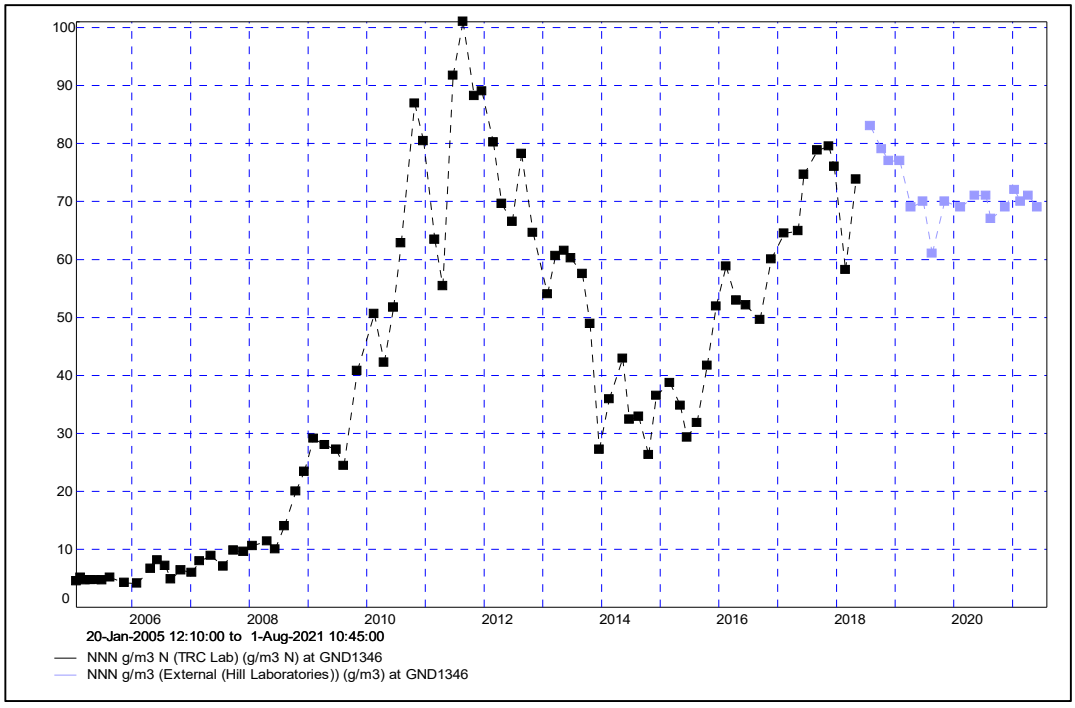

Figure 20 Long term NNN monitoring GND1346 2005-2021

GND1347: This bore is located to the west of the facility, close to the Shearer 200 kg nitrogen block, however not within it, on the eastern side of paddock 21. The paddock loading was recorded at 246 kg N/ha from wastewater only. The analysis of the six monitoring rounds is provided in Table 25.

Groundwater level ranged 2.43 m this monitoring period. The associated temperature of the groundwater ranged 2.83°C. Chloride results showed a slight decreasing trend through the monitoring period, ranging 15 g/m^3 Electrical conductivity also demonstrated a decreasing concentration, with a range of 11.2 mS/m. *E. coli* was below the LOD on five of the six occasions, with the highest value being 5 cfu/100 ml. Nitrate/nitrite nitrogen concentrations demonstrated a decreasing concentration through the monitoring period, ranging 14 g/m^3

pH results were stable and weakly acidic, ranging 0.3 pH. Total ammoniacal nitrogen was not recorded above the LOD on all six occasions. Long term analysis of NNN in this monitoring well is provided in Figure 21. The long term analysis indicates a slight plateau in results, fluctuating between 50-70 g/m^3

Table 25 GND1347 2020-2021 monitoring period

GND1347	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	m	9.35	7.75	7.12	6.92	7.94	8.86
TEMP	°C	14.6	12.17	14.6	14.8	14.9	15
Chloride	g/m^3	105	105	102	90	95	98
Electrical Conductivity	mS/m	95.1	93.2	92.2	83.9	88.1	88.4
Escherichia coli	cfu / 100 ml	<1	<1	5	<1	<1	<10
Nitrate-N + Nitrite-N	g/m^3	66	62	60	52	56	56
pH	pH Units	6.5	6.4	6.2	6.3	6.3	6.2
Total Ammoniacal-N	g/m^3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

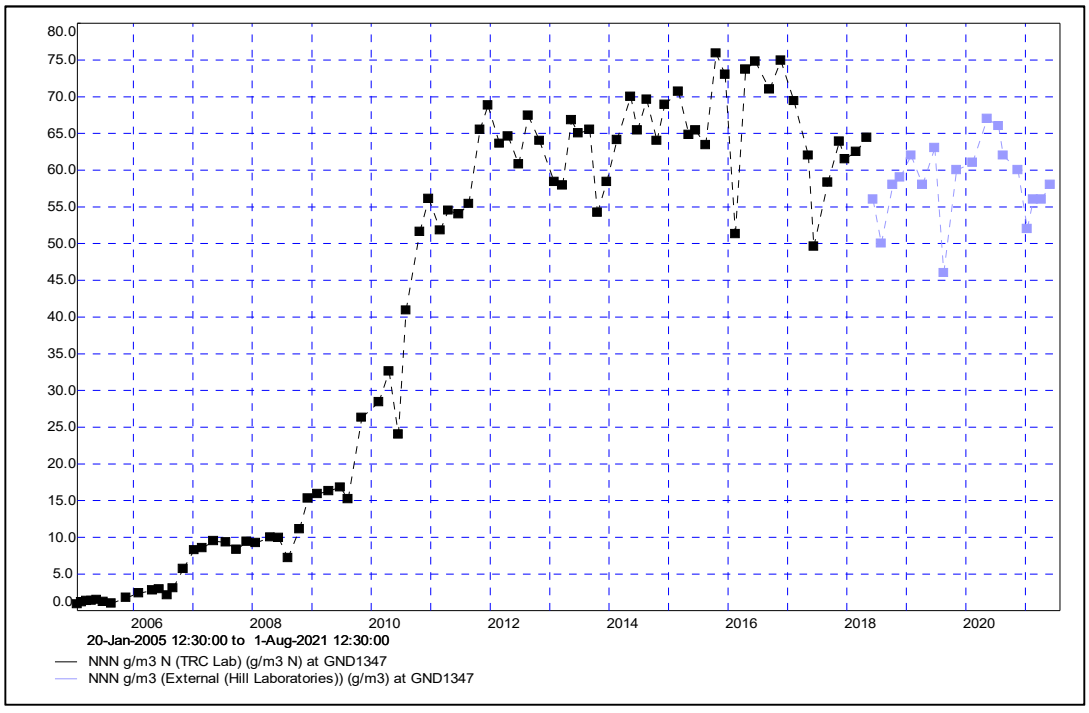

Figure 21 Long term NNN monitoring GND1347 2005-2021

GND1348: This bore is located to the north east of the facility, in paddock 8, which is close to the Inaha Stream. The associated nitrogen loading was conveyed as 105 kg N/ha of wastewater only. Monitoring of GND1348 is provided in Table 26.

Groundwater level ranged 1.41 m. The associated temperature ranged 1.4°C. Chloride ranged 23 g/m^3 and indicated an increasing concentration through the year. Electrical conductivity ranged 16.6 mS/m.

E. coli was below the LOD on four of the six monitoring rounds and had a range of 9 cfu/100 ml. Nitrate nitrite nitrogen ranged 44.1 g/m^3 and demonstrated an increasing concentration through the monitoring period, with August 2020 having a significantly lower value. pH remained stable and weakly acidic, ranging 0.3 pH. Total ammoniacal nitrogen was below the LOD across all five of the six monitoring rounds, with August exhibiting 0.014 g/m^3

Figure 22 provides the long term assessment of NNN at this monitoring location. This shows a significant variation across the last few monitoring years. More recently the degree of variation (barring August 2020) has decreased, with a reduction in significantly elevated concentrations reducing annually.

Table 26 GND1348 2020-2021 monitoring period

GND1348	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	**m**	11.38	11.17	10.68	9.97	10.23	10.71
TEMP	**°C**	14.1	14.6	15.3	15.5	14.8	14.9
Chloride	**g/m^3**	76	90	85	94	94	99
Electrical Conductivity	**mS/m**	72.3	78	77.6	82.6	82.6	88.9
Escherichia coli	**cfu / 100 ml**	<1	10	1	<1	<1	<10
Nitrate-N + Nitrite-N	**g/m^3**	46	9.9	44	47	47	54
pH	**pH Units**	6.3	6.6	6.4	6.4	6.4	6.4
Total Ammoniacal-N	**g/m^3**	<0.010	0.014	<0.010	<0.010	<0.01	<0.010

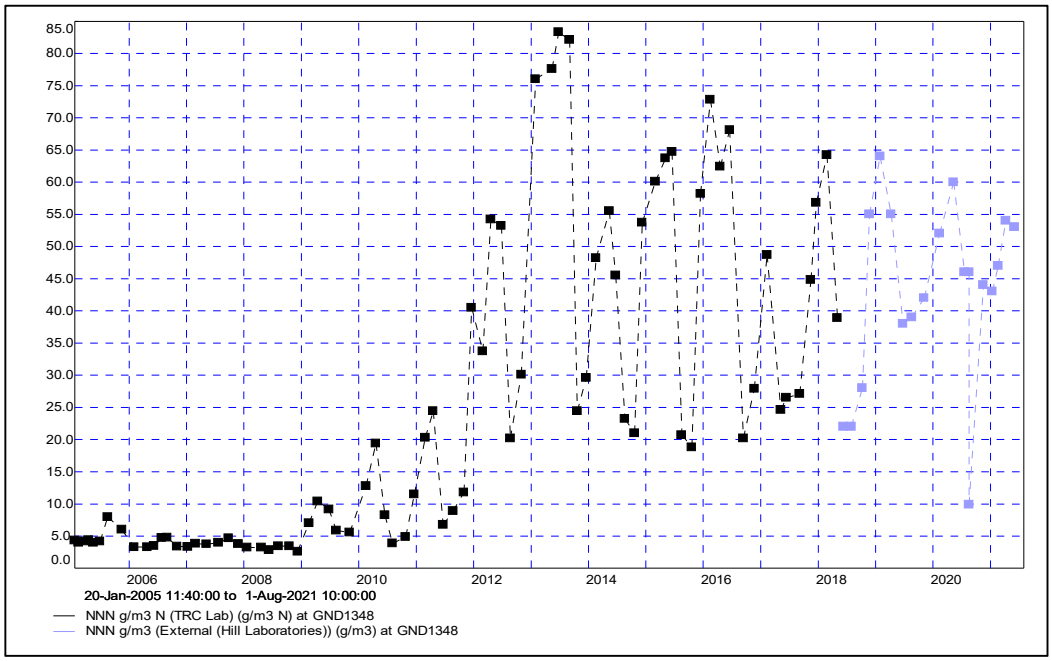

Figure 22 Long term NNN monitoring GND1348 2005-2021

GND1349: This is located on the western side of the Western tributary of the Inaha Stream in paddock 26. Paddock loading was recorded at a combined 51 kg N/ha. The six rounds of monitoring are provided in Table 27. The analysis indicated the following:

Groundwater level ranged 1.5 m. The corresponding temperature ranged 0.6°C. Chloride remained stable during the monitoring period, ranging 2 g/m^3 Electrical conductivity increased in concentration and ranged 9.1 mS/m. *E. coli* was recorded in five of the six rounds, with a range of 30 cfu/100 ml.

Nitrate nitrite nitrogen remained stable and elevated, with a range of 14 g/m^3. pH was stable at 6.3 pH, with a variance of 0.1 pH. Total ammoniacal nitrogen were all below the LOD. Figure 23 provides the long term analysis of NNN in this monitoring location. The recent analysis demonstrate a plateauing in elevated NNN results. This well had observed some significant variation in NNN concentration over the past few monitoring periods.

