Remediation New Zealand Ltd
Uruti Composting Facility
Monitoring Programme
Annual Report
2023/24
Technical Report 2024-56

Taranaki
Regional Council

Remediation New Zealand Ltd
Uruti Composting Facility
Monitoring Programme
Annual Report
2023/24
Technical Report 2024-56

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: TRCID-176456519-134 (Word)
Document: TRCID-1188382587-723 (Pdf)
April 2025

Executive summary

Remediation New Zealand Ltd (the Company) operates a composting facility which produces compost under the brand name Revital Fertilisers and a worm farm which produces vermicast. It is located on State Highway 3, Mokau Road, Uruti, Taranaki.

During the monitoring period, the Company's environmental and administrative performance required improvement.

This report for the period July 2023 to June 2024 describes the monitoring programme implemented by 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.

The Company holds eight resource consents which include 139 conditions setting out the requirements that the Company must comply with. The Company holds two consents which authorise discharges to contaminants air land and water from composting and irrigation (both of which expired in 2018). Another consent authorises discharges of stormwater contaminants from a quarry elsewhere on the site, and there are four land use consents for the erection, modification or use of culverts on site. Applications to replace the two expired consents were declined by Council in March 2021 and the Company appealed the decision to the Environment Court. The court upheld the decision however the Company made appeal to the High Court in September 2024. The Company is permitted to exercise the expired consents until a decision is made by the High Court.

The Council's monitoring programme for the year under review included 13 scheduled inspections, 121 water samples collected for physicochemical analysis (wastewater discharge, surface and groundwater), one biomonitoring survey of receiving waters, a soil survey of all irrigation areas, and 51 proactive odour surveys.

The inspections concluded that the Company fully complied with land use and quarry consents and any effects were not significant and within the scope of the consents. However, the Company failed to comply with conditions of the consents which authorise discharges of contaminants to air and to ground from the composting activity for five of the scheduled site inspections. These occurred from January to June 2024 and largely related to inadequate oversight and management of the compost pile and the ring drain which diverts stormwater and leachate to the treatment ponds. These factors resulted in odour discharges which caused significant adverse effects on several occasions, and standing water posed a risk to waterways from an overflow of contaminated water. The findings of the investigations into these incidents are subject to Environment Court proceedings and are not discussed further in this report.

The Company's irrigation records indicate that the management of wastewater irrigation was marginally better than the previous year. The volume of wastewater irrigated to land this monitoring year was 3,000m^3 more than the previous year and while the same number of areas (6) exceeded the nitrogen loading guideline the exceedances were much lower. This improvement may have been reflected in the slight improvement in water quality of Haehanga Stream and tributary compared to last year.

Analysis of the samples collected from six surveys of the surface waters this year show there were no exceedances of most of the consent limits on contaminants. The first of the six samples collected this year contained unionised ammonia at a concentration of 0.048g/m^3 which exceeded the consent limit of 0.025g/m^3. The majority of surface water results were within their respective historical ranges. Last year the consent limits were exceeded in about half of the surveys. The water quality parameters of most concern this year were *E. coli* which is an indicator of the presence of human pathogens, and ammonia which is ecotoxic. Based on this year's results the stream would have received the lowest possible rating for *E. coli* (NPS:FM) and posed a high risk to human health from direct contact. Conversely, the ammonia results

would likely have resulted in a category B rating (NPS:FM) which provides for protection of 95% of aquatic species.

The biomonitoring survey concluded that most monitoring sites had a low to moderate taxa richness which can be an indicator of ecotoxic compounds in the water. Two sites had high taxa richness. Macroinvertebrate health in most monitoring locations was rated poor or fair. Overall, the stream health has not substantially improved or declined in recent years. The results indicate that aquatic organisms are being affected, to some extent, by ecotoxic compounds and/or poor habitat quality.

Samples collected from the Mimitangiatua River showed that the concentration of nitrogen-based contaminants such as unionized ammonia, ammoniacal nitrogen and nitrate-nitrite were often higher in the downstream sample than the upstream sample. This is evidence that contaminants from site activities which entered the river via the Haehanga Stream caused degradation of the water quality. However, the difference between the results was slight and no results exceeded relevant environmental criteria.

Almost all results from this year's groundwater monitoring survey were within the long-term range of historical results at each location. No petroleum hydrocarbons or pesticides were detected in any of the bores this monitoring period. Groundwater bores 3009 and 2190 continue to be the most affected by irrigation of wastewater to land, in particular high by levels of nitrogen species which likely contribute to in-stream concentrations. The monitoring bore at the downstream boundary reported the lowest levels of contaminants indicating that there is little migration of groundwater contaminants beyond the site.

For reference, in the 2023/24 year, consent holders were found to achieve a high level of environmental performance and compliance for 864 (89%) of a total of 967 consents monitored through the Taranaki tailored monitoring programmes, while for another 75 (8%) of the consents a good level of environmental performance and compliance was achieved. A further 26 (3%) of consents monitored required improvement in their performance, while the remaining two (<1%) achieved a rating of poor.

Over the previous five monitoring years the Company's environmental performance has been rated as poor in accordance Council guidelines. Monitoring of surface and ground water showed some improvement or no decline in water quality, although there were offsite odour effects which resulted in enforcement action. The overall environmental performance is rated "improvement required" because adverse effects were minor but not substantial, and could be remedied through better site management.

This report includes recommendations for the 2024/25 year in section 4.

Table of contents

List of tables

List of figures

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 2023 to June 2024 by Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Remediation NZ Ltd (RNZ/the Company). The Company operates a composting and vermiculture facility together with associated wastewater treatment and disposal systems situated on State Highway 3 at 1460 Mokau Road, Uruti, in the Haehanga sub-catchment of the Mimitangiatua Catchment.

The report includes the results and findings of the monitoring programme implemented by the Council to monitor the consents held by the Company for various land uses, discharges of contaminants to land and water within the Mimitangiatua Catchment, and discharges of contaminants to air. Two resource consents for the discharge of contaminants from composting have expired and applications to replace these was declined by the Council in 2021. The Company appealed the Council's decision to the Environment Court declined the appeal and therefore the consents. On 30 August 2024 the Company appealed this decision to the High Court and is allowed by provisions in the *Resource Management Act 1991* (RMA) to continue to exercise the expired consents until the Court has reached its own determination.

One of the intents of the 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 15th annual report by the Council for the Company. The Uruti facility was previously owned by other parties, and there are a further seven reports for earlier activities at the Uruti facility.

1.1.2 Structure of this report

Section 1 of this report is a background section and 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 Mimitangiatua 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 2024/25 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 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 based on existing consent conditions as well as 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 use, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental performance

In addition to discussing the details of the environmental performance and extent of compliance with the consent conditions, this report also assigns a rating to the Company's environmental and administrative performance during the period under review. The rating categories are high, good, improvement required and poor for both environmental and administrative performance. The interpretations for these ratings are found in Appendix II.

For reference, in the 2023/24 year, consent holders were found to achieve a high level of environmental performance and compliance for 864 (89%) of the 967 consents monitored through the Taranaki tailored monitoring programmes, while for another 75 (8%) of the consents a good level of environmental performance and compliance was achieved. A further 26 (3%) of consents monitored required improvement in their performance, while the remaining two (<1%) achieved a rating of poor.

1.2 Catchment overview

The Haehanga Stream is a small waterway forming a tributary of the much larger Mimitangiatua River Catchment and flows from south-east to north-west. Most of the valley is owned by the Company and consists of steep eroded hillsides, multiple side gullies, and small river flats distributed along its length. The area receives more rainfall on average than the northern Taranaki coastline to the south-west. Soils are generally nutrient poor and highly erodible. Patches of bush and planted trees cover most of the hillsides The Company's facilities and pasture occupy the remainder of the flats. In the past the grasslands were grazed but the Company removed all livestock from the property in recent years, and the grasslands are now solely used as wastewater irrigation zones, with pasture growth managed on a cut-and-carry basis. Riparian and hillside planting is being established.

1.3 Process description

During the year under review the Company's operations include composting, quarrying and vermiculture operations at Mokau Road, Uruti.

The Mokau Road, Uruti composting site was established in late 2001 following the relocation of composting operations from the old Winstone Aggregates quarry site at Manutahi Road, Bell Block. The closure of the composting operations at the former site was due to the nature of the activity being incompatible with the surrounding rural residential land use because of unacceptable off-site odour incidents.

The current site at Uruti accepts a range of organic waste streams which include paunch grass, poultry waste and mortalities, greenwaste, and sheep skins. Drilling wastes from oil and gas wellsite exploration had been accepted for about 15 years but this activity ceased in January 2021. The list of acceptable material is set out in appendix I of Consent 5838-2.2. Further materials have been added to the acceptable material list over time and these materials have been agreed between the Company and the Council prior to acceptance. In certain cases, trials have taken place to add confidence in the treatment of the proposed composting waste stream. The raw materials are converted, via vermiculture or composting, into marketable products for use as a fertiliser and/or soil conditioner. However, there are also bulk stockpiles of non-marketable material at the site, primarily on Pad 3. RNZ is committed to remediating and/or removing this material[1].

The composting operation at the Uruti site generates a significant amount of leachate and contaminated stormwater from three main processing areas. These are the greenwaste/animal protein composting pad (Pad 1), the paunch pad (pad 2), and the drilling wastes pad (pad 3). The wastewater collection and wetland treatment system (WTS) for the vermiculture facility discharges to the Haehanga Stream, while wastewater from the composting facility and drilling wastes pad is irrigated onto land in the valley after interim storage. These systems are described more fully below.

Pad 3 holds drilling mud, fluids and cuttings which have been mixed with sawdust and/or other organic material such as poultry waste. This very large pile was originally turned to stimulate the composting process in the initial phase. The Company noted that it had been unable to find a market for the drilling wastes due to market perception, but in any case, Council and RNZ monitoring has found it to contain contaminants at concentrations that make it unsuitable for uncontrolled distribution. Some of this material has been distributed elsewhere on the site.

Rainfall runoff and leachate from Pad 3 is diverted into the irrigation settlement and storage ponds. A separator treats the leachate and stormwater from pad 1 where greenwaste, sheep skins, poultry byproducts, and other animal-derived wastes are routinely composted, prior to it flowing into the irrigation settlement and storage ponds. The treated liquid is then irrigated intermittently to cut-and-carry pasture on a number of irrigation areas. Harvested pasture is taken offsite for sale. Prior to and during the year under review, the configuration and number of wastewater system ponds formerly in use was modified by the Company, in part to reduce the number and intensity of odour sources.

1 *Pers comm*, Gibson-Bedford 21 February 2023

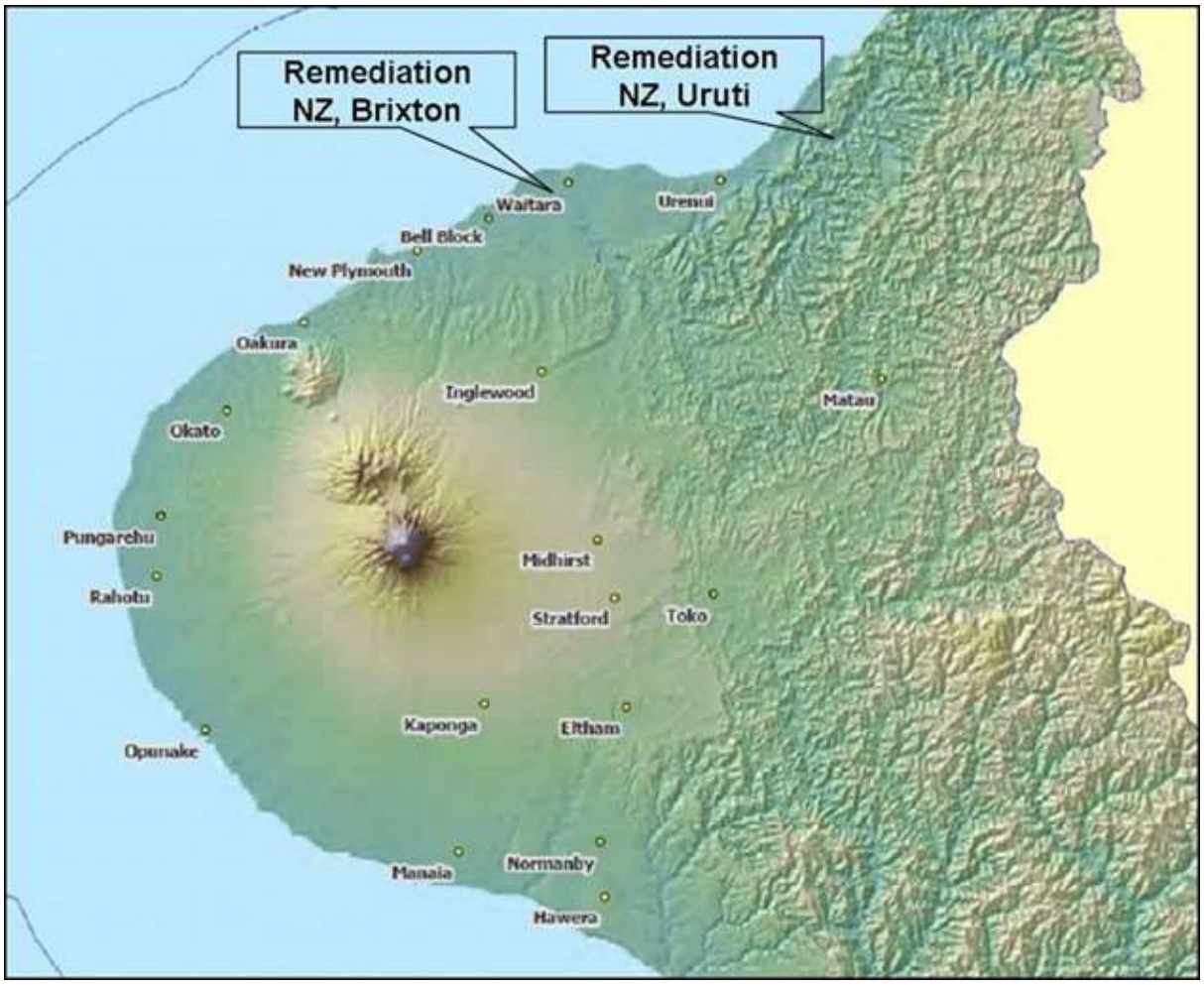


Figure 1 Regional locations of the Company assets on Waitara Road, Brixton and Mokau Road, Uruti

Figure 2 Map of operational areas of the site

Pad 2, the paunch pad, is where paunch (semi-digested grass from animal stomachs) from abattoirs was delivered and stockpiled. The dewatered paunch is routinely applied to the worm beds which are located in this area of the site. During this year the Company stopped storing paunch on the pad and instead used it to store overflow of mature compost from Pad 1. The Company also continued works to reduce the size of the Pad 2 pond.

Leachate generated from the paunch pad flows into a single large pond, from where it is pumped up to the top of a seven-tier constructed wetland. This wetland is planted with the bulrush raupō which is intended to function as a nitrogen sink for the ammonia-rich paunch leachate. Under dry conditions the water from the bottom pond of the wetland is reticulated back to the top tier of the wetland. Under high flow conditions the wetland discharges the treated stormwater/leachate to a tributary of the Haehanga Stream. Council routinely collects samples of this discharge for monitoring purposes.

The Company periodically operates a pea gravel quarry within the site. The quarry did not operate during this monitoring period, although the Company has expressed interest in renewing this operation in the near future.

1.4 Resource consents

The Company holds eight resource consents, the details of which are listed in the table below, and summaries of the consent conditions are set out in Section 3.3. A summary of the 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.

Discharge consents 5838-2.2 and 5839-2 expired in June 2018 and the Company applied to Council for replacement consents. The applications were declined, and the Company has subsequently appealed the

decision first to the Environment Court and finally to the High Court. In accordance with s.124 of the RMA the Company may continue to exercise the consents until a decision is made and all appeals are determined.

Table 1 Resource consents held by the Company

Consent number	Purpose	Granted	Review	Expires
Air discharge permit				
5839-2	To discharge emissions into the air, namely odour and dust, from composting operations	May 2010	-	June 2018 pending High Court decision
Discharges of waste to land and water				
5838-2.2	To discharge: a) waste material to land for composting; and b) treated stormwater and leachate from composting operations onto and into land in circumstances where contaminants may enter water in the Haehanga Stream Catchment and directly into an unnamed tributary of the Haehanga Stream	August 2015	-	June 2018 pending High Court decision
Land use permits				
5938-2	To use a twin culvert in the Haehanga Stream for vehicle access purposes	September 2015	June 2027	June 2033
6212-1	To erect, place, use and maintain a culvert and associated structures[s] in the bed of the Haehanga Stream in the Mimi Catchment for access purposes	June 2021	-	Application under review
10547-1	To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed	March 2018	June 2027	June 2033
10825-1	To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes	June 2020	June 2027	June 2039
10843-1	To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream. Including associated disturbance of the stream bed	June 2020	June 2027	June 2039
Discharge to water				
10063-1	To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream	March 2015	June 2027	June 2027

1.5 Monitoring programme

1.5.1 Introduction

Section 35 of the RMA imposes obligations on 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 on 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 scheduled monitoring programme for the Company site consisted of five primary components.

1.5.2 Programme liaison and management

There can be a significant investment of time and resources by the Council in:

- liaison with resource consent holders about consent conditions and their interpretation and application;
- discussion about 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.

1.5.3 Site inspections

The Uruti site received 13 routine compliance inspections which assessed all consents held by the Company.

With regard to consents for the discharges of contaminants to land or water the main points of interest were the three composting and stockpile pads, the storm and wastewater management systems, wastewater treatment pond and irrigation fields. The culverts used for vehicle access were also assessed for maintenance and fish passage.

Air quality inspections focused on management of the main compost stockpile and the worm farm, leachate ponding around stockpiles, and maintenance of the wastewater irrigation pond.

In addition there were 51 proactive surveys conducted approximately weekly to monitor for offsite odour effects. Surveys were conducted in accordance with the Good Practice Guide for Assessing Odour (Ministry for the Environment (MfE), 2016). Further site visits were undertaken in response to complaints about odour (Section 2.5).

1.5.4 Chemical sampling

Surface water analysis

Surface water samples were collected from up to 15 monitoring locations on the Haehanga Stream and associated tributaries (Figure 3). The samples were analysed by Hill Laboratory for a suite of analytes listed in Table 2 below. The Council conducted six surveys during the monitoring period.

An in-stream continuous monitoring device is located at the downstream boundary of the property. It measures water quality parameters including stage, EC and temperature. As field sensors of the requisite accuracy and reliability become available the Council will consider adding sensors to monitor other parameters.

During the surveys a range of field parameters were recorded including pH, dissolved oxygen, conductivity, temperature and oxidation and reduction potential. The data was collected using a Yellow Springs Instrument (YSI) multi-parameter probe.

Three surface water locations on the Mimitangiatua River were monitored to identify changes in water quality arising from the inflow of the Haehanga Stream. The results from the first downstream site are compared to the results from the upstream site to assess the magnitude of change. A second downstream monitoring site is used to assess how far downstream effects of the inflow from the Haehanga Stream may extend.