Table 27 GND1349 2019-2021 monitoring period

GND1349	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	m	11.93	11.86	11.39	10.43	10.76	11.14
TEMP	°C	14.5	14.3	14.4	14.9	14.8	14.6
Chloride	g/m^3	64	65	66	65	65	65
Electrical Conductivity	mS/m	77	77.4	86.3	86.5	86.5	86.1
Escherichia coli	cfu / 100 ml	2	<1	1	30	2	<10
Nitrate-N + Nitrite-N	g/m^3	42	45	56	56	56	55
pH	pH Units	6.4	6.3	6.3	6.3	6.3	6.3
Total Ammoniacal-N	g/m^3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

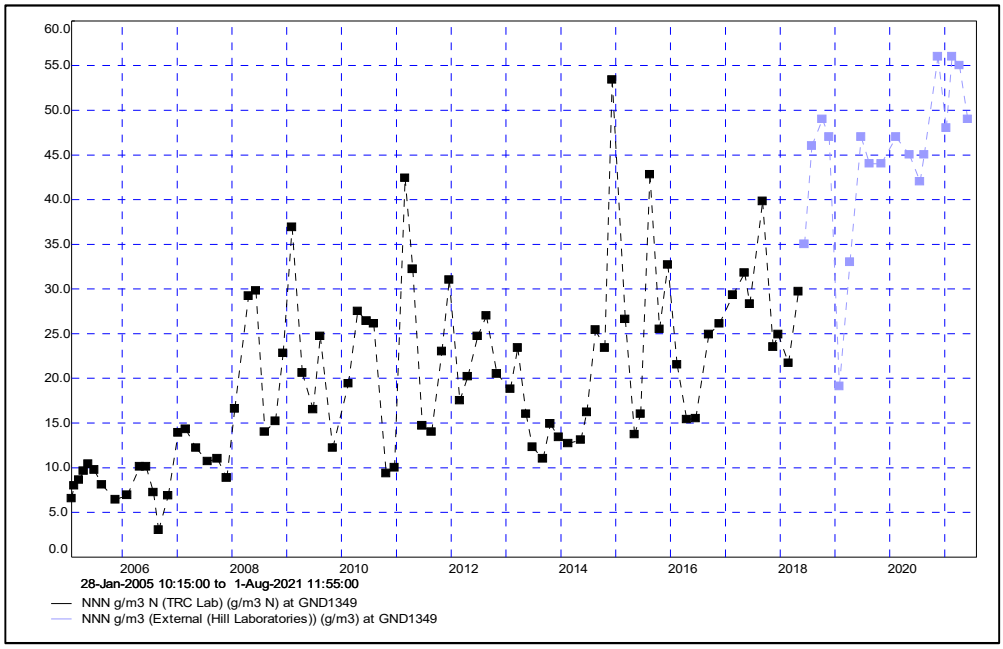

Figure 23 Long term NNN monitoring GND1349 2005-2021

GND2225: This well is located in the north western corner of the irrigation area, within paddock 34. This paddock received 228 kg N/ha this monitoring period, of wastewater only. The results of the six rounds are provided in Table 28. The groundwater level ranged 1.24 m. The temperature ranged 0.8 °C.

Chloride results were stable in concentration through the monitoring period, ranging 1 g/m^3. Electrical conductivity increased slightly in concentration, ranging 13 mS/m. *E. coli* was recorded in five samples of six, ranging from 1-60 cfu/100 ml.

Nitrate nitrite nitrogen remained relatively stable, though increased slightly in concentration, ranging 13 g/m^3. pH remained stable ranging 0.3 pH for the duration. Total ammoniacal nitrogen was recorded on one occasion (August 2020) just above the LOD.

Long term analysis of NNN concentrations is provided in Figure 24. The analysis indicates that while the NNN concentrations remain elevated they are beginning to plateau.

Table 28 GND2225 2019-2021 monitoring period

GND2225	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	**m**	5.9	5.61	5.45	5.63	6.27	6.69
TEMP	**°C**	14.5	14.4	14.6	15.2	14.8	14.7
Chloride	**g/m^3**	93	94	93	93	93	94
Electrical Conductivity	**mS/m**	72.1	71.1	80.3	84.1	84.1	83.8
Escherichia coli	**cfu / 100 ml**	10	1	60	1	<1	1
Nitrate-N + Nitrite-N	**g/m^3**	41	39	49	52	52	50
pH	**pH Units**	6.2	6.5	6.3	6.3	6.3	6.2
Total Ammoniacal-N	**g/m^3**	<0.010	0.011	<0.010	<0.010	<0.010	<0.010

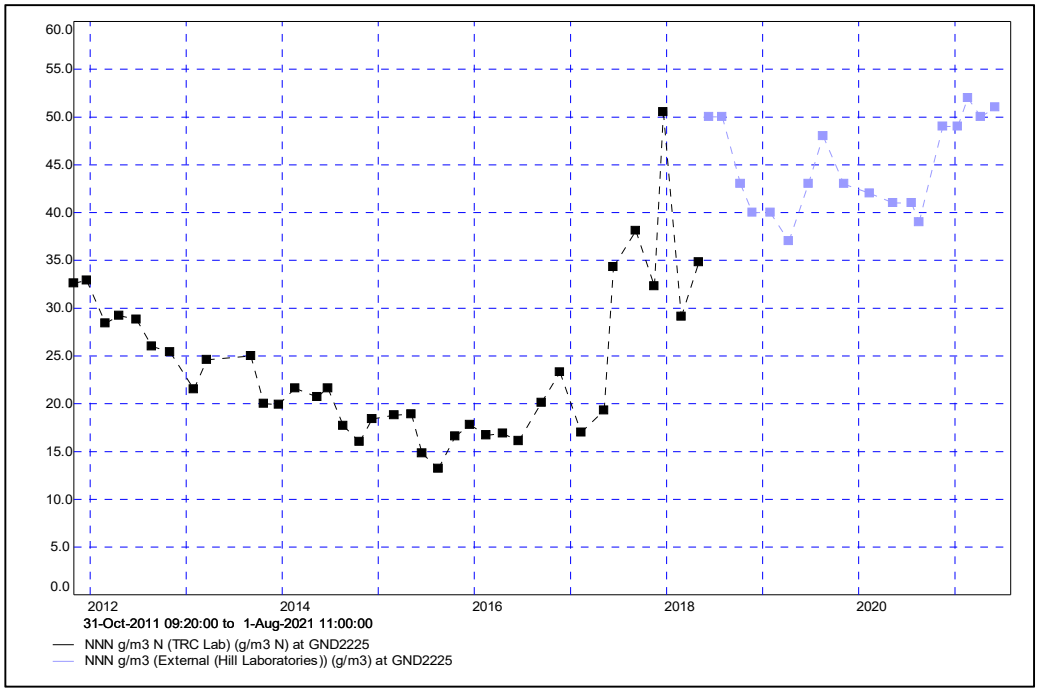

Figure 24 Long term NNN monitoring GND2225 2001-2021

GND2226: This monitoring well is located on the western side of the Western tributary of the Inaha Stream, in close proximity to the Inaha Road. It is cited in paddock 29. This paddock received 158 kg N/ha this monitoring period of wastewater only.

Results of the monitoring rounds are provided in Table 29. The groundwater level ranged 2.11 m this monitoring period. The associated temperature ranged 0.6°C. Chloride decreased slightly, with a range of 16 g/m^3. This slight decrease was also noted in the conductivity monitoring, with a range of 5.5 mS/m.

E. coli was below the LOD on four occasions with a range of 1-10 cfu/100. Nitrate nitrite nitrogen remained significantly elevated, though at a stable concentration, ranging 6 g/m^3. pH results were stable with a range of 0.3 pH. Ammoniacal nitrogen results were all below the LOD.

Figure 25 is the long term monitoring of NNN. The results indicate a plateauing in elevated concentrations of NNN, whereas in previous monitoring periods, this well had recorded a steady increase in concentrations.

Table 29 GND2226 2020-2021 monitoring

GND2226	Unit/Date	20 Jul 2020	18 Aug 2020	16 Nov 2020	12 Jan 2021	19 Feb 2021	9 April 2021
LEVEL	**m**	7.25	7.16	6.67	5.6	6.78	7.71
TEMP	**°C**	14.6	14.3	14.4	14.9	14.8	14.6
Chloride	**g/m^3**	173	180	170	166	164	166
Electrical Conductivity	**mS/m**	137	138.9	136.4	136.5	134	133.4
Escherichia coli	**cfu / 100 ml**	<1	<1	10	1	<1	<1
Nitrate-N + Nitrite-N	**g/m^3**	89	90	87	86	84	84
pH	**pH Units**	6.4	6.1	6.2	6.2	6.2	6.1
Total Ammoniacal-N	**g/m^3**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010

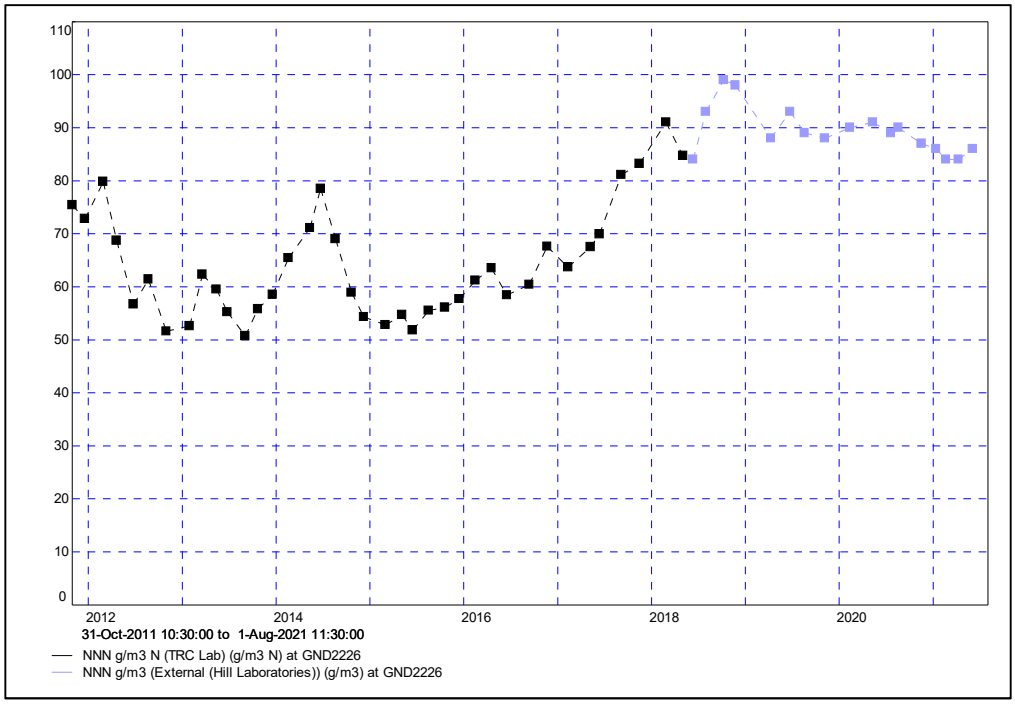

Figure 25 Long term NNN monitoring GND2226 2011-2021

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.

Sand trap waste was buried during the January 2020 period. The previous use of this area was in the 2017-2018 monitoring period where sand trap waste was also buried. Currently the consent holder is undertaking a consent renewal.

The current consent requirement for this activity is a minimum of eight monitoring wells. Over time, ten wells have been constructed (Figure 26) however site operations have adversely affected 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. With the advent of a new consent being issued there will be a requirement to install additional monitoring wells in future.

The analysis of the five monitoring wells is provided in the following Tables 29-33. In this monitoring period four rounds were planned and executed. On two separate occasions (July 2020 and June 2021) at well GND1067 water level was too low for analysis.

Figure 26 Burial groundwater monitoring well locations

Table 30 Burial pit monitoring well GND1063 2020-2021

GND1063	Unit/Date	28 Jul 2020	22 Oct 2020	20 Jan 2021	18 Jun 2021
LEVEL	m	9.37	8.12	7.24	8.985
TEMP	°C	14.2	14.7	14.4	14.8
Chemical Oxygen Demand (COD), trace level	g O_2/m^3	<6	8	<6	<6
Electrical Conductivity (EC)	mS/m	37	36.9	39.6	37.2
Nitrate-N + Nitrite-N	g/m^3	14.8	15.8	14.6	15.7
pH	pH Units	6.5	6.5	6.4	6.9
Total Ammoniacal-N	g/m^3	<0.010	<0.010	<0.010	<0.010

Table 31 Burial pit monitoring well GND1066 2020-2021

GND1066	Unit/Date	28 Jul 2020	22 Oct 2020	20 Jan 2021	18 Jun 2021
LEVEL	m	6.34	5.71	5.71	5.96
TEMP	°C	14.7	14.7	15.3	15.1
Chemical Oxygen Demand (COD), trace level	g O_2/m^3	77	42	12	42
Electrical Conductivity (EC)	mS/m	384	274	298	356
Nitrate-N + Nitrite-N	g/m^3	16	108	44	18.8
pH	pH Units	6.9	6.8	6.9	7.2
Total Ammoniacal-N	g/m^3	230	101	159	230

Table 32 Burial pit monitoring well GND1067 2020-2021

GND1067	Unit/Date	28 Jul 2020	22 Oct 2020	20 Jan 2021	18 Jun 2021
LEVEL	m	N/A	5.76	5.75	N/A
TEMP	°C	N/A	14.7	15.6	N/A
Chemical Oxygen Demand (COD), trace level	g O_2/m^3	N/A	<6	7	N/A
Electrical Conductivity (EC)	mS/m	N/A	53.8	68.2	N/A
Nitrate-N + Nitrite-N	g/m^3	N/A	3.2	6.4	N/A
pH	pH Units	N/A	6.3	6.3	N/A
Total Ammoniacal-N	g/m^3	N/A	0.012	<0.010	N/A

Table 33 Burial pit monitoring well GND1069 2020-2021

GND1069	Unit/Date	28 Jul 2020	22 Oct 2020	20 Jan 2021	18 Jun 2021
LEVEL	m	6.77	5.85	6.81	6.395
TEMP	°C	14.6	14.8	15.8	15.3
Chemical Oxygen Demand (COD), trace level	g O_2/m^3	80	18	7	44
Electrical Conductivity (EC)	mS/m	274	229	144.1	224
Nitrate-N + Nitrite-N	g/m^3	1.74	102	47	30
pH	pH Units	6.9	6.8	6.7	7.1
Total Ammoniacal-N	g/m^3	210	90	52	114

Table 34 Burial pit monitoring well GND2506 2020-2021

GND2506	Unit/Date	28 Jul 2020	22 Oct 2020	20 Jan 2021	18 Jun 2021
LEVEL	m	6.48	6.06	5.15	5.83
TEMP	°C	14.6	14.7	14.6	15.4
Chemical Oxygen Demand (COD), trace level	g O_2/m^3	<6	16	<6	<6
Electrical Conductivity(EC)	mS/m	22.4	94.4	87.9	45.9
Nitrate-N + Nitrite-N	g/m^3	3.6	9.2	8.8	3.8
pH	pH Units	6.6	6.4	6.4	6.6
Total Ammoniacal-N	g/m^3	<0.010	<0.010	<0.010	0.06

The analysis of the burial pit monitoring wells indicated the following:

- Groundwater temperature ranged 14.2-15.8°C across the four monitoring rounds.
- Chemical oxygen demand was recorded in all monitoring wells, though on three occasions (July 2020, Jan 2021, and June 2021), it was below the LOD (GND1063 and 2506) and in October 2020 in well GND1067. The range of the detected demand was 6-80 g O_2/m^3. Of the five wells, GND1066 on average held the highest chemical oxygen demand across the four monitoring rounds (Table 32), however GND1069 in July 2020 had the highest concentration.
- Electrical conductivity ranged 22.5-384 mS/m. GND1066 held the highest conductivity, ranging 274-384 mS/m across the four rounds.
- In terms of nitrate nitrite nitrogen (NNN), which was recorded in all five wells, the range was 1.74-108 g/m^3. Two wells (GND1066 and 1069) held a NNN concentration in excess of 50 g/m^3, recorded during the October 2020 monitoring round. In both cases the following sample round recorded a decrease in concentration. The other three monitoring wells (GND1063, 1067 and 2506) held concentrations below 30 g/m^3.
- The majority of the pH results were all weakly acidic, ranging 6.3-7.2 pH.
- Total ammoniacal nitrogen was below the LOD in GND2506 on three of four occasions, and on all occasions in GND1063. GND1067 (Table 32) held a low concentration of ammonia on one occasion. GND1066 and 1069 held significantly elevated concentrations for ammonia in comparison to the other wells, ranging 101-230g/m^3 in the case of GND1066 and 52-210 g/m^3 in the case of GND1069.

2.4.6 Biomonitoring

Taranaki By-Products Ltd hold a number of consents for discharges to land and to water, which are associated with the operation of a rendering plant and a neighbouring farm owned and operated by the Company. The discharge consents most relevant to this biomonitoring survey are summarised in Table 35 below.

Table 35 Relevant consents to biomonitoring

Consent no.	Purpose
2049-4	To discharge up to 940 m^3/day of treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream
2050-4	To discharge up to 2,160 m^3/day of cooling water and backwash water from a rendering operation into an unnamed tributary of the Inaha Stream
3941-2	To discharge up to 1400 m^3/day of treated wastewater from a rendering operation and from a dairy farm via spray irrigation onto and into land, and to discharge emissions into the air, in the vicinity of the Inaha Stream and its tributaries between 1700909E-5625245N, 1700631E-5625092N and 1700921E-5625046N
5426-1	To discharge up 1,095 L/s of stormwater from an animal rendering site into an unnamed tributary of the Inaha Stream

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

Method

Biomonitoring surveys were undertaken at eight sites on the 17 November 2020 and 23 February 2021 (Table 36 and Figure 27). Five of the eight sites surveyed were in the Inaha Stream and the remaining sites were in an unnamed tributary of the Inaha Stream. The locations of sampling sites in relation to the discharges from the rendering plant are discussed below.

Table 36 Biomonitoring sites associated Taranaki By-Products

Stream	Site Number	Site code	Grid reference (NZTM)	Location
Inaha Stream	U	INH000334	E1703013 N5625271	Upstream of irrigation area, near Ahipaipa Road
	1	INH000400	E1701874 N5624322	Upstream of treatment ponds, Kohiti Road
	2d	INH000420	E170202 N5623745	500 m downstream of cooling water discharge
	3	INH000430	E1701650 N5623262	Upstream of Normanby Road
	4	INH000450	E1701454 N5622948	100 m downstream of 'irrigation' tributary confluence
Unnamed tributary of Inaha Stream	UT	INH000433	E1701109 N5625496	Upstream of irrigation area
	MT	INH000435	E1700827 N5624524	Middle site within the new irrigation area
	DT	INH000440	E1701518 N5623227	50m upstream Normanby Road

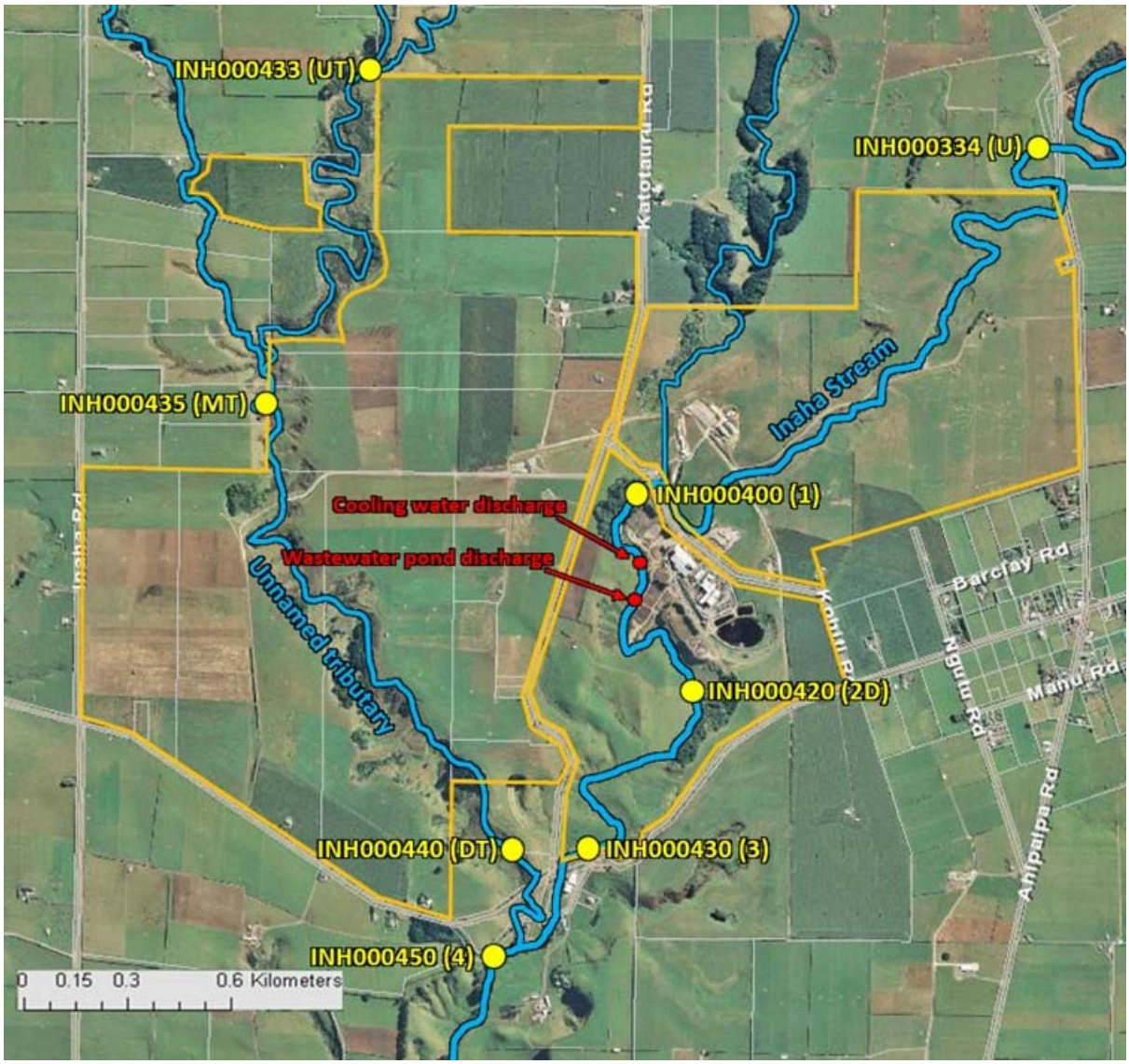

Figure 27 Taranaki By-Products biomonitoring site locations map

Two different sampling techniques were used to collect streambed macroinvertebrates in this survey, which was determined by the available sampling habitat. The Council's standard '400 ml kick-sampling' technique was used at sites U, 1, 2d 3, 4 and DT, while the 'vegetation sweep' sampling technique was used at site UT. A combination of the 'kick-sampling' and 'vegetation sweep' techniques was used at site MT. 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 ethanol for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark *et al.* 2001). Macroinvertebrate taxa abundances were scored based on the categories presented in Table 38.

Table 37 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. By averaging the scores obtained from a list of taxa collected from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution (Table 39). More 'sensitive' communities inhabit less polluted waterways. A difference of 10.83 units or more in MCI values is considered significantly different between individual kick samples (Stark 1998) and from past TRC experience is also significantly different between individual kick-samples and other values (medians, means, limits, expected values).

Table 38 Macroinvertebrate community health based on MCI and SQMCI ranges which has been adapted for Taranaki streams and rivers from Stark's classification (Stark, 1985 and Stark, 1998)

TRC Grading	MCI	SQMCI
Excellent	≥140	≥7.00
Very Good	120-139	6.00-6.99
Good	100-119	5.00-5.99
Fair	80-99	4.00-4.99
Poor	60-79	3.00-3.99
Very Poor	<60	<3.00

A semi-quantitative MCI value, SQMCI (Stark 1999) 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 scores, and dividing by the sum of the loading factors. 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). A difference of 0.83 units or more in SQMCI values is considered significantly different between individual kick samples (Stark 1998) and from past TRC experience is also significantly different between individual kick-samples and other values (medians, means, limits, expected values).

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

2.4.6.1 Results of the first biomonitoring survey 17 November 2020

This November 2020 survey followed a period of 7 days since a fresh in excess of three times median flow in the nearby Waiokura Stream at No. 3 Fairway (the nearest appropriate water level recorder), and 344 days since a fresh in excess of seven times median flow. In the month prior to this survey, there were six fresh events that kept flow above the median level. Two of these fresh events exceeded three times the median flow.

The Company's records showed that treated wastewater was not discharging to the Inaha stream at the time of this biological survey, with a period of cessation beginning on 21 October 2020. Cooling water was discharged to the stream throughout this period. The record shows that the minimum dilution of wastewater of 1:300 that is required under consent 2049-4 was maintained throughout the period.

Environmental data is presented in the Tables 39 and 40.

Table 39 Summary of the environmental data recorded at five sites in the Inaha Stream in relation to monitoring carried out for Taranaki By-products, 17 November 2020

Site number		Site U	Site 1	Site 2d	Site 3	Site 4
Site Code		INH000334	INH000400	INH000420	INH000430	INH000450
Sample Number		FWB20309	FWB20310	FWB20311	FWB20312	FWB20313
Time		13:10	12:45	12:30	10:05	09:35
Temperature		16.6	16.7	17.2	14.8	14.4
Water colour		Uncoloured	Uncoloured	Uncoloured	Uncoloured	Uncoloured
Water clarity		Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
Flow conditions		Moderate	Moderate	Moderate	Moderate	Moderate
Water speed		Swift	Swift	Swift	Swift	Swift
Sampling habitat		Riffle	Riffle	Riffle	Riffle	Riffle
Periphyton mats		Slippery	Patchy	Patchy	Slippery	Slippery
Periphyton filaments		None	Patchy	None	None	None
Moss		Patchy	Patchy	Patchy	Patchy	Patchy
Leaves		None	None	None	None	None
Wood		None	None	None	None	Patchy
Macrophytes		Edges Only	Edges Only	Edges Only	On Bed Too	Edges Only
Bank stability		Stable	Stable	Stable	Stable	Mostly Stable
Stock damage		None	None	None	None	None
Iron oxide or silt coating		No	No	No	No	No
Substrate embedded		No	No	No	No	No
Substrate disturbed		Moderate Kicking	Moderate Kicking	Moderate Kicking	Moderate Kicking	Very Easily
Bed shaded		Partial	No	No	No	Partial
Undercut banks		Yes	Yes	No	Yes	Yes
Overhanging vegetation		Yes	Yes	Yes	Yes	Yes
Substrate composition	Silt	0	5	5	5	10
	Sand	5	5	5	5	15
	Fine gravel	10	10	15	15	30
	Coarse gravel	25	15	20	25	15
	Cobble	50	50	50	40	20
	Boulder	10	15	5	10	5
	Bedrock	0	0	0	0	0
	Hard clay	0	0	0	0	0
	Wood/root	0	0	0	0	5
	Concrete/gabion	0	0	0	0	0

Table 40 Summary of the environmental data recorded at three sites in the unnamed tributary of the Inaha Stream in relation to monitoring carried out for Taranaki By-products, 17 November 2020

Site number		Site UT	Site MT	Site DT
Site Code		INH000433	INH000435	INH000440
Sample Number		FWB20314	FWB20315	FWB20316
Time		11:45	10:55	10:20
Temperature		14.5	15.4	14.7
Water colour		Uncoloured	Uncoloured	Uncoloured
Water clarity		Cloudy	Clear	Clear
Flow conditions		Moderate	Moderate	Moderate
Water speed		Slow	Swift	Swift
Sampling habitat		Run	Run	Riffle
Periphyton mats		None	Slippery	Patchy
Periphyton filaments		None	Patchy	Patchy
Moss		None	Patchy	Patchy
Leaves		Widespread	Patchy	None
Wood		Widespread	Patchy	None
Macrophytes		On Bed Too	On Bed Too	On Bed Too
Bank stability		Stable	Stable	Stable
Stock damage		None	Minor	None
Iron oxide or silt coating		No	No	No
Substrate embedded		No	No	No
Substrate disturbed		Very Easily	Very Easily	Moderate Kicking
Bed shaded		Complete	Partial	No
Undercut banks		No	No	No
Overhanging vegetation		Yes	Yes	Yes
Substrate composition	Silt	55	15	5
	Sand	5	5	5
	Fine gravel	5	15	10
	Coarse gravel	0	10	30
	Cobble	0	5	45
	Boulder	0	0	5
	Bedrock	0	0	0
	Hard clay	0	0	0
	Wood/root	35	50	0
	Concrete/gabion	0	0	0

A microscopic inspection of material collected from the bed of the Inaha Stream found no evidence of 'heterotrophic growths '(protozoa or fungi) at any of the sites sampled. This is an important result as the presence of such growths, often associated with 'sewage fungus,' is generally considered a sign that an organic wastewater discharge is overloading the assimilative capacity of the receiving waters, and detrimentally affecting the stream ecology. Such growths have been recorded on many previous sampling occasions, often in abundance, particularly downstream of the plant discharges at site 2d. The lack of such growths during the current survey is evidence that the degree of enrichment is not as severe as that recorded previously.