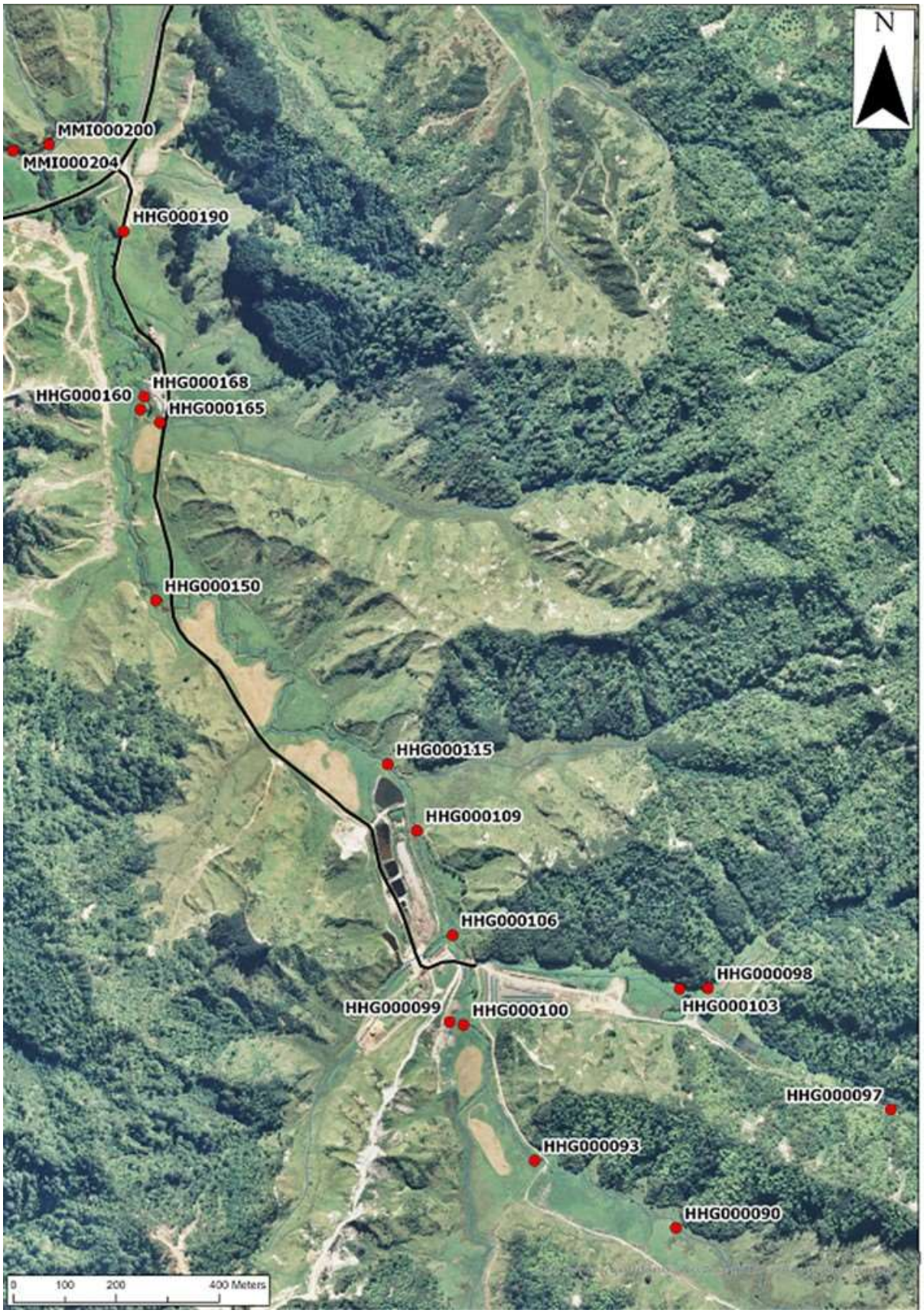


Figure 3 Stream and river monitoring locations

Groundwater analysis

The site has a groundwater monitoring network as required by Resource Consent 5838-2.2 to monitor the effects of wastewater irrigation and storage. Each groundwater survey collects samples from 11 bores and the samples are analysed for a suite of analytes listed in Table 2 below. There were four groundwater surveys conducted this monitoring year, and the results can be found in section 2.4 below.

Soil analysis

Representative soil sampling was conducted on nine irrigation areas (Figure 8) to monitor emerging contamination issues that might arise as a direct result of irrigation to these areas. Two composite soil samples (shallow and deep layers) were collected from each irrigation area this monitoring period. With the commissioning of irrigation area L6 in 2021/22 the total area available for irrigation has increased to 15.96ha.

Soil sampling is undertaken using two methods. Shallow soil samples are collected using a soil corer inserted to a depth of 75mm+/- below ground level (bgl). Ten soil cores are collected along a 50m transect and composited to obtain one representative sample. Deep soil samples are obtained using a footstool sampler which removes a core to a depth of 400mm bgl. Twenty cores are collected and composited into one representative sample. These methods are repeated for each irrigation area.

The composite samples were analysed by Hill Laboratory for the suite of analytes listed in Table 2 below. The results of the shallow soil cores are compared to the deep soil core results to identify major differences in contaminants or parameters. The shallow samples reflect recent irrigation activity, while the deep samples provide a more meaningful picture of suitability for land use.

Table 2 Analyte by medium

Surface Water Analytes	
Calcium	pH
Biochemical Oxygen Demand (BOD)	Chloride
Benzene	Potassium
Toluene	Magnesium
Ethylene	Un-ionised ammonia
Xylene	Ammoniacal nitrogen
Temperature	Nitrite-Nitrate nitrogen
Suspended Solids	Organonitrogen and organophosphorus pesticides screen
Conductivity	Hydrogen sulphide screen (total sulphide , un-ionised hydrogen sulphide)
Total Petroleum Hydrocarbons (TPH) C_7-C_{36}	Methylene blue activated substances (MBAS)
C_7-C_9	Dibutyltin
C_{10}-C_{14}	Tributyltin
C_{15}-C_{36}	Triphenyltin
Discharge Analytes (Irrigation pond and WTS discharge)	
Un-ionised ammonia	Acid soluble lead
pH	Dissolved mercury
Conductivity	Dissolved nickel
Total suspended solids	Dissolved zinc
Temperature	Total Kjeldahl Nitrogen (TKN)
Ammoniacal nitrogen	Carbonaceous Biochemical Oxygen Demand
Nitrite-nitrate nitrogen	Total Petroleum Hydrocarbons (TPH) C_7-C_{36}
Total calcium	Benzene
Total magnesium	Toluene
Total potassium	Ethylene
Sodium Absorption Ratio	Xylene (BTEX)

Total sodium Chloride Total nitrogen Dissolved arsenic Dissolved barium Dissolved cadmium Dissolved chromium Dissolved copper Dissolved lead	Acid soluble barium Total barium Organonitrogen and organophosphorus pesticides screen Hydrogen sulphide screen (total sulphide , un-ionised hydrogen sulphide) Methylene blue activated substances Dibutyltin Tributyltin Triphenyltin
Groundwater Analytes	
Benzene Toluene Ethylene Xylene Chloride Total Petroleum Hydrocarbon (TPH) Total calcium Total magnesium Total sodium	Un-ionised ammonia Ammoniacal nitrogen Nitrite-nitrate nitrogen Total Dissolved Salts Temperature Level Dissolved barium Acid Soluble barium Organonitrogen and organophosphorus pesticides screen
Soil Analytes	
Calcium Chloride Conductivity Potassium Moisture factor Sodium Absorption Ratio (SAR) Arsenic Cadmium Chromium Copper Lead Nickel	Mercury Zinc Magnesium Sodium Ammoniacal nitrogen Nitrite-nitrate nitrogen pH Total Petroleum Hydrocarbons (TPH) Poly-cyclic aromatic hydrocarbons (PAH) BTEX Organonitrogen and organophosphorus pesticides screen

1.5.5 Biomonitoring surveys

One biological monitoring survey was performed this year on 11 April 2024 to assess the health of the in-stream macroinvertebrate community. The survey includes eight locations in the Haehanga Stream, the associated unnamed tributary and an offsite reference location. Analysing the results and comparing them to historical survey results can help to determine whether or not discharges from the onsite activities had a significant adverse effect on the in-stream aquatic community. A summary of this survey is provided in Section 2.3.

2. Results

2.1 Inspections

12 July 2023

The culverts were found to comply with the relevant consent conditions and facilitated fish passage with adequate water flow and downstream riffle structures. Headwalls and embankments were well maintained with no evidence of erosion. The consent holder was advised to continue with maintenance and inspections to ensure blockages in the stream or culverts are prevented and the embankments are not compromised.

The inspecting officer observed low level odour around the wastewater irrigation pond and noted the DO reading was 5.92mg/L. The pond was reaching capacity and the officer advised that irrigation to land should be prioritised when soil conditions were suitable.

An inspection of the main composting pad noted exposed chicken carcasses, and the consent holder was advised to blend with other compost as soon as practicable to minimise the risk of significant odour. Leachate containment around the pad was adequate and the ring drain was clear and functioning well.

The stormwater management system at the paunch pad was considered inadequate and improvements were needed. In particular traffic needed to be controlled to minimise erosion and damage. Additionally, the officer noted that leachate from the worm beds may have been entering the tributary.

Grass strike on the drilling waste pad was good and the ring drain had been upgraded since the last inspection.

The discharge from the WTS was noted as slow and clear.

Overall, the site was considered to be compliant with the consent conditions, although with some site improvements were required.

16 August 2023

The inspection occurred during periods of rain and hail and the culverts and downstream riffles were found to be functioning well and providing for fish passage. There were no signs of erosion around the structures, and they were deemed to be compliant with the relevant consent conditions.