Taxa richness was moderately low in the Inaha Stream, however did not vary substantially between most sites. The 'control' site U recorded a richness of 14, which was the lowest taxa richness recorded for the site to date and lower than the previous survey (18), and the median (23) for the site. Site 1 recorded a slightly higher richness of 17 taxa, which was lower than both the median (22) and previous survey (24). Site 2d recorded 12 taxa which was substantially lower than that recorded by the previous survey (27) and the

median for the site (22). Site 3 also recorded 12 taxa, which was also substantially lower than that recorded by the previous survey (23) and the median for the site (20). Site 4 recorded the highest taxa richness of the five Inaha Stream sites surveyed (22), which was lower than the median for the site (25), but slightly higher than that recorded by the previous survey (17) Table 41.

Table 41 Summary of previous numbers of macroinvertebrate taxa and MCI and SQMCI values for surveys between September 1987 and March 2020 together with current results recorded in the Inaha Stream and an unnamed tributary in relation to Taranaki By-Products

Site	Numbers of taxa					MCI values				SQMCI values				
	N	Range	Median	Previous Survey	Current Survey	Range	Median	Previous Survey	Current Survey	N	Range	Median	Previous Survey	Current Survey
U	40	17-34	23	18	14	81-102	93	92	109	40	3.8-6.9	5.3	6.0	5.4
1	80	12-31	22	24	17	82-104	95	101	98	56	3.6-6.3	5.1	5.9	5.6
2d	68	10-30	22	27	12	52-106	82	90	102	57	1.2-6.5	2.3	3.7	4.6
3	81	6-35	20	23	12	43-108	83	90	92	57	1.3-6.5	2.8	4.9	5.0
4	37	12-31	25	17	22	77-106	90	96	97	37	2.0-6.6	4.8	5.4	4.5
UT	19	9-23	15	14	11	64-115	97	94	76	19	1.6-6.3	5.3	5.0	4.8
MT	32	10-29	19	10	18	70-94	83	86	82	32	3.1-5.7	4.5	4.7	4.9
DT	33	12-25	20	16	16	80-106	90	94	84	33	3.5-5.6	4.6	5.1	5.3

The MCI scores recorded in the current survey categorised 'control' site U and site 2d as having 'good' macroinvertebrate community health, while sites 1, 3 and 4 recorded 'fair' health. Site U recorded the highest MCI score of 109 MCI units, which was significantly higher than those scores recorded downstream at sites 1, 3 and 4 (by 11, 17 and 12 MCI units respectively), and slightly higher than that recorded at site 2d (by 7 MCI units). The SQMCI can be more sensitive to organic pollution compared with the MCI, as it also takes into account taxa abundances. SQMCI scores ranged between 4.5 and 5.6 units and categorised sites U, 1 and 3 as being in 'good' health, while sites 2d and 4 recorded 'fair' health. Site 1 recorded the highest SQMCI score of 5.6 units, which was a significant 1.0 unit and 1.1 units higher than that recorded at sites 2d and 4 respectively. Site U recorded the second highest SQMCI score of 5.4 units, which was a significant 0.9 unit higher than that recorded at site 4. There were no significant differences recorded between sites 2d, 3 and 4, which recorded SQMCI scores of 4.6 units, 5.0 units and 4.5 units respectively. Characteristic to all of the Inaha Stream sites surveyed the 'highly sensitive' mayfly taxon (*Deleatidium*) and 'moderately sensitive' caddisfly taxon (*Pycnocentrodes*) were present. Two additional taxa were dominant at the four downstream sites only; including the snail taxon (*Potamopyrgus*) and caddisfly taxon (*Hydropsyche-formerly Aoteapsyche*). Oligochaete worms were also dominant at sites 2d, 3 and 4, while Elmid beetles were dominant at sites U, 1 and 3. The mayfly taxon (*Austroclima*) was dominant at site 1 only, while dobsonfly larvae (*Archichauliodes*) was dominant at site 3 only.

Taxa richness was moderate to moderately low in the unnamed tributary of the Inaha Stream, with 11, 18 and 16 taxa recorded at sites UT, MT and DT respectively. Site UT recorded the lowest taxa richness, which was lower than both the median for the site (15) and the previously recorded richness (14). Site MT recorded a taxa richness similar to the median for the site (19), but higher than that recorded by the previous survey (10), while downstream site DT recorded a taxa richness slightly lower than the median for the site (20), but the same as that recorded in the previous survey. Taxa richness was lower than the median richness of 22 recorded by 'control' sites across similar streams at comparable altitudes across the region.

The MCI scores recorded in the current survey categorised site UT as having 'poor' health, while sites MT and DT recorded 'fair' health. Despite this decline in macroinvertebrate 'health' category, between the upstream and two downstream sites, there were no significant differences in MCI scores recorded between the three sites surveyed. There were no significant differences in SQMCI scores recorded between the three sites surveyed. SQMCI scores were 4.8, 4.9 and 5.3 units at sites UT, MT and DT respectively.

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

2.4.6.2 Results of the second biomonitoring survey 23 February 2021

This February 2021 survey followed a period of seven days since a fresh in excess of three times median flow in the nearby Waiokura Stream at No. 3 Fairway (the nearest appropriate water level recorder), and 89 days since a fresh in excess of seven times median flow. Aside from the fresh that occurred seven days prior to this survey, in the month prior to this survey flow was either near to or slightly below the median level.

The Company's records showed that treated wastewater was not discharging to the Inaha stream at the time of this biological survey, with a period of cessation beginning on 14 December 2020. Cooling water was discharged to the stream throughout this period. The record shows that the minimum dilution of wastewater of 1:300 that is required under consent 2049-4 was maintained throughout the period.

Heterotrophic growths have also occurred in the Inaha Stream downstream of the rendering plant. A microscopic inspection of material collected from the bed of the Inaha Stream found no evidence of such growths at any of the sites sampled. This is an important result as the presence of such growths, often associated with 'sewage fungus,' is generally considered a sign that an organic wastewater discharge is overloading the assimilative capacity of the receiving waters, and detrimentally affecting the stream ecology. The lack of such growths during the current survey is evidence that the degree of enrichment is not as severe as that recorded previously.

Taxa richness was moderate in the Inaha Stream, ranging between 15 and 22 taxa. In comparison to the previous survey, site 4 recorded a slightly lower taxa richness while the upstream sites recorded slightly higher taxa richness. Taxa richness was either the same (site U), or lower than site medians (sites 1, 2d, 3 and 4). There was no evidence of a toxic discharge, which could dramatically lower taxa richness, Table 42.

Table 42 Summary of previous numbers of macroinvertebrate taxa and MCI and SQMCI values for surveys between September 1987 and November 2020 together with current results recorded in the Inaha Stream and an unnamed tributary in relation to Taranaki By-Products

Site	Numbers of taxa					MCI values				SQMCI values				
	N	Range	Median	Previous Survey	Current Survey	Range	Median	Previous Survey	Current Survey	N	Range	Median	Previous Survey	Current Survey
U	41	14-34	22	14	22	81-109	93	109	95	41	3.8-6.9	5.3	5.4	5.8
1	81	12-31	22	17	20	82-104	95	98	102	57	3.6-6.3	5.1	5.6	5.4
2d	69	10-30	21	12	17	52-106	82	102	92	58	1.2-6.5	2.3	4.6	4.6
3	82	6-35	20	12	15	43-108	83	92	101	58	1.3-6.5	2.8	5.0	5.7
4	38	12-31	25	22	19	77-106	91	97	104	38	2.0-6.6	4.8	4.5	5.5
UT	20	9-23	15	11	15	64-115	97	76	84	20	1.6-6.3	5.3	4.8	5.3
MT	33	10-29	19	18	13	70-94	83	82	94	33	3.1-5.7	4.5	4.9	5.0
DT	34	12-25	20	16	15	80-106	90	84	104	34	3.5-5.6	4.7	5.3	5.1

The MCI scores recorded in the current survey categorised 'control' site U and site 2d as having 'fair' macroinvertebrate community health, while sites 1, 3 and 4 recorded 'good' health. MCI scores were similar across the five site surveys with only sites 2d and 4 recording MCI scores that were significantly different to one another. Site 4 recorded the highest MCI score of 104 MCI units, which was a significant 12 MCI units higher than that recorded at site 2d. The MCI score recorded at site 1 (located upstream of the wastewater and cooling water discharge points but downstream of part of the treated wastewater irrigation area), was 7 units higher than that recorded upstream at 'control' site U. The SQMCI can be more sensitive to organic pollution compared with the MCI, as it also takes into account taxa abundances. SQMCI scores ranged between 4.6 and 5.8 units and categorised site 2d as being in 'fair' health, and the remaining sites in 'good' health, Figures 29-35.

There were no significant differences in SQMCI scores between sites U, 1, 3 and 4, while the SQMCI score recorded at site 2d was significantly lower than those recorded at sites U, 3 and 4 (by 1.2, 1.1 and 0.9 units respectively) and substantially lower than that recorded upstream at site 1 (by 0.8 unit). Characteristic to all of the Inaha Stream sites surveyed the 'highly sensitive' mayfly taxon (*Deleatidium*), and three 'moderately sensitive' taxa (mayfly (*Austroclima*), caddisfly (*Pycnocentrodes*) and beetle (Elmidae)) were present.

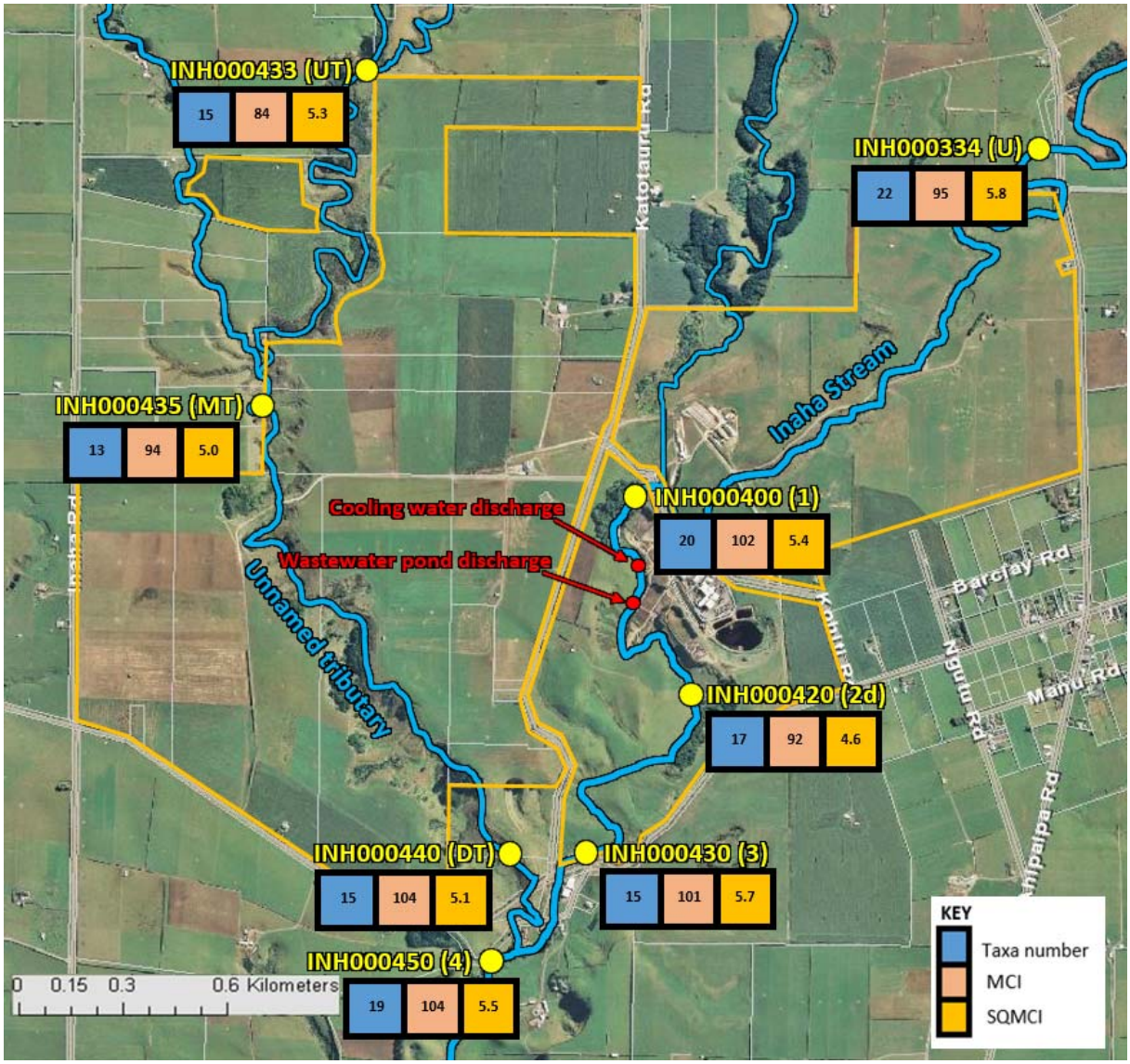

Figure 28 Location of biomonitoring sites in the Inaha Stream and an unnamed tributary of the Inaha Stream in relation to discharges from the Taranaki By-Products plant, with taxa number, MCI scores and SQMCI scores for each site. The orange line outlines the irrigation areas around the rendering plant

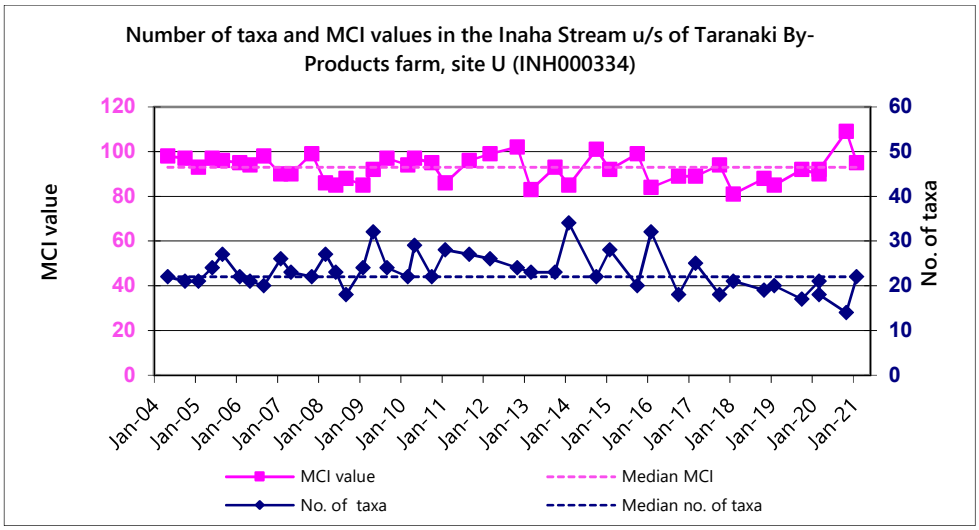

Figure 29 Number of taxa and MCI scores at site U in the Inaha Stream, upstream of irrigation area, near Ahipaipa Road

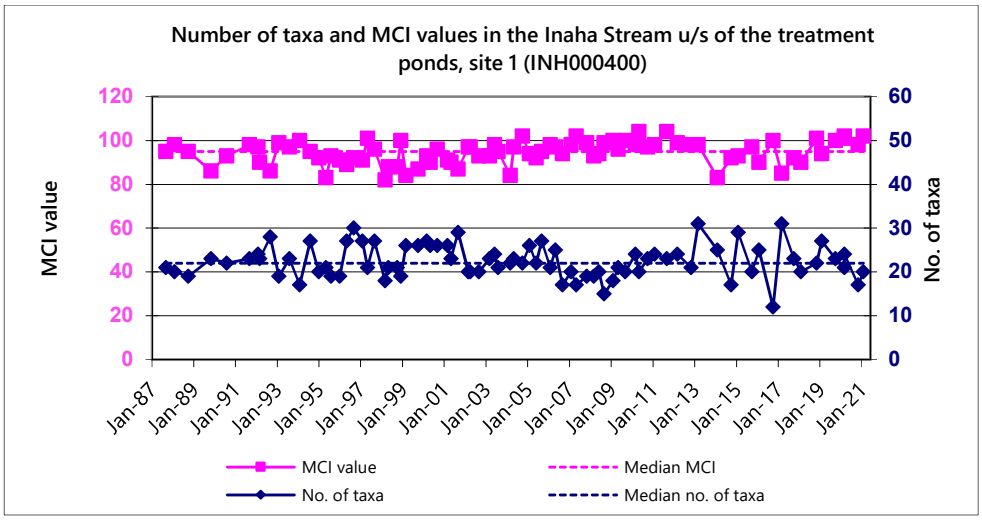

Figure 30 Number of taxa and MCI scores at site 1 in the Inaha Stream, upstream of treatment ponds, Kohiti Road

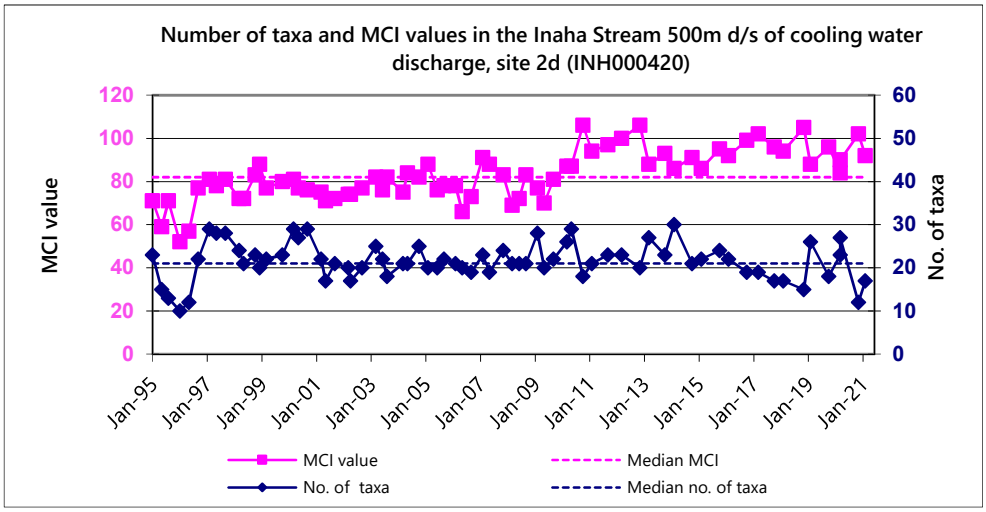

Figure 31 Number of taxa and MCI scores at site 2d in the Inaha Stream, 500 m downstream of cooling water discharge

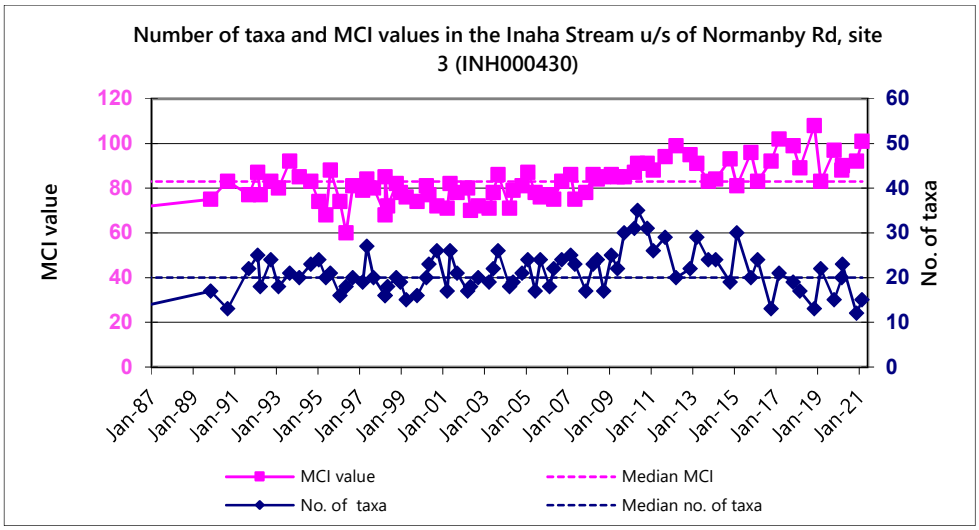

Figure 32 Number of taxa and MCI scores at site 3 in the Inaha Stream, upstream of Normanby Road

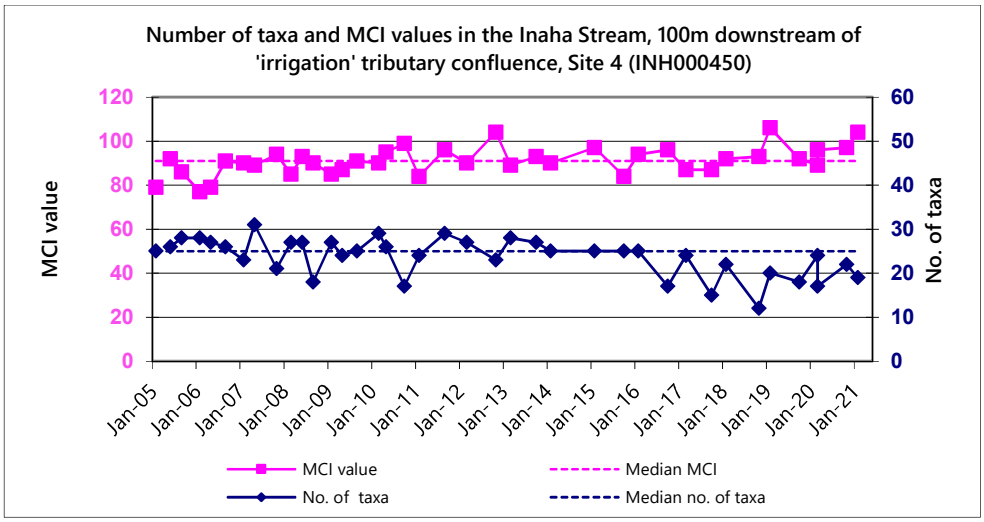

Figure 33 Number of taxa and MCI scores at site 4 in the Inaha Stream, 100 m downstream of 'irrigation' tributary confluence

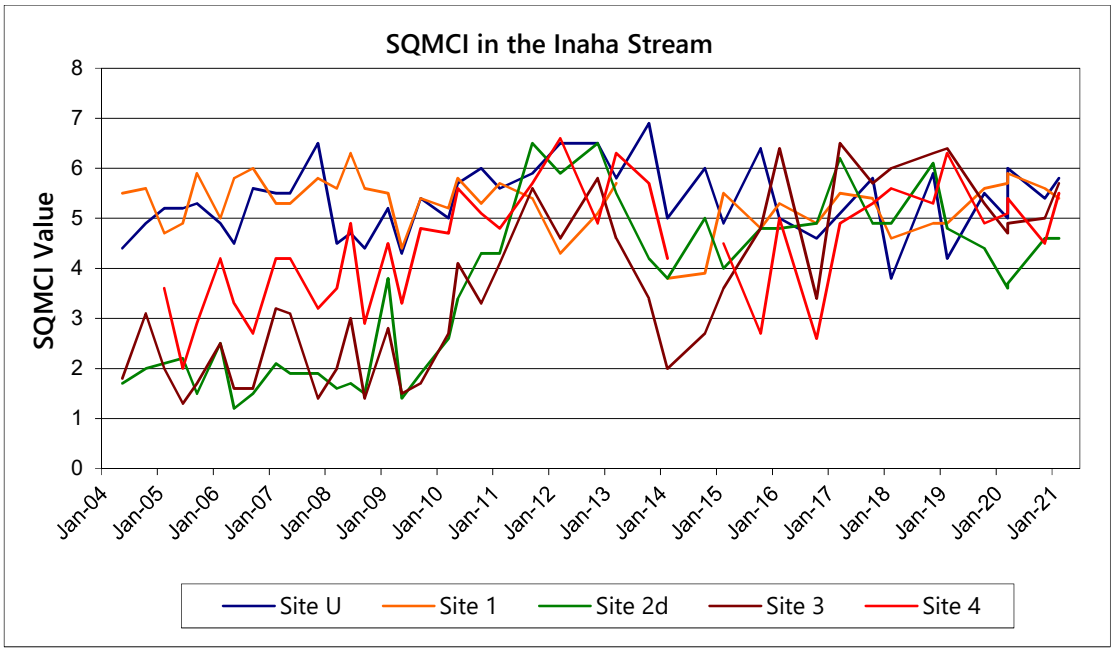

Figure 34 SQMCI values for the Inaha Stream sampled in relation to Taranaki By-Products discharges since May 2004