The quarry was not operating. However, the officer noted that the drainage systems at the base of the access track and the sediment retention areas were functioning adequately. There were some improvements which needed to be made to the bunding at the base of the track to further improve containment of stormwater flow and entrained sediment.

The officer reported low level odour around the compost pile, slightly stronger near areas which had recently been turned or blended. There was some leachate from the pile but it was contained and diverted to the irrigation pond which was nearly full and being aerated. The officer identified compost product which had been relocated to between shipping containers away from the compost pad and advised of the risk posed by odour and uncontrolled leachate.

Aspects of the operation which the officer considered needed attention included surface runoff associated with irrigation pods, insufficient capacity on the ring drains for the rainfall at the time, turbid discharge from the WTS, and regular inspections of the paunch pad pond

Otherwise, the irrigation pond was being aerated and had capacity for the amount of rainfall on the day, the washdown area was functioning properly, and the consent holder advised that the upper irrigation area was ready to receive irrigation when the weather conditions, and therefore soil conditions, were suitable.

Overall, the site was considered to be compliant with the relevant consent conditions at the time of the inspection.

14 September 2023

The odour and dust levels on site were reported as being low, although there was little activity on the main compost pad at the time. Vegetation coverage on pad 3 (drilling waste) had improved, however maintenance work on the ring drain was deemed necessary, and there appeared to be potential for a backflow pathway from the irrigation pond into the ring drain. The ring drain around pad 1 was operating effectively at the time but monitoring and maintenance would likely be needed as a result of the heavy traffic using the area.

The worm beds had recently been repositioned resulting in potential leachate and stormwater management issues which needed to be addressed. Some maintenance work was also needed around the quarry track and nearby culvert to maintain effectiveness.

The officer was advised that the preliminary works on pad 2 (paunch pad) had begun. The officer advised that the site management plan should be reviewed, updated and submitted to the Council. There were also some minor erosion scars in the WTS which required remedial work.

The culverts were considered to be compliant at the time, but some modifications and remedial works were recommended to improve fish passage and depth of water flow during low-flow conditions.

Overall, the site was considered to be compliant with the conditions of the resource consents.

16 October 2023

There was no quarrying underway at the time of the inspection, however the officer noted that the sediment control systems were still in place, and that recent riparian planting along the access track may enhance management of sediment runoff.

The culverts and adjacent streambeds were considered to be in good condition. The conditions at the time were calm and dry and the Haehanga Stream was at base flow level, but depth was still sufficient for fish passage. The headwalls and embankments were all in good condition.

There was little odour or dust around the compost pad at the time of the inspection. Irrigation management had improved, and the water level of the irrigation pond was at its lowest for some time. Work to reduce the size of the pad 2 leachate pond was ongoing. Many worm beds were uncovered during the earthworks on pad 2, and the site manager advised that they would be covered again once the work was finished. Greater management efforts were underway to remedy the pooling of leachate beside the access track.

Pad 3 was almost entirely vegetated and work to redefine and stabilise the ring drain to reduce the risk of overflow was expected to start soon. The material on the main compost pad was well contained and there was no standing water in the ring drain. The erosion scars in the WTS identified during earlier inspections had not been repaired, however the soil moisture conditions were too damp for heavy vehicles to access the damage. The paunch pond contents were being pumped to the top of the WTS for treatment, and the discharge from the outlet was described as a light tea colour.

15 November 2023

Prior to the inspection proactive odour surveys were conducted at several locations along Mōkau Road, none of which observed compost-type odours, despite the compost pile being turned at the same time. Additionally, the irrigation pond was being aerated and causing localised odour

The headwalls and embankments of all culverts were found to be in good structural condition and well vegetated. Riffle structures were present downstream of the culverts and all provided adequate fish passage, although one side of the Haehanga Stream culvert was slightly perched. No further action on this was required. Water was flowing freely and unobstructed through the culverts.

Free-standing leachate contaminated water was present around the drilling mud pad and the consent holder was advised to attend to the ring drain in general. The size of the paunch pad pond had been further reduced, the worm beds were covered and no handling of these occurred at the time. Works to prepare and bund the paunch pad had been completed. A portion of compost material had collapsed over the ring drain which adversely affected drainage. Work was underway to clear this, but additional silt and sediment controls were also necessary.

The irrigation paddocks were well grassed, and the irrigation pods were not present. The irrigation pond was noted to be nearly full which may be due to the pods having been removed which prevents irrigation occurring.

Overall, the site was compliant with the resource consents.

15 December 2023

Prior to the inspection proactive odour surveys were conducted at four locations along Mōkau Road, none of which observed compost-type odours, despite the compost pile being turned at the same time. During the onsite inspection localised odour was observed near the compost pad, treatment pond, worm beds and paunch pond. The officer described onsite odour as generally low and primarily from the compost pad.

All culverts were found to be free flowing, and the officer noted that recent rock placements have improved fish passage although further adjustments may be needed in time.

The operator had installed sumps, silt fences, coconut fibre mats and riprap to maintain the stormwater management network. However, the officer determined that improvements were needed to meet the Soil Disturbance – Waikato Guidelines. Likewise, the stormwater control and treatment system for the quarry required further improvements, although it was not operating at the time.

The irrigation fields were observed to be dry and suitable for receiving irrigation water however it was not occurring during the inspection. There was adequate freeboard in the irrigation pond and the DO reading was 6.3mg/L, above the recommended minimum of 2mg/L to minimise odour.

The inspecting officer determined that the site complied with the consent conditions, although the key areas of improvement were odour control, stormwater management and infrastructure maintenance.

24 January 2024

Prior to the inspection proactive odour surveys were conducted at locations along Mōkau Road. Intermittent odour was detected at 1415 Mōkau Road which the officer considered could be offensive if it was continuous. No odour was detected at any other location. There was a strong odour reported near the compost pad and it was attributed to inadequate mixing and covering of new material recently applied to the pad. There was localised minor odour around the irrigation pond.

Both culverts had high flow levels but were not blocked, and still provided adequate fish passage. Riffle features were still present and functioning well.

The lower irrigation fields were water-logged due to long grass and improper irrigation practices. This can lead to pooling, runoff into stream, and inefficient water use. The consent holder was advised to cut grass to improve infiltration and evaporation. A surface water sampling survey was conducted on the same day and all results complied with the relevant consent limits.

Poor management of the paunch pond had resulted in a discharge of sludge into a stream during cleaning. Some paunch piles lacked adequate leachate collection, and there was an overflow from bunding around the worm beds. Further, the ring rain was blocked leading to standing water. The ring drain around the compost pad was blocked at one location by compost material which had occurred during turning of the pile. Additionally, the drilling mud pad ring drain again contained standing water. The operator was advised to address the leachate and ring drain issues promptly.

The officer determined that the site had not complied with condition one of Consent 5838-2.2 which require the adoption of the best practicable option. The Company was issued with an abatement notice and an infringement.

28 February 2024

An odour complaint was received shortly before the inspection but a survey of nearby residences did not detect any odours. The strongest odour detected onsite was from new material recently added to the compost pad. A slight odour was reported from the irrigation pond.

The lower irrigation paddocks were in better condition for receiving irrigation water. There were no signs of over-application or ponding, except on L3 which had standing water in some areas. The upper irrigation paddocks were saturated, and irrigation lines were overgrown in places. The operator was advised to move the irrigation pods more frequently to minimise the risk of localised saturation.

The culverts were in good condition and compliant with consent conditions.

The eastern side of the compost pad ring drain was overgrown and hindering water flow, and the channel itself required redefining to ensure adequate capacity to transport stormwater and leachate. As noted in previous reports compost material had slumped into and outside the ring drain but it was promptly cleaned up. The consent holder was advised to spray the vegetation on the drilling mud pad which was hindering water flow. There continued to be standing water and the consent holder was advised to investigate a permanent solution to this ongoing problem.

Redevelopment of the paunch pond area was ongoing, and the sediment pit between it and the compost pad was undergoing maintenance.

The inspection found the site to be compliant with the conditions of the resource consents, although noting the areas for improvement.

7 March 2024

An unscheduled site inspection was conducted following a proactive odour inspection. The findings of this investigation are subject to Environment Court proceedings and are not discussed further in this report.

22 March 2024

Prior to the inspection proactive odour surveys were conducted at locations along Mōkau Road. The findings of this investigation are subject to Environment Court proceedings and are not discussed further in this report.

17 April 2024

Prior to the inspection an odour survey was conducted at several locations along Mōkau Road The findings of this investigation are subject to Environment Court proceedings and are not discussed further in this report.

3 May 2024

An additional inspection was undertaken to inspect progress on site remedial measures The findings of this investigation are subject to Environment Court proceedings and are not discussed further in this report.

6 June 2024

The findings of this investigation are subject to Environment Court proceedings and are not discussed further in this report.

20 June 2024

This inspection followed up on compliance issues related to the compost pad ring drain which were identified during the previous inspection. No odour was detected at locations on Mōkau Road except at the site entrance where the odour was weak. The compost pile was adequately capped, including over the newly received material, and more windrows had been formed. There was a plentiful supply of mulch for blending and capping. The operator had undertaken work to better redefine the ring drain and leachate appeared to be captured and diverted from the pad. The site was deemed to be compliant with the abatement notice and the consent conditions related to the compost pad.

2.2 Surface water

2.2.1 Discharge and receiving environment

2.2.1.1 Surface water monitoring

The discharge of contaminants into the Haehanga and its tributary from the disposal of waste material to land and the irrigation of storm and wastewater onto and into land is authorised by Resource Consent 5838-2.2. The Haehanga Stream and tributary were sampled at 15 sites (Figure 3) on six occasions during the 2023/24 monitoring year. Surveys were undertaken on 20 July, 31 August and 9 November 2023, and on 24 January, 22 March, and 31 May 2024.

The WTS for Pad 2 (Figure 2) pumps ammonia-enriched stormwater from the paunch mixing pond to the top of a multi-tiered WTS which has been planted with raupō. Nutrients in the water are assimilated by the raupō, which also acts as a filter for sediment and other contaminants. Water in the final wetland pond is preferentially returned to the head of the WTS to maintain the water level, and therefore any discharges directly into the Haehanga Stream are periodic. Monitoring location IND003008 is at the point of discharge from the final wetland pond into the tributary of the Haehanga Stream. Samples may be collected from here when there is a discharge from the wetland. The condition of the tributary is monitored by collecting samples at Site HHG000103, approximately 40m downstream from the WTS discharge, and comparing results with those for HHG000098 located just above the discharge. Water quality at HHG000098 can also be affected by diffuse runoff from adjacent vermiculture beds.

Site IND002044 is located in the irrigation water reservoir. This wastewater is irrigated to the upper and lower irrigation fields and does not directly enter surface water except under excessive application rates,

during high rainfall, or high soil moisture levels. These conditions increase the risk of overland flows or rapid shallow subsurface infiltration into the Haehanga Stream.

Sites HHG000090 (main stem) and HHG000097 (tributary) are located at the top of the catchment. They are considered to be baseline sites because they are upstream of the main activities on the site and therefore not likely to be contaminated by them.

Sites HHG000099 and HHG000100 are below the upper irrigation fields, while HHG000109 is adjacent to the main composting facilities and HHG000115 lies below them. Site HHG000150 is adjacent to the lower irrigation fields, and HHG000165 is on a tributary flowing from a new irrigation area (used for the first time in 2021/22) and entering the main stem of the Haehanga Stream between sites HHG000160 (just upstream of the confluence) and HHG000168 (downstream). HHG000190 is the lowest site in the Haehanga, above its confluence with the Mimitangiatua River and close to the boundary of the RNZ property.

Monitoring sites MMI000200 and MMI000204 were established during the 2021/22 year to monitor the effects of contaminants from the Haehanga Stream in the Mimitangiatua River. They are located above the confluence with the Haehanga Stream and below the mixing zone of the two water courses. The contaminants from activities on the Company's site are carried down the Haehanga Stream into the Mimitangiatua River and the effects can be monitored by comparing the difference in results between MMI000200 (upstream) and MMI000204 (downstream). In 2022/23 the Council established a new site, MMI000210, which is150m below the confluence to ascertain how far downstream effects may be distributed.

2.2.2 Surface water results

The results of the surface water sampling surveys are presented in Table 3 to Table 8 below.

The discharge from the WTS (IND003008) has been included in the results to provide context for the results of HHG000103 which is the nearest downstream monitoring location. Concentrations of Total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX) in samples from the WTS, irrigation pond, and HHG000190 were analysed. With the exception of samples collected from the irrigation pond none of the results were above the laboratory limit of detection (LOD) and accordingly these have been omitted from the tables below.

The most important parameters for assessing potential environmental effects on water quality and stream health are ammonia (NH_4), biochemical oxygen demand (DCBOD), total suspended solids (TSS), nitrate-nitrogen (NNN) and Escherichia coli (*E. coli*) an indicator of pathogenic microorganisms.

20 July 2023

Table 3 Surface water monitoring 20 July 2023

20 July 2023	NH3	pH	*E. coli*	EC	TSS	Temp
Site	**g/m³**	**pH Units**	**cfu/100ml**	**mS/m**	**g/m³**	**°C**
Consent limit	**< 0.025**					
HHG000090	LOD	7.6	10	16.8	LOD	10.8
HHG000093	0.0020	7.6	420	19.5	LOD	10.4
HHG000100	0.0144	7.7	900	25.2	5	11.1
HHG000097	0.00099	7.7	530	22	15	10.3
HHG000098	0.00129	7.6	360	21.9	26	9.9
IND003008	0.058	7.9	140	29.9	7	12.3
HHG000103	0.0045	7.8	350	21.3	7	10.9
HHG000106	0.0032	7.8	360	24.4	-	10.4
HHG000109	0.0033	7.8	300	24.9	-	10.5
HHG000115	0.0036	7.8	360	25.2	-	10.3
HHG000150	0.0036	7.6	1400	26.5	8	10.2
HHG000160	0.048	7.7	2000	35	152	10.5
HHG000165	0.00088	7.2	70	24.4	41	11.0
HHG000168	0.0172	7.6	1200	29.3	11	10.4
HHG000190	0.0038	7.6	100	25.7	-	10.2
MMI000200	0.00024	7.6	150	11.9	3	10.8
MMI000204	0.00032	7.5	130	12.6	5	11.0
	Total Sodium	**Chloride**	**Total ammoniacal nitrogen**	**Total ammoniacal nitrogen with equivalent toxicity at pH 8**	**NNN**	**DCBOD**
Site	**g/m³**	**g/m³**	**g/m³**	**g/m³**	**g/m³**	**g O_2/m³**
Consent limit		**<150**				**<2.0**
HHG000090	9.7	6.9	LOD	0.01	0.088	1.3
HHG000093	11.5	10.4	0.26	0.16	0.70	LOD
HHG000100	12.1	13.4	1.35	0.92	0.77	LOD
HHG000097		7.8	0.111	0.08	0.147	LOD
HHG000098		8.2	0.163	0.10	-	LOD
IND003008		15.6	3.4	2.98	3.3	
HHG000103	-	9.2	0.4	0.31	-	LOD
HHG000106	-	11.4	0.29	0.22	-	LOD
HHG000109	-	13.5	0.29	0.22	-	LOD
HHG000115	12.7	13.0	0.32	0.24	0.48	LOD
HHG000150	15.1	18.3	0.47	0.29	0.55	LOD
HHG000160	18.3	26	5.1	3.47	3.2	1.3
HHG000165	13.4	12.2	0.31	0.14	0.65	LOD
HHG000168	15.9	21	2.1	1.29	1.64	LOD
HHG000190	-	19.5	0.46	0.28	-	-
MMI000200	9.6	10.1	0.034	0.02	0.142	LOD
MMI000204	9.7	10.6	0.049	0.03	0.173	LOD

Approximately 2.2mm of rain was recorded at the site in the 48 hours preceding the July survey. The Company records show that the most recent irrigation of wastewater occurred three days beforehand and was applied to areas L2, L5 and U3.

The results of surface water monitoring on 20 July 2023 (Table 3) indicate the following:

- The Haehanga Stream temperature ranged from 9.9-11.1°C.
- Un-ionised ammonia (NH_3) exceeded the consent limit (0.025 g/m^3) at HHG000160 where it was reported to be 0.048g/m^3. The remainder of results were below the consent limit. The suspended solids, NH *E. coli* and nitrate-nitrate (NNN) results at this monitoring location were all significantly higher than all other locations during this survey. These results indicate a point source discharge upstream of HHG000160, possibly overland flow of irrigated wastewater. However, according to Company records there had not been any irrigation in the two days preceding the survey, and more than 10 days since irrigation to the nearest area to the sample location. No enforcement action was taken at the time.
- pH remained in a very narrow band of 7.2–7.8
- Sodium and chloride generally increased with distance downstream, the maximum results of 18.3 and 26g/m^3 respectively were also reported from monitoring location HHG000160. The chloride result was significantly lower than the consent limit of 150g/m^3.
- *E. coli* results fluctuated between 10cfu/100ml at the uppermost site to 2,000 cfu/100ml at HHG000160.
- The results from the Mimitangiatua River monitoring sites indicate some influence on water quality although the differences are slight, and none of the parameters approached the *E. coli* or ammoniacal nitrogen attribute values.

31 August 2023

Table 4 Surface water monitoring 31 August 2023

31 August 2023	NH_3	pH	*E. coli*	EC	TSS	Temp
Site	**g/m^3**	**pH Units**	**cfu/100ml**	**mS/m**	**g/m^3**	**°C**
Consent 5838-2.2 condition 11 max	**< 0.025**					
HHG000090	LOD	7.2	LOD	14.9	LOD	8.0
HHG000093	0.00027	7.3	50	15.8	6	8.5
HHG000100	0.00054	7.3	300	21.3	5	9.0
HHG000097	0.00062	7.3	700	18.4	13	6.6
HHG000098	0.00061	7.2	30	19.7	14	6.6
IND003008	0.0132	7.9	30	18.2	28	11.7
HHG000103	0.00066	7.4	130	18	6	6.8
HHG000106	0.00074	7.4	600	21.3	-	7.7
HHG000109	0.00093	7.3	140	23.8	-	8.0
HHG000115	0.00107	7.3	150	23.5	-	8.4
HHG000150	0.00089	7.1	90	26	9	9.0
HHG000160	0.00093	7.1	50	26.7	20	9.0
HHG000165	0.00023	6.6	30	27.1	8	9.5
HHG000168	0.00075	7.0	70	26.1	11	8.1
HHG000190	0.00089	7.2	30	25	-	7.8
MMI000200	0.00016	7.2	130	11.6	4	9.3
MMI000204	0.00017	7.2	120	11.8	4	9.2

	Total Sodium	Chloride	Total ammoniacal nitrogen	Total ammoniacal nitrogen with equivalent toxicity at pH 8	NNN	DCBOD	CBOD
Site	**g/m^3**	**g/m^3**	**g/m^3**	**g/m^3**	**g/m^3**	**g O_2/m^3**	**g O_2/m^3**
Consent 5838-2.2 condition 11 max		**<150**				**<2.0**	
HHG000090	9.9	7.1	LOD	0.00	0.05	LOD	
HHG000093	10.2	8.1	0.083	0.04	0.06	LOD	
HHG000100	11.4	11.5	0.146	0.07	0.12	LOD	
HHG000097	-	9.0	0.21	0.10	0.18	LOD	
HHG000098	-	9.8	0.26	0.12	-	LOD	
IND003008	-	11.5	0.75	0.66	2.6	-	
HHG000103	-	9.7	0.195	0.10	-	LOD	
HHG000106	-	12.5	0.187	0.10	-	LOD	
HHG000109	-	16.9	0.30	0.14	-	LOD	
HHG000115	13.5	17.2	0.35	0.17	0.33	LOD	
HHG000150	16.2	25	0.42	0.18	0.44	LOD	
HHG000160	16.6	25	0.44	0.19	0.44	LOD	
HHG000165	14.4	13.2	0.30	0.11	0.13	LOD	
HHG000168	16.1	24	0.43	0.18	0.41	LOD	
HHG000190		23	0.36	0.16	-	LOD	LOD
MMI000200		10.0	0.058	0.03	0.21	LOD	
MMI000204		10.4	0.062	0.03	0.22	LOD	

In the 72 hours preceding the survey 28mm of rain was recorded at the site, and 2mm of rain was recorded on the day. The most recent irrigation had occurred nine days before the survey, although wastewater was applied to areas L1, L2 and U2 on the day.