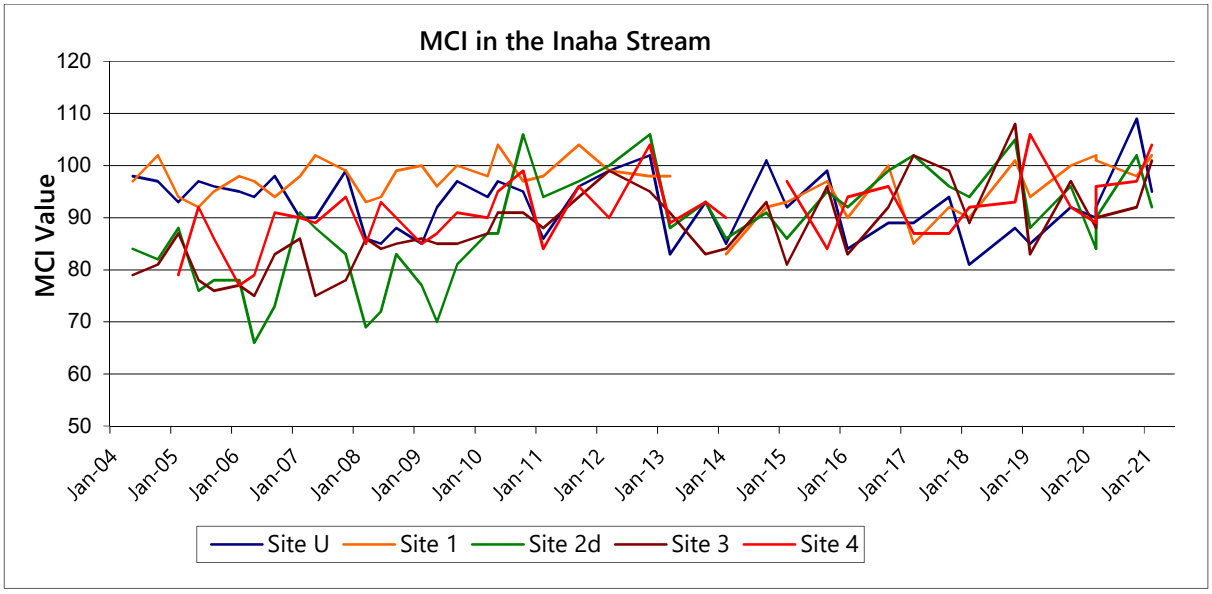

Figure 35 MCI values for the Inaha Stream sampled in relation to Taranaki By-Products discharges since May 2004

Taxa richness was moderate to moderately low in the unnamed tributary of the Inaha Stream, with 15, 13 and 15 taxa recorded at sites UT, MT and DT respectively, Figures 36-38. Site UT recorded a taxa richness equal to the median for the site and slightly higher than that recorded by the previous survey (11). Site MT recorded the lowest taxa richness, which was lower than both the median for the site (19) and the previously recorded richness (18), while downstream site DT recorded a taxa richness lower than both the median for the site (20), and that recorded by the previous survey (16). Taxa richness was also lower than the median richness of 22 recorded by 'control' sites across similar streams at comparable altitudes across the region at all three sites.

MCI scores increased significantly in a downstream direction, with an increase of 20 MCI units recorded between sites UT and DT. MCI scores categorised sites UT and MT as having 'fair' health, while site DT

recorded 'good' macroinvertebrate community health. There were no significant differences in SQMCI scores recorded between the three sites surveyed. SQMCI scores were 5.3, 5.0 and 5.1 units at sites UT, MT and DT respectively, which categorised all sites as having 'good' macroinvertebrate community health.

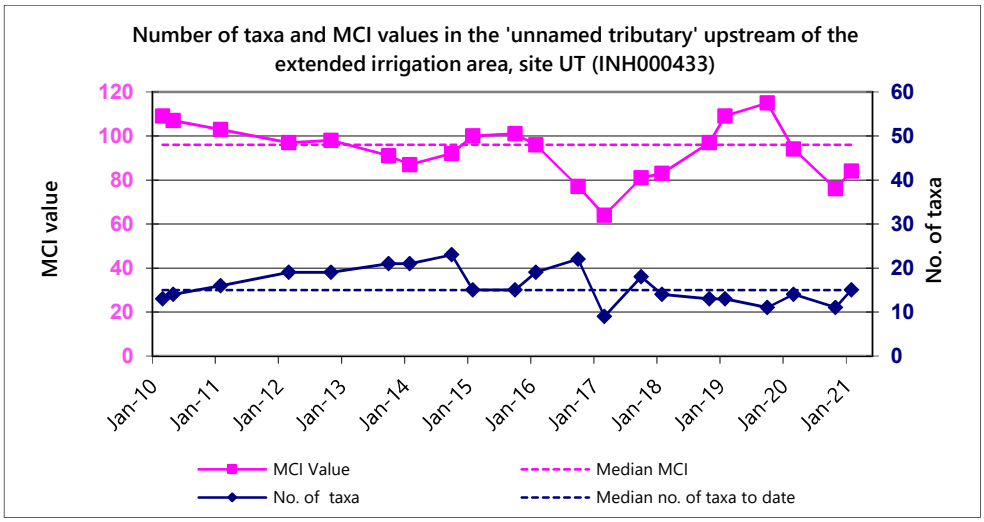

Figure 36 Number of taxa and MCI scores at site UT in the unnamed tributary of the Inaha Stream, upstream of irrigation area

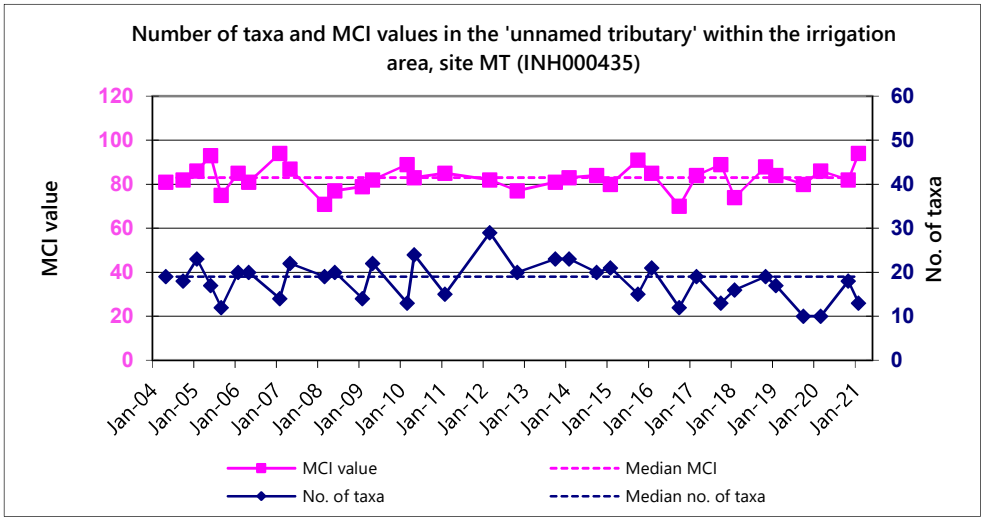

Figure 37 Number of taxa and MCI scores at site MT in the unnamed tributary of the Inaha Stream, middle site within the irrigation area

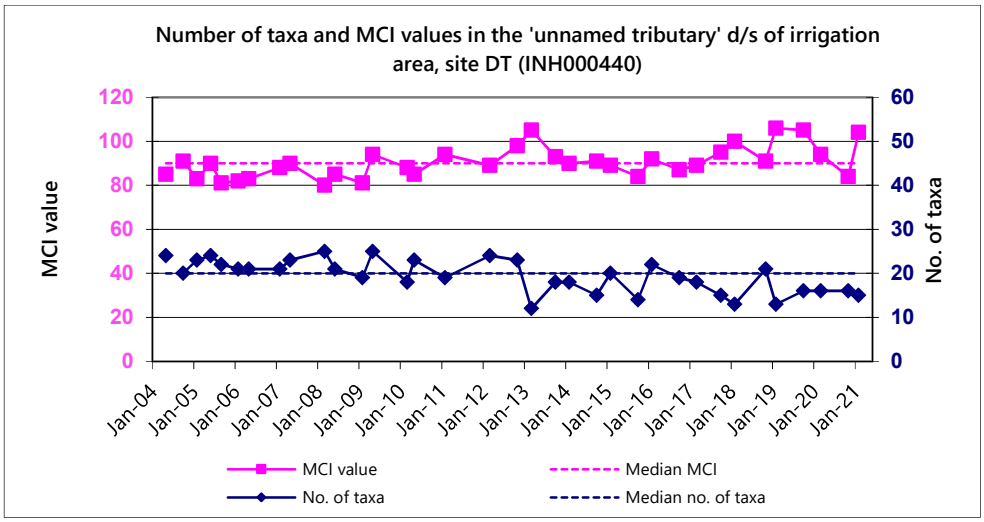

Figure 38 Number of taxa and MCI scores at site DT in the unnamed tributary of the Inaha Stream, 50 m upstream Normanby Road

Overall, there was no evidence that discharges from Taranaki By-Products have significantly affected the freshwater macroinvertebrate communities present in the Inaha Stream or unnamed tributary of the Inaha Stream. However, there was evidence that the discharge from Taranaki By-Products had contributed to the lowered SQMCI score at site 2d.

2.5 Air

2.5.1 Inspections

10 August 2020

During the inspection the following was observed. No objectionable odours or visible emissions were noted. Cooking odours were present. The pond liner in pond one had lifted in the centre. The slit in the far corner was still present, but above the crust. The Company communicated that they were monitoring the inflated pond line. They also communicated that once the reverse osmosis (RO) plant was operational without issue, consideration would be given to the decommissioning of pond 1 and possibly 2. Both were well crusted on observation.

The stormwater treatment system was functioning well and the fire pond appeared to becoming cleaner with every inspection. Additionally, the stormwater treatment discharge looked clear. The receiving areas were clean and tidy with no stored product. The Inaha Stream at the staff gauge was 3.18 m, at the time of inspection.

Pond 3 had full vegetative coverage and aerators were operating in ponds 4 and 6 at the time. The associated dissolved oxygen (DO) probe was 2.76 g/m^3, while pond 6 was not discharging. Irrigation was occurring at the time of inspection with no noticeable effects. The storage area in the old dairy factory was required to be addressed (mentioned in previous inspection). There was spillage at the loading in/out area which needed immediate attention.

Discussions were held in relation to the disposal of the old bio-filter bed materials and the ability to blend it when cropping. This was allowed to occur.

25 August 2020

A compliance monitoring inspection and odour survey were completed and the outcome was the Company were compliant at the time of inspection, however, there were some items that required attention.

Abatement notice EAC-23312, which was issued in March 2020 had not been complied with and the requirements of this notice were required to be submitted as soon as possible. There was also ongoing issues with the storage of product in the old dairy factory on Old Normanby Road, as well as the load out area. There was product spilled at the door which had washed into a small sump that discharges directly into the Inaha Stream.

In addition, it was advised to continue to monitor the burn pile, as there were some unauthorised materials in there. The Inaha Stream was flowing at 11.30 L/s, as reported by the Council's Hydrology officer.

Further discussions were held in regard to the repairs to the liner of pond 1. It was communicated that this is required to occur, as there was evidence that there was product underneath it, as referenced by the liner pushing up in the centre of the pond. The Council's understanding is that this will be decommissioned when the RO plant is fully operational.

The remainder of the site was clean and tidy with continual improvement works being undertaken.

8 September 2020

During the inspection the following was noted. The inspection was conducted after a period of prolonged rain and the Inaha Stream was in fresh. At the time of inspection there were no sustained noticeable offensive or objectionable odours found.

There were however noticeable cooking odours in and around the site and also intermittently on Old Normanby Road. The site was found to be generally clean and tidy.

Visually the fire water pond looked good and the main stormwater discharge to the Inaha was visually clear and non-odorous. Ponds 1 and 2 were typical in odour, however, the issue with pond 1 needs to be addressed. Crusts were formed on both ponds 1 and 2. Pond 3 had not changed from the previous visit and was well covered in vegetation.

The Inaha Stream level was at 3.82 m (at the staff gauge) and associated dissolved oxygen (DO) probe was 2.26 g/m^3 on pond 4. The bio-filters appeared to be working well. Site surface water and discharge samples were taken and the site was deemed compliant at the time of inspection, with water analysis also compliant.

21 December 2021

During the inspection the following was recorded. It was found that all assessed consent conditions were compliant at the time of inspection, however, there a few matters that required urgent attention.

The plant was running without the RO plant operating and were slowing down for the Christmas break. Issues of concern were outlined. These included the liner in pond 1. This was bulging badly and the tear in the far corner was unable to be sighted. This was concerning as it is now likely that waste could be making its way under the liner. The level on pond 4 is lower than usual and this has exposed an area of the concrete liner that looks like it has been missing for some time and eroded behind the liner. The remainder of the site appeared clean, tidy and well managed with continual improvement works being undertaken.

The Inaha Stream was running at moderate flows and was observed to be at 3.12 m by the staff gauge. The DO concentration of pond 4 was 2.47 g/m^3.

It was reminded that no unauthorised materials shall be burnt in the pallet burning area. Discussions with the Company were held in relation to these and some other minor points, but overall compliance was achieved.

31 March 2021

During the inspection the following was noted. It was found that all assessed consent conditions were compliant at the time. Discussions on the recent and future improvements will occur with the Plant Manager. There had been some issues with the burning of unauthorised materials on the consented burn

pile. This was identified as a staff member and has been addressed. The burn area is now fenced off and accessed through a gate which is locked after hours. The burn pile has also been cleaned up.