The results of surface water monitoring on 31 August 2023 (Table 4) indicated the following:

- In-stream temperatures ranged from 6.6 to 9.0 °C.
- Un-ionised ammonia was very low throughout the catchment and all results were substantially lower than the consent limit. The NH4 remained high throughout the catchment below the WTS discharge, peaking at 0.19g/m^3 in the mid-catchment location of HHG000160.
- pH ranged 6.6–7.9 in the Haehanga Stream, and 7.2 in the Mimitangiatua River.
- EC generally increased in with distance down the catchment, and all monitoring locations near active areas of the site were above the baseline sites. All locations below the WTS discharge, except one, were greater than 21mS/m indicating effects from the WTS discharge as well as various diffuse sources.
- Sodium and chloride concentrations slightly increased with distance down the catchment although there was only a marginal increase of chloride at the downstream monitoring location of the Mimitangiatua River.
- Dissolved carbonaceous biochemical oxygen demand (DCBOD) was below the LOD at all monitoring locations and therefore complied with the consent limit.
- *E. coli* results were low, ranging from LOD to 700 cfu/100ml.
- Water quality at site HHG000093 appears to show some slight deterioration by comparison with HHG000090, although the Company records show there had not been any irrigation to U3 preceding the survey. Likewise, there are slight increases in a number of markers of water quality, from HHG000115 to HHG000160 which are consistent with impacts from irrigation on adjacent fields.
- In general the water quality parameters in the Mimitangiatua River were not significantly affected by the inflow of contaminants from the Haehanga Stream. None of the results raise significant ecological concerns.

9 November 2023

Table 5 Surface water monitoring 9 November 2023

9 November 2023	NH_3	pH	*E. coli*	EC	EC	TSS	Temp
Site	g/m^3	pH Units	cfu/100ml	mS/m	µS/cm	g/m^3	°C
Consent 5838-2.2 condition 11 max	< 0.025						
HHG000090	LOD	7.5	160	12.7		LOD	14.1
HHG000093	0.00011	7.4	180	12.9		4	13.9
HHG000100	0.00029	7.4	190	15.7		12	12.6
HHG000097	0.00029	7.4	190	15.7		12	12.6
HHG000098	0.00024	7.3	120	14.9		13	12.9
IND003008	0.030		3,900	18.8		12	19.8
HHG000103	0.00147	7.4	520	14.1		9	14.2
HHG000106	0.00039	7.4	210	15		-	13.7
HHG000109	0.00058	7.4	260	15.6		-	14.0
HHG000115	0.00059	7.4	220	15.6		-	14.6
HHG000150	0.00041	7.2	320	16.2		7	13.2
HHG000160	0.00049	7.2	170	16.4		11	13.2
HHG000165	0.000143	6.8	120	17.3		13	12.8
HHG000168	0.00037	7.2	390	16.5		18	13.0
HHG000190	0.00042	7.3	210	16.1		-	13.0
MMI000200	0.00008	7.1	600	9.2		24	14.6
MMI000204	0.00009	7.1	2,100	9.5		25	14.6
	Total Sodium	Chloride	Total ammoniacal nitrogen NH_4	Total ammoniacal nitrogen with equivalent toxicity at pH 8	NNN	DCBOD	CBOD
Site	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	$g\ O_2/m^3$	$g\ O_2/m^3$
Consent 5838-2.2 condition 11 max		<150				>2.0	
HHG000090	9.3	5.7	LOD	0.01	LOD	1.1	
HHG000093	9.6	6.0	0.019	0.01	0.006	LOD	
HHG000100	-	7.7	0.049	0.02	0.059	LOD	
HHG000097	-	7.7	0.049	0.03	0.059	LOD	
HHG000098	-	7.8	0.058	0.03	-	LOD	
IND003008		9.6	2.2	1.35	0.88	-	
HHG000103	-	8.1	0.25	0.13	-	LOD	
HHG000106	-	7.6	0.066	0.03	-	LOD	
HHG000109	-	8.2	0.093	0.05	-	LOD	
HHG000115	10.1	8.1	0.088	0.05	0.096	LOD	
HHG000150	10.7	9.3	0.099	0.04	0.128	LOD	
HHG000160	10.8	9.8	0.127	0.06	0.138	LOD	
HHG000165	11.8	9.1	0.098	0.04	0.073	LOD	
HHG000168	10.4	10.1	0.106	0.05	0.134	LOD	
HHG000190	-	9.4	0.100	0.05	-	-	LOD
MMI000200	8.4	8.6	0.027	0.01	0.079	LOD	
MMI000204	8.6	8.9	0.027	0.01	0.084	LOD	

There had been no rain at the site for the 48hours preceding the survey, although 30mm fell three days before the survey. Four days had passed since the previous irrigation, although most paddocks received wastewater on the day of the survey.

The results of surface water monitoring on 9 November 2023 (Table 5) indicated the following:

- Temperatures in the Haehanga Stream ranged from 12.6 to 16.6 °C. Both locations in the Mimitangiatua River were 14.6°C.
- Un-ionised ammonia at all locations was substantially lower than the consent limit (0.025 g/m^3), although locations below the WTS discharge were generally higher than results from above.
- The pH and conductivity results in from the Haehanga Stream were stable, showing little variation with distance downstream.
- Sodium and chloride concentrations showed little variation with distance downstream, ranging from 10.1 to 11.8g/m^3 of sodium and 5.7 and 10.1g/m^3 of chloride.
- DCBOD was not recorded above the LOD at any site.
- CBOD was below the LOD at HGG000190 and therefore complied with the consent condition.
- The *E. coli* results from the Mimitangiatua River monitoring locations were 600 (upstream) and 2,100cfu/100ml (downstream) which are higher than all results from the Haehanga Stream which ranged from 120-390cfu/100ml.
- Additionally, the highest suspended solids results were from the Mimitangiatua River locations, 24 and 25g/m^3 compared to results from onsite which ranged from LOD to 18g/m^3.
- The Mimitangiatua River was largely unaffected by the inflow from the Haehanga Stream, with most results from the upstream and downstream locations being similar. While *E. coli* results were three times higher in the downstream sample it's unlikely this is caused by site discharges because results in the Haehanga Stream were all lower.

24 January 2024

Table 6 Surface water monitoring 25 January 2023

24 January 2024	NH_3	pH	*E. coli*	EC	EC	TSS	Temp
Site	**g/m³**	**pH Units**	**cfu/100ml**	**mS/m**	**µS/cm**	**g/m³**	**°C**
Consent 5838-2.2 condition 11	**< 0.025**						
HHG000090	LOD	7.3	130	14.9		LOD	18.8
HHG000093	0.00027	7.4	420	14.1		4	19.6
HHG000100	0.00083	7.5	1200	16.7		15	19.1
HHG000097[2]	0.00061	7.5	1000	15.4		24	15.7
HHG000098	0.00047	7.3	800	14.9		46	15.9
IND003008	0.0073	7.6	1000	16.3		22	22.8
HHG000103	0.00082	7.5	1000	14		28	17.1
HHG000106	0.00151	7.5	2100	17.7		-	17.4
HHG000109	0.00178	7.5	1500	18.2		-	17.7
HHG000115	0.00196	7.5	2500	17.2		-	17.8
HHG000150	0.00187	7.3	1700	18.2		10	17.5
HHG000160	0.0047	7.3	1900	20.4		22	17.4
HHG000165	0.00021	6.8	610	18.2		6	16.2
HHG000168	0.00174	7.3	2300	18.3		18	17.1
HHG000190	0.00143	7.3	700	17.6		-	17.1
MMI000200	0.00020	7.3	2200	10.6		34	20.2
MMI000204	0.00028	7.4	1500	10		31	20.1
	Total Sodium	**Chloride**	**Total ammoniacal nitrogen as N**	**Total ammoniacal nitrogen with equivalent toxicity at pH 8**	**NNN**	**DCBOD**	**CBOD**
Site	**g/m³**	**g/m³**	**g/m³**	**g/m³**	**g/m³**	**g O_2/m³**	**g O_2/m³**
Consent 5838-2.2 condition 11 max		**<150**				**<2.0**	
HHG000090	9.2	6.4	LOD	0.00	0.002	LOD	
HHG000093	9.4	7.0	0.026	0.01	0.006	LOD	
HHG000100	10.1	8.5	0.078	0.04	0.048	LOD	
HHG000097		6.4	0.066	0.04	0.068	LOD	
HHG000098		6.5	0.074	0.04	-	LOD	
IND003008		9.4	0.38	0.23	0.30	-	
HHG000103	-	7.3	0.089	0.05	-	LOD	
HHG000106	-	8.6	0.164	0.09	-	LOD	
HHG000109	-	9.4	0.171	0.10	-	LOD	
HHG000115	10.7	9.6	0.190	0.11	0.106	LOD	
HHG000150	11.3	12.1	0.26	0.12	0.160	LOD	
HHG000160	12.3	13.6	0.76	0.36	0.41	LOD	
HHG000165	12.0	9.6	0.108	0.04	0.083	LOD	
HHG000168	11.4	12.3	0.27	0.13	0.20	LOD	
HHG000190	-	11.9	0.21	0.10	-	-	LOD
MMI000200	9.0	8.7	0.023	0.01	0.058		

24 January 2024	NH_3	pH	*E. coli*	EC	EC	TSS	Temp
Site	g/m^3	pH Units	cfu/100ml	mS/m	µS/cm	g/m^3	°C
MMI000204	8.9	8.6	0.028	0.01	0.067		

The site received 14.8ml of rain four days before the survey, and 30.6ml on the day of the survey. A moderate amount of wastewater had been irrigated to all but two areas the day before the survey.

The results of surface water monitoring on 25 January 2023 (Table 6) indicated the following:

- Sodium and chloride concentrations remained low throughout the catchment, with no clear increasing or decreasing trend.
- Un-ionised ammonia remained low throughout the catchment with a maximum concentration of 0.004g/m³ reported from HHG000160 in the mid -catchment, substantially lower than the consent limit of 0.025g/m³.
- Twelve of the 14 Haehanga Stream monitoring sites reported elevated *E. coli* concentrations ranging between 610-2,500cfu/100ml. There was no clear linear trend to the results, with the three results greater than 2,000cfu/100ml evenly distributed through the catchment below the WTS.
- The *E. coli* results from the Mimitangiatua River locations were the highest reported this year, although the upstream result (2,200cfu/100ml) was higher than the downstream result (1,500cfu/100ml). The results show that the *E. Coli* concentration was already very high even before the Haehanga Stream inflow.
- The most significant influence on the Mimitangiatua River from the Haehanga Stream was from the nitrogen species, all contributed to increased concentrations downstream of the inflow. All other parameters had negligible impact on the downstream results.

22 March 2024

Table 7 Surface water monitoring 22 March 2024

22 March 2024	NH_3	pH	*E. coli*	EC	EC	TSS	Temp
Site	g/m^3	pH Units	cfu/100ml	mS/m	µS/cm	g/m^3	°C
Consent 5838-2.2 condition 11 max	< 0.025						
HHG000090	LOD	7.0	17	16.6		LOD	12.8
HHG000093	0.00020	7.2	5100	17.4		LOD	12.8
HHG000100	0.00071	7.3	8400	23		73	13.1
HHG000097	0.00055	7.2	730	21.1		260	10.3
HHG000098	0.00064	7.3	800	22.6		210	11.4
IND003008[2]	0.00122		1000	17.1		8	17.9
HHG000103	0.00013	7.4	900	19.2		28	11.2
HHG000106	0.00153	7.3	4600	23.5		-	12.7
HHG000109	0.0023	7.2	2200	27.3		-	12.5
HHG000115	0.0027	7.2	2100	27.9		-	12.3
HHG000150	0.00191	7.1	330	30.9		9	14.4
HHG000160	0.00140	7.0	1200	31.3		21	13.7
HHG000165	0.00027	6.6	32	31.4		9	14.0
HHG000168	0.00094	6.9	340	30		18	13.5
HHG000190	0.00082	7.3	230	28.1		-	13.2
MMI000200	0.00011	7.4	160	13.6		LOD	14.2
MMI000204	0.00012	7.3	130	14		LOD	14.2
	Total Sodium	Chloride	Total ammoniacal nitrogen	Total ammoniacal nitrogen with equivalent toxicity at pH 8	NNN	DCBOD	CBOD
Site	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	$g\ O_2/m^3$	$g\ O_2/m^3$
Consent 5838-2.2 condition 11 max		<150				<2.0	
HHG000090	10.6	8.0	LOD	0.00	LOD	LOD	
HHG000093	11.4	9.9	0.053	0.02	0.016	LOD	
HHG000100	13.5	16.8	0.160	0.08	0.125	LOD	
HHG000097		8.5	0.174	0.08	0.30	LOD	
HHG000098		8.7	0.165	0.08	-	LOD	
IND003008		11.7	0.105	0.06	0.186	-	
HHG000103	-	9.6	0.026	0.01	-	2.0	
HHG000106	-	16.0	0.32	0.15	-	LOD	
HHG000109	-	26	0.62	0.28	-	LOD	
HHG000115	17.3	26	0.71	0.32	0.47	LOD	
HHG000150	21	38	0.61	0.26	0.59	LOD	
HHG000160	21	38	0.55	0.23	0.64	LOD	
HHG000165	16.3	15.5	0.26	0.10	0.075	LOD	
HHG000168	19.8	34	0.47	0.19	0.58	LOD	
HHG000190	-	30	0.192	0.09	-	-	LOD
MMI000200	11.1	12.0	0.019	0.01	0.060	LOD	
MMI000204	11.5	12.7	0.021	0.01	0.074	LOD	

In the four days preceding the survey 27mm of rain was recorded at the site. Most irrigation areas had been used for three days leading up to the survey. On the day of the survey 0.6mm of rain fell and no irrigation was occurring.

The results of surface water monitoring on 22 March 2024 (Table 7) indicated the following:

- Temperature in the Haehanga Stream ranged 11.6–14.8 °C, a change of 3.2 °C, with the highest temperatures found in the lower catchment.
- Un-ionised ammonia at all locations was at least an order of magnitude lower the consent limit (0.025 g/m^3).
- The highest (pH adjusted) NH4 results were from the middle of the catchment below the WTS and ranged from 0.23-0.32g/m^3. The same trend can be seen in the NNN and NH_3 concentrations where the highest results are from the same monitoring locations. All three parameters increase between the Mimitangiatua River locations although only slightly.
- Chloride concentration likewise increased by more than 50% down the catchment, ranging 5.5–13.4 g/m^3 with the highest recording located at the downstream boundary (HGG000190).
- The concentration of DCBOD at HHG000103 immediately below the WTS was 2.00g O_2/m^3 which is the maximum allowed by the consent condition.
- The *E. coli* results were generally high throughout the catchment and fluctuated. Above the WTS the concentration ranged from 17cfu/100ml at the head of the catchment to 8,400cfu/100ml at HHG000100, which was the highest result during this survey. The *E. coli* concentrations downstream of the WTS peaked at 4,600cfu/100ml at monitoring location HHG000106, and decreased to 32cfu/100ml.
- Most parameters increased in concentration between the upstream and downstream samples, although the changes in the Mimitangiatua River were of no ecological significance.

31 May 2024

Table 8 Surface water monitoring 31 May 2024

31 May 2024	NH_3	pH	*E. coli*	EC	EC	TSS	Temp
Site	**g/m^3**	**pH Units**	**cfu/100ml**	**mS/m**	**µS/cm**	**g/m^3**	**°C**
Consent 5838-2.2 condition 11 max	**< 0.025**						
HHG000090	LOD	7.2	120	15.3		LOD	8.7
HHG000093	0.00014	7.2	170	15.8		3	8.9
HHG000100	0.00022	7.3	510	18.2		5	9
HHG000097	0.00022	7.4	160	20.3		4	8.8
HHG000098	0.00033	7.2	250	19.9		6	8.5
IND003008	0.79	7.8	2200	76.9		25	11.1
HHG000103	0.021	7.4	610	23.2		10	8.7
HHG000106	0.0024	7.3	1000	19.6		-	8.6
HHG000109	0.0026	7.4	540	20		-	8.9
HHG000115	0.0023	7.4	700	19.9		-	8.8
HHG000150	0.00170	7.2	570	20.5		6	8.9
HHG000160	0.00158	7.2	420	20.8		10	8.9
HHG000165	0.00033	6.7	70	20.7		4	9.7
HHG000168	0.00144	7.2	360	20.2		12	8.8
HHG000190	0.00157	7.2	490	20.1		-	8.8
MMI000200	0.00009	7.2	280	11.7		8	9.3
MMI000204	0.00019	7.2	300	12.2		9	9.3
	Total Sodium	**Chloride**	**Total ammoniacal nitrogen**	**Total ammoniacal nitrogen with equivalent toxicity at pH 8**	**NNN**	**DCBOD**	**CBOD**
Site	**g/m^3**	**g/m^3**	**g/m^3**	**g/m^3**	**g/m^3**	**g O_2/m^3**	**g O_2/m^3**
Consent 5838-2.2 condition 11 max		**<150**				**<2.0**	
HHG000090	9.2	7.2	LOD	0.00	0.047	LOD	
HHG000093	9.9	7.7	0.049	0.02	0.048	LOD	
HHG000100	10	9	0.069	0.03	0.065	LOD	
HHG000097	-	7.5	0.059	0.03	0.093	LOD	
HHG000098	-	7.9	0.12	0.05	-	LOD	
IND003008	-	37	57	43.51	0.42	-	
HHG000103	-	10.7	4.5	2.32	-	LOD	
HHG000106	-	9.9	0.65	0.31	-	LOD	
HHG000109	-	10.3	0.62	0.32	-	LOD	
HHG000115	10.4	10.7	0.59	0.30	0.27	LOD	
HHG000150	11.1	12.9	0.59	0.27	0.36	LOD	
HHG000160	11.0	13.2	0.57	0.26	0.42	LOD	
HHG000165	11.6	11.3	0.33	0.13	0.160	LOD	
HHG000168	11.0	12.8	0.57	0.26	0.41	LOD	
HHG000190	-	12.9	0.53	0.24	-	-	LOD
MMI000200	9.0	10.2	0.031	0.01	0.086	LOD	
MMI000204	8.7	10.2	0.063	0.04	0.112	LOD	

Most days in the month of May received rainfall, and in the four days preceding the survey 24.6mm of rain fell. The most recent irrigation had occurred two days beforehand to six of the nine areas.