The RO water treatment plant is progressing well and it is hoped that it will operational in the near future due to testing of new stainless steel membranes. The damaged liner in pond 4 is still there and this urgently needs to be addressed. The liner in pond 1 had been repaired and no bulging could be seen within the pond or liner. A good crust had begun to form. Pond 2 appeared to be visually fine. The area of old bio-filter bark had been removed and the general area looked very tidy. Pond 3 had a good vegetated cover and pond 4 had a dissolved oxygen of 0.53 g/m^3.

All aerators were operating in pond 4 at the time (see above comments re liner). Pond 5 was not discharging and the auxiliary ponds were well down. The fire pond was cloudy from stormwater and/or rain water, however, the discharge into the Inaha Stream looks good. Bio-filters were discharging with the usual odours and appear to be in good operating condition. JTL area was clean and tidy.

The storage shed on Normanby Road was empty and free of any product. It was noted that future plans include the installation of a stand-alone dairy effluent pond at the dairy farm shed that will deal with dairy effluent separately. This is proposed to greatly reduce the incoming wastewater and compliment the already commenced improvements.

11 May 2021

During the inspection the following was observed. The assessed consent conditions were found to be compliant. The pond liner in pond one had been repaired and a good crust had formed on both pond 1 and 2. Pond 3 was well vegetated and had recently had some hay placed over some exposed areas of the pond. Pond 4 had been repaired and aerators were in operation.

No discharge from the final ponds was occurring. The firepond was clear and the discharge into the Inaha was clear and non-odorous. The storage facility on Normanby Road was empty. There was a fair amount of odour from the bio filters at the time of inspection, and the Company was advised to contact the investigating officer on any issues the Company had been working on.

2.5.2 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 43.

Table 43 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 23 December 2021
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 10 February 2022

Requirement	Consent Number (and Condition Numbers)	Dates(s) required	Compliance achieved
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 10 February 2022
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 10 February 2022
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
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 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).

In the 2020-2021 period, the Council was required to undertake additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

Table 44 Summary of incidents in relation to the Company in the 2020-2021 monitoring period

Date	Details	Compliant (Y/N)	Enforcement action taken?
24 December 2020 11:30	Complaint was received in regard to odour emanating from TBP in Okaiawa	Yes	No
01 March 2021 16:35	Complaint was received in regard to odour emanating from TBP in Okaiawa	Yes	No

3 Discussion

3.1 Discussion of site performance

Performance will be discussed by consent.

Water takes

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

The maximum abstraction limit from the Inaha Stream was complied with for the entire monitoring period. This is the third consecutive monitoring period there has been no exceedance in surface water abstraction daily limit.

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

The maximum abstraction limit and rate from the abstraction bore, as defined by consent 9756-1, condition 1, were complied with for the duration of the monitoring period.

Discharges to water

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

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 was achieved for the whole of the 2020-2021 period. The discharge ceased on the 17 November 2020, and no discharge to the Inaha Stream occurred till the 21 June 2021. This was a period of 216 days when the wastewater discharge was irrigated to land.

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.

Noted during inspections was a damaged and inflated liner in pond 1, the pond 4 liner was also compromised in one specific area. Pond 1 was repaired in March 2021. While the liner within pond 4 was repaired during May 2021.

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

The discharge of cooling water did not exceed the 35°C limit when discharged to the Inaha Steam. Suspended solids were within compliance standards. The concentrations of ammonia which were discharged to the firepond, from the surface water abstraction, were within the range of that abstracted from the Inaha Stream. Measurable ammonia was again noted in the borewater discharge, this was coupled with reasonable oxygen demand. This is purportedly due to the elevated ammonia within the groundwater.

This consent specifically requires the discharge to not contain concentrations of any chemical, biological or physical contaminant (other than heat of suspended solids) greater than those found in the water abstracted from the Inaha Stream. Given the borewater constituents are more elevated than the Inaha Stream. The Company will need to explore options to negate the elevated contaminants discharging through the borewater discharge, into the firepond.

To discharge stormwater to the unnamed tributary of the Inaha Stream (5426-1)

The updated stormwater system was discussed in the previous monitoring period. The monitoring results from this period were within consent conditions for pH, suspended solids and oil and grease. However measurable ammonia, *E.coli* coupled with elevated oxygen demand was recorded.

Elevated concentrations of oxygen demand can lead to sewage fungus formation within surface waters. However the Council's biologist did not note the presence of said fungus during the biomonitoring surveys. Increasing ammonia concentrations within surface water can be harmful to instream communities.

Measurable ammonia was recorded in all surface water surveys. The concentrations, while not elevated, did demonstrate that the higher results in the surface water were at the plant site and below the surface water wastewater discharge location. The detections of ammonia continued when the facility had switched to land based irrigation, as referenced by the January 2021 survey. Section 2.3.4 details the combination of stormwater, cooling water and Inaha tributary into the firepond. Noting the continual discharge of the fire pond to the Inaha Stream is year round, irrespective of the flow.

Negating the elevated ammonia and oxygen demand associated within the stormwater discharge would reduce the potential for impacts to instream communities. As noted by the biologist at site 2d where a reduction in SQMCI has been recorded.

To discharge wastewater to land (3941-2)

The discharge of wastewater to land was undertaken in a compliant manner this monitoring period. Nitrogen loading per hectare was below 250 kg N, this included both the discharge of wastewater and stick water. In the strict 200 kg N/ ha areas only one paddock was utilised and the loading rate was less than half of the consented limit.

The facility continues to demonstrate a reduction in the quantity of stickwater discharged to land. The quantity of wastewater had also reduced when compared to the previous monitoring period. However, it is noted that the Company did discharge to land longer in the previous monitoring period (264 days opposed to 216).

It is noted that the Company have been piloting a vibratory shear enhanced processing filtration system (VSEP) for use on their wastewater stream. This is proposed to allow a reduction in the quantity of wastewater required to be discharged to the environment in the long term, and allows reuse of the filtrate for Company processes. This is coupled with a reverse osmosis system to allow a portion of filtered fluid to be recycled for use in the Company boilers. The piloting scheme for the VSEP system has not been without issues, and the Company remain committed to utilising its functionality in the long term. The end goal is to negate wastewater discharges to the environment completely.

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

No burial notifications were received by the Council this monitoring period.

Required by consent is the need for eight monitoring wells. These are to be installed and maintained by the Company. Currently there are five functional monitoring wells located in the burial pit area. Over the life of the consent there have been ten wells installed, though five of them have been damaged and are no longer useable. A further three wells are required to be installed by the Company.

The consent is currently under the renewal process.

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

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

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

Two unsubstantiated odour complaints were received by the Council this monitoring period. The biennial review of odour control systems was undertaken by a suitably qualified third party consultant. The recommendations provided by the consultant will be undertaken by the Company.

Biannual audit meetings were held with the Community on two occasions this monitoring period. On one of those occasion trucks were mentioned by the community to have the potential of bringing odour into the nearby community, as they travelled to and from the site. The Company has taken on to make sure that trucks remain covered and are cleaned once the material has been delivered. No Hapu meeting was held this monitoring period.

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

Inspections noted that non-consented materials had been included in the burn pile this monitoring period. The Company, post discussions with the Council inspector addressed the situation. The burn area is now fenced off and can only be accessed by key. It will only be in operation during day light hours. This was a proactive response from the Company.

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 surface water from the Inaha Stream.

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

Measurable ammonia had been recorded in the discharge of the groundwater derived cooling water. The source of the ammonia had been quantified by the Company to be from the groundwater source, rather than contaminated through plant processes, prior to discharge. This however remains a constant source of ammonia to the fire pond and specifically the Inaha Stream, year round.

The daily limit (1,970 m^3) for abstraction and the rate (22.8 L/s) were not exceeded for the duration of the monitoring period.

Discharges to water

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

The operations of the Company lead to an increase of 1-1.5 g/m^3 nitrate nitrogen within the Inaha Stream when compared to the preceding water conditions. The largest concentration of nitrate nitrogen within the Inaha Stream is observed at site INH000450, which is below the confluence of the Western Tributary.

While the increase in nitrate was of low concentration between INH000334 and INH000450 (1-1.5 g/m^3 nitrate nitrogen). The overall concentration combined with the preceding water concentration for nitrate is above the NPS-FM national bottom line, at attribute state C, for both an annual median and 95th percentile. The policy statement stipulates at these concentrations there is potential to impact on 20% of the most sensitive species within a water course.

From a biological monitoring perspective, the Council's biologist noted the following

Overall, there was no evidence that discharges from Taranaki By-Products have significantly affected the freshwater macroinvertebrate communities present in the Inaha Stream or unnamed tributary of the Inaha Stream. However, there was evidence that the discharge from Taranaki By-Products had contributed to the lowered SQMCI score at site 2d.

Site 2d is located 500 m downstream from the instream discharge location. Given that the biologist recorded a reduced species abundance, SQMCI dropped 17% in the November 2020 survey between the sites 1 (INH000400) and 2d (INH000420) and 14.8% in the March 2021 survey. The impacts appear to be a localised adverse effect of the Company operations.

Conversely however, the Western Tributary held the most elevated concentration of nitrate nitrogen when compared to the Inaha Stream, its median concentration was found to be within attribute state D, as defined by the NPS-FM. The elevated concentrations however did not result in significant effects to the instream communities within the Western Tributary. The Council's biologist categorised the biomonitoring sites on the Western tributary as follows:

'*All sites as having 'good' macroinvertebrate community health'*.

It is noted that the long term goal for the Company is to reduce and eventually remove the requirement to discharge to the Inaha Stream. If this were to occur. The Inaha Stream would still be classified at attribute state C, due the preceding water condition for nitrate. This elevation is in part related to dairy shed effluent discharges which are still consented to water, further up catchment. The last will be removed by 2028. Post the removal of the dairy effluent consents to discharge to water, it is envisaged that the base loading for nitrate will decrease.

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

The discharge of Inaha Stream derived cooling water to the unnamed tributary resulted in no adverse effects this monitoring period. The associated groundwater discharge (consent 9756-1) has been previously discharge.

To discharge stormwater to the unnamed tributary of the Inaha Stream (5426-1)

While the stormwater discharge was within compliance with set standards for suspended solids, pH and oil and grease. It remains a source of ammonia, oxygen demand and *E.coli*. This discharge coupled with the bore water discharge and any other seepage from the plant area results in a consistent discharge of nitrate, ammonia and *E.coli* to the Inaha stream.

While the concentrations of are low concentrations, they are regular and sustained. This will be contributing to the increases in nitrate nitrogen recorded in the Inaha Stream.

To discharge wastewater to land (3941-2)

As noted in the previous section, the loading of wastewater to land was undertaken in a complaint manner this monitoring period. Groundwater monitoring of the irrigation areas has recorded some significant elevations in nitrate nitrogen, these have been reported in detail in previous monitoring reports. More recently the monitoring has observed, a plateauing or reduction of elevated concentrations in certain monitoring wells. This is directly linked to the greater control which is now being exercised by the Company in terms of irrigation management.

During the ongoing consent renewal, the third party consultant tasked with providing and quantifying the current effects of the waste discharge to land operation stated that the reductions in nitrate nitrogen impacts would take over 10 years to take effect. Given this statement, further monitoring will assess the reductions over time. For the most part, the current monitoring suggests this is occurring.

While there are reductions or plateauing in certain groundwater monitoring wells for nitrate concentrations, the effect of the elevated groundwater nitrate nitrogen is very apparent in the nitrate monitoring of the Western Tributary. The concentrations of nitrate remain elevated in the Western Tributary of the Inaha Stream. In excess of the national bottom line of the NPS-FM and in excess of the attribute state D. Current monitoring has demonstrated a reduction in surface water nitrate concentrations within the Western tributary, when compared to previous monitoring years.

In terms of the effects of the elevated nitrate nitrogen within the Western Tributary, these appear to be of a limited nature. The Council's biologist categorised all monitoring sites within this tributary as having 'good' macroinvertebrate community health.

The Council will continue to monitor the impacts of the irrigation of wastewater land. To determine how effective the mitigation undertaken by the Company will be in alleviating elevated nitrate nitrogen impacts in groundwater and surface water over time.

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

The main environmental effect associated with the sporadic burial of material[3] is significantly elevated ammonia, oxygen demand and nitrate nitrogen in the groundwater in two of five monitoring wells, within the vicinity of the burial pits. As mentioned there are currently five wells monitored for this consent. The consent requires eight wells to be constructed and monitored. It is suggested that the Company undertake steps to install the remaining three monitoring wells, or repair the damaged wells, as required by the consent, which is currently under renewal at the moment.

Given the elevated ammonia, oxygen demand and nitrate nitrogen within the groundwater, as determined by monitoring wells GND1066 and 1069. The nearest possible receptor is the Inaha Stream. To date no effects have been noted on the Inaha Stream as a process of the exercise of consent.

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

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

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

Noticeable odour is allowed under the consent and inspections noted noticeable odour on most occasions this monitoring period. On no occasions was objectionable odour noted or observed beyond the boundary of the site this monitoring period. As previous stated in the performance section. The biennial audit of dour control system as undertaken by a suitably qualified third party consultant. The Company has committed to putting the recommendations of said audit into effect.

The Company have also been stockpiling bark for the bio-filters to replace the bark as required. This is proposed as a proactive response, rather than a whole bio-filter replacement at one time, which can be a very time consuming.

To discharge emissions to air from the burning of pallets, paper and cardboard (1054-1)

Other than the non-consented material which were observed in the burn pile this monitoring period, minimal environmental effects were noted from the exercise of this consent.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 45-56.

Table 45 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

[3] No burial operations were undertaken during the 2020-2021 monitoring period.

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?**
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 However, preceding water conditions are above the NPS-FM national bottom line for nitrate, the Company contributes a 1-1.5 g/m^3 increase of nitrate nitrogen to the Inaha Stream as a process of its operations. Biomonitoring recorded a reduction in SQMCI at one site below the discharge
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 February 2022	Yes
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

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?**
19. Optional review provision	Next review date available June 2017	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**

N/A = not applicable

Table 46 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	Surface water returned water within specification Ammonia within groundwater drawn via abstraction
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 47 Summary of performance for consent 2051-4.1

Purpose: *To take water from the Inaha Stream for a rendering operation (2051-4.1)*		
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 48 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	Analysis of the firepond pond indicated measurable ammonia, nitrate, *e.coli* and oxygen demand. Negating this would help alleviate some of the additional nitrogen forcing observed in the surface water monitoring

Purpose: *To discharge stormwater to Inaha tributary (5426-1)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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		**Good** **High**

Table 49 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 April 2021, recommendations to be implemented	Yes
2. No offensive or objectionable odour beyond boundary	Odour surveys undertaken by Council during inspections and by TBP	Yes
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 April 2021	Yes
7. Preparation of Air Discharge Management Plan	Submission of Plan, on 3 July 2012, reviewed plan received February 2022	Yes
8. Operation in accordance with Air Discharge Management Plan	Inspection by Council	Yes

Purpose: *To discharge emissions to air (4058-4)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
9. Annual review of Air Discharge Management Plan by 31 May	Liaison. Reviewed by TBP and submitted to Council February 2022	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 December 2020	Yes
12. Optional review provision to deal with significant adverse effects	Review	Review 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 50 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.	Pond 1 and 4 liners were compromised, the Company repaired them in this monitoring period
7. Seek permission for Inaha Stream discharge when cannot irrigate, and Inaha Stream in low flow	Liaison and inspection. Not required this period	N/A

Purpose: *To discharge treated wastewater to land (3941-2)*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
8. Limit on dissolved oxygen in final pond	Chemical sampling of pond 6 indicated compliance with limit on occasion assessed	Yes
9. No offensive or objectionable odour beyond boundary	Inspection and complaint register	Yes
10. No spray drift beyond boundary	Inspection and complaint register	Yes
11. Limit on sodium absorption ratio	Chemical sampling indicated compliance with this limit	Yes
12. Prohibition of ponding and run-off	Inspection and complaint register	Yes
13. Spray buffer zones	Inspection and complaint register	Yes
14. Limit on nitrogen application rate	Monitoring by TBP and review of irrigation records. Record also kept of fertiliser application to establish total nitrogen loading	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	Ongoing consultation through consent renewal	Yes
21. Notification prior to Inaha discharge	Imposed by review of 21 December 2005. Liaison with TBP and Ngati Manuhiakai	No Hapu meeting held in 20-21 monitoring period

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	No Significant nitrate impacts in groundwater identified and communicated to TBP in previous monitoring periods. Five wells contain NNN concentrations greater or equal to 50 g/m^3. Other wells beginning to plateau or reduce in nitrate concentration. Elevated nitrate nitrogen in Western Tributary, though some reduction in peak annual concentration. More control now exercised in land irrigation management
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 51 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, notified during January 2020 inspection burial of sand trap waste	Yes
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, burial of sand trap waste	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 52 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 53 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

Purpose: *To take and use groundwater for industrial water supply (9756-1)*		
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		**High** **High**

Table 54 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	No unconsented material observed in the fire pile on one occasion
3. Prohibition of objectionable odour	Inspection by Council	Yes
4. Supervision of burning	Inspection by Council	Yes
5. Limit on dust deposition rate	Inspection by Council	N/A
6. Control of airborne dust components and particulate concentration	Inspection by Council	Yes
7. Prohibition of toxic components beyond boundary	Inspection by Council	Yes
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		**Good** **High**

Table 55 Overall environmental and administration grading 2020-2021 monitoring period

Consent Number	Description	Environmental compliance	Administrative performance
2051-4	To take water from the Inaha Stream for a rendering operation	High	High
2049-4	To discharge treated wastewater from a rendering operation and from a farm dairy into the Inaha Stream	Good	High
2050-4	To discharge cooling water to Inaha tributary	Good	High
5426-1	To discharge stormwater to Inaha tributary	Good	High
4058-4	To discharge emissions to air	High	High
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
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	Good	High

Table 56 Environmental performance since 2010

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			

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

Year	Consent no	High	Good	Improvement req	Poor
	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			
	5426-1	1			
	4058-4		1		
	3941-2			1	
	5495-1	1			
	6431-1	1			
	9756-1	1			
	10054-1	1			
2018-2019	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			
2019-2020	2051-4	1			
	2049-4		1		
	2050-4		1		
	5426-1		1		
	4058-4	1			

Year	Consent no	High	Good	Improvement req	Poor
	3941-2			1	
	5495-1	1			
	6431-1	1			
	9756-1	1			
	10054-1		1		
Totals		41	25	19	3

During the year, the Company demonstrated a good level of environmental and high level of administrative performance with the resource consents overall as defined in Section 1.1.4, with some variability across individual consents.

3.4 Recommendations from the 2019-2020 Annual Report

1. THAT in the first instance, monitoring of consented activities at Taranaki By-Products in the 2020-2021 year continue at the same level as in 2019-2020.
2. THAT should there be issues with environmental or administrative performance in 2020-2021, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation 1 was undertaken.

Recommendation 2 was not required.

3.5 Alterations to monitoring programmes for 2021-2022

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 2021-2022 that the monitoring programme remain unchanged from that undertaken in the 2020-2021 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 2021-2022.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Taranaki By-Products in the 2021-2022 year continue at the same level as in 2020-2021.
2. THAT the Company either recommission the destroyed bores in burial pit area, or install three more bores, so that eight monitoring bores are functional, as required by consent 5495-1, special condition 16.
3. THAT should there be issues with environmental or administrative performance in 2021-2022, 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.
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.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
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.
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.
PM_{10}, $PM_{2.5}$, $PM_{1.0}$	Relatively fine airborne particles (less than 10 or 2.5 or 1.0 micrometre diameter, respectively).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
Zn*	Zinc.

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

letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

For further information on analytical methods, contact a Science Services Manager.

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Appendix I

Resource consents held by Taranaki By-Products

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

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

TARANAKI REGIONAL COUNCIL
PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
FAX 0-6-765 5097

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.

TRK992050

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

Signed at Stratford on 31 May 1999

For and on behalf of
TARANAKI REGIONAL COUNCIL

DIRECTOR—RESOURCE MANAGEMENT

Water Permit

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

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

Conditions of Consent

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

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

General conditions

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

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

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

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

Special conditions

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

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

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

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

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

Signed at Stratford on 21 January 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Taranaki By-Products Limited P O Box 172 HAWERA 4640
Change To Conditions Date:	9 November 2009 [Granted: 15 December 1999]

Conditions of Consent

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

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

General conditions

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

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

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

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

Special conditions

Condition 1 – new

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

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

Management plan

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

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

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

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

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

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

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

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

Odour and spray effects

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

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

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

Land effects

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

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

Condition 13 [previously condition 12 - changed]

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

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

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

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

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

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

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

Monitoring and liaison

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

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

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

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

Mitigation

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

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

Review

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

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

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

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

Signed at Stratford on 9 November 2009

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

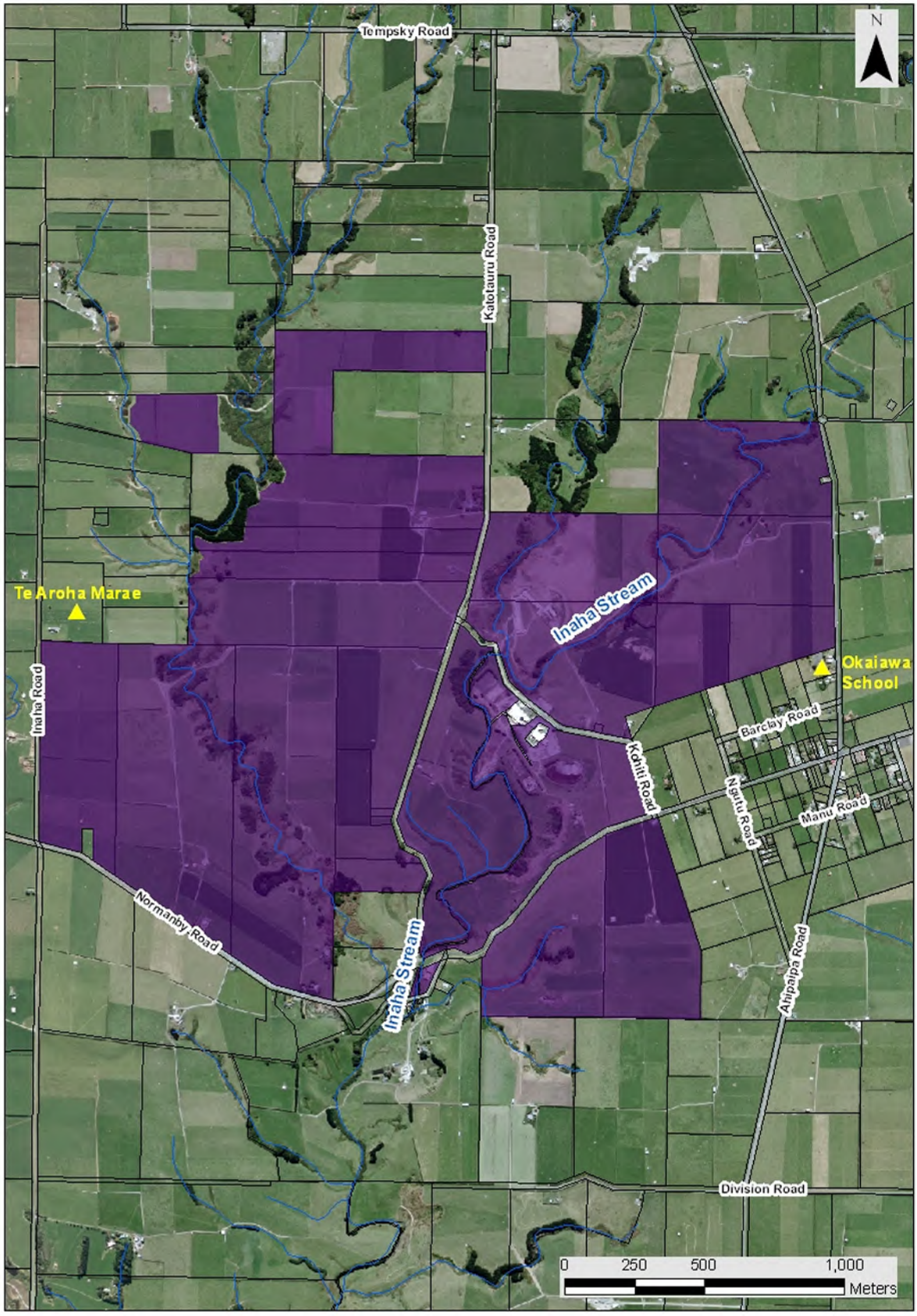

Figure 1 Location of the authorised area to receive wastewater, via spray irrigation, onto and into land

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

_____

Director-Resource Management

TRK995426

TARANAKI REGIONAL COUNCIL
PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
FAX 0-6-765 5097

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.

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.

TRK995426

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

DIRECTOR—RESOURCE MANAGEMENT

Consent 5495-1

TARANAKI REGIONAL COUNCIL

PRIVATE BAG 713
47 CLOTEN ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
FAX 0-6-765 5097

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

Consent 5495-1

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

Director-Resource Management

Consent 6431-1

TARANAKI REGIONAL COUNCIL

CHIEF EXECUTIVE
PRIVATE BAG 713
47 CLOTEN ROAD
STRATFORD
NEW ZEALAND
PHONE 06-765 7127
FAX 06-765 5097

Please quote our file number on all correspondence

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

Director-Resource Management

Water Permit

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

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

Conditions of Consent

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

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

General condition

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

Special conditions

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

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

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

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

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

5. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording equipment required by the conditions of this consent ('the equipment'):

   (a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or

   (b) has been tested and shown to be operating to an accuracy of ± 5%.

   The documentation shall be provided:

   (i) within 30 days of the installation of a water meter or datalogger;

   (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and

   (iii) no less frequently than once every five years.

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

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

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

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

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

9. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.

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

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

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

Signed at Stratford on 3 February 2014

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Taranaki By-Products Limited PO Box 172 Hawera 4640
Decision Date:	21 January 2015
Commencement Date:	21 January 2015

Conditions of Consent

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

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

General condition

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent and shall include as a minimum:
    - having regard to the prevailing and predicted wind speed and direction at the time of burning in order to minimise offsite effects;
    - allowing the waste material to dry before burning;
    - starting a small fire with the driest material and adding further material once it is blazing, as opposed to igniting a large stack and leaving it unattended.

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

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

    Note: For the purposes of this condition:

    - The site is defined as Lot 3 DP 378038 Lot 2 DP 410593 Lots 2-3 DP 6457; and
    - Assessment under this condition shall be in accordance with the *Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.*

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

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

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

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

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

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

Signed at Stratford on 21 January 2015

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management