The results of surface water monitoring on 31 May 2024 (Table 8) indicated the following:

- Temperature ranged 13.9–15.0°C.
- The samples from the WTS reported the highest un-ionised ammonia and ammoniacal nitrogen results this year. The unionized ammonia result was 0.79g/m³ compared to the second highest result of 0.058g/m³. and the ammoniacal nitrogen concentration was 57g/m³ compared to the second highest result of 3.4g/m³.
- Consequently, the unionized ammonia at HHG000103 was 0.21g/m³ which is significantly higher than the result from the monitoring location upstream of the WTS (HHG000098, 0.00033g/m³) but marginally lower than the consent limit of 0.025 g/m^3. The concentration reduced significantly with distance downstream, although the results from the Mimitangiatua show a slight influence from the Haehanga Stream input.
- The (pH adjusted) NH4 concentration downstream of the WTS was 2.32g/m³ which is the second highest result of the monitoring year. The concentration generally decreased downstream, although increased the concentration in the Mimitangiatua River by three times, from 0.01 to 0.04g/m³.
- pH ranged 6.7-7.4.
- EC ranged between 15.3 and 23.2 through the catchment
- Chloride (9.2-11.6g/m³) and sodium (9.9-13.2g/m³) results showed little variation with distance down the catchment, and did not increase the respective concentrations in the Mimitangiatua River.
- DCBOD results were below the LOD at all locations.
- As with the nitrogen results *E. coli* results spiked immediately after the WTS, with the results from the next five monitoring locations ranging from 540 to 1000cfu/100ml.
- The most significant effect on the Mimitangiatua River was from unionized ammonia, ammoniacal nitrogen and nitrogen-nitrate which more than doubled between the upstream and downstream results. Although none of the downstream results were significantly high compared to relevant assessment criteria. The remaining parameters did not change significantly between the two locations and did not adversely affect the quality of the Mimitangiatua in terms of recognised standards and guidelines for safeguarding water quality.

2.2.3 NPS-FM attributes

The National Policy Statement for Freshwater (NPS-FM) provides local authorities with updated direction on how they should manage freshwater under the Resource Management Act 1991. The revised version came into force in September 2020 and includes attributes which require limits on resource use. The attributes most relevant to the Remediation NZ site and for which there is data are ammonia and *E. coli*. The NPS-FM sets out how these are to be calculated and assessed.

At certain threshold concentrations ammonia (as ammoniacal nitrogen) can be ecotoxic to aquatic life. Table 5 of the NPS-FM delineates four attribute bands and a national bottom line value based on annual median and annual 95th percentile (95%ile).

This monitoring year 84 samples were collected from 14 monitoring sites in the Haehanga Stream, the ammonia concentrations (adjusted for temperature and pH) ranged from 0.004 to 3.47g/m³. The annual median for this year was 0.10g/m³ which is in 'B' attribute band and above the national bottom line. The 95%ile for this monitoring year is 0.36g/m³ which is also in the 'B' attribute band and above the national bottom line. When ammonia concentrations are in the 'B' band 95% of species are protected, but 5% of sensitive species are impacted occasionally.

The second relevant attribute is the abundance of *E. coli* which indicates the presence of pathogens harmful to human health through close contact activities such as swimming. The appropriate attribute bands can be found in table 9 of the NPS-FM and are based on the risk of infection. There are five attribute bands labelled A-E, and four numeric attribute states based on % of exceedances of threshold values, and median and 95%ile thresholds. The numeric attribute values are based on monthly monitoring frequency, irrespective of weather and flow conditions, and a site may only be graded after five years of data. On this basis the Haehanga Stream cannot be graded, however the results are used in this report as indicators of stream quality.

Eighty-four samples were analysed for *E. coli* this year, results ranged from <10 to 8,400cfu/100ml. The annual median was 360cfu/100ml which places the stream in the 'E' attribute band which is the lowest category. The annual 95%ile of this year's results is 2,285cfu/100ml which also categorises the stream in the 'E' attribute band. When *E. coli* is present at concentrations within this band the risk of infection is greater than 50 in 1,000 for more than 30% of the time, and the predicted average risk of infection is 7%.

2.2.4 Heavy metals

In addition to the analyses reported above, sites HHG000090 (upper catchment), HHG000097 (immediately above the WTS), IND003008 (WTS discharge), and HHG000103 (receiving water) were analysed for total metals in each survey undertaken in this year. Metals analyses were added to the surveys following the discovery of treated sawdust in the drilling waste stockpile in previous years. The primary contaminants of concern are arsenic, chromium, and copper which can be found in timber preservatives. In the discussion below the results are compared to the Australia New Zealand Environment and Conservation Council (ANZECC) water quality guidelines.

Results are presented in Table 9 below.

Table 9 Metals in surface water and WTS discharge

Site / Metal (total) g/m³		HHG000090 Upstream (baseline)	HHG000097 Tributary above WTS discharge	IND003008 WTS discharge	HHG000103 Tributary below WTS discharge	Reference criteria*
Arsenic	20/3/2023	LOD	0.002	0.003	0.002	0.024
	31/8/2023			0.002	0.001	
	9/11/2023			0.002	0.001	
	24/4/2024			0.003	0.002	
	22/3/2024			0.003	0.002	
	31/5/2024			0.006	0.001	
Cadmium	20/3/2023	LOD	LOD	LOD	LOD	0.0002
	31/8/2023					
	9/11/2023					
	24/4/2024					
	22/3/2024					
	31/5/2024					
Chromium	20/3/2023	LOD	0.001	0.001	LOD	0.001 (CrVI)
	31/8/2023	LOD		0.001	LOD	
	9/11/2023	0.001		0.001	0.001	
	24/4/2024	LOD		0.001	0.001	
	22/3/2024	0.001		0.001	LOD	
	31/5/2024			0.002	0.001	

Site		HHG000090 Upstream (baseline)	HHG000097 Tributary above WTS discharge	IND003008 WTS discharge	HHG000103 Tributary below WTS discharge	Reference criteria*
Metal (total) g/m³						
Copper	20/3/2023	0.0011	0.0018	0.0021	0.0017	0.0014
	31/8/2023	0.0012		0.0028	0.0017	
	9/11/2023	0.0016		0.0029	0.0023	
	24/4/2024	0.0021		0.0040	0.0030	
	22/3/2024	0.0013		0.0020	0.0021	
	31/5/2024	0.0013		0.0031	0.0022	
Lead	20/3/2023	0.0002	0.0005	0.0008	0.0004	0.0034
	31/8/2023	0.0002		0.0008	0.0004	
	9/11/2023	0.0003		0.0008	0.0006	
	24/4/2024	0.0003		0.0008	0.0008	
	22/3/2024	LOD		0.0006	0.0004	
	31/5/2024	0.0002		0.0010	0.0004	
Nickel	20/3/2023	0.002	0.0033	0.003	0.003	0.011
	31/8/2023	0.002		0.003	0.003	
	9/11/2023	0.002		0.003	0.003	
	24/4/2024	0.003		0.004	0.004	
	22/3/2024	0.002		0.003	0.003	
	31/5/2024	0.002		0.006	0.003	
Zinc	20/3/2023	LOD	0.002	0.003	LOD	0.008
	31/8/2023	LOD		0.003	LOD	
	9/11/2023	LOD		0.002	0.002	
	24/4/2024	0.005		0.008	0.003	
	22/3/2024	LOD		0.002	0.002	
	31/5/2024	0.001		0.005	0.002	

*Australian and New Zealand Guidelines for Marine and Fresh Water Quality 2018, 95% protection of freshwater species

- The arsenic concentrations in the catchment increased slightly with distance downstream. All results at HHG000097, the upstream location, were less than the LOD and all results from the WTS discharge and downstream locations ranged between 0.006 and 0.001g/m³. None of the results were greater than the ANZECC guideline of 0.024g/m³.
- The cadmium concentration in all samples was lower than the LOD which is lower than the ANZECC guideline.
- All samples collected from HHG000097 contained chromium at levels close to or below the LOD, and all downstream results were equal to the ANZECC guideline value for Chromium VI (0.001g/m³).
- All monitoring locations reported copper concentrations higher than the ANZECC trigger value (95% protection) during the monitoring year. All samples collected from HHG000103 were greater than the upstream results as well as the ANZECC trigger value. Four samples from HHG000103 contained copper at a concentration which was higher than the ANZECC trigger value for 90% species protection (0.0018g/m³), and one of those was higher than the trigger value for 80% species protection (0.0025g/m³). The 2023/24 monitoring report (TRC, 2024) explained that dissolved copper is naturally high in Taranaki streams compared to the ANZECC guideline for ecological protection, as shown by the elevated results from HHG000090 which included one result (0.0021g/m³) which was higher than the 90% trigger value.
- During all surveys this year the concentration of lead in samples increased with distance downstream, indicating activities on-site may be a source of lead contamination. However, all results were an order of magnitude lower than the ANZECC trigger value of 0.034g/m³.

- Likewise, nickel and zinc in the stream increased slightly with distance downstream although no results were elevated above the ANZECC guideline values. Further, all nickel results were an order of magnitude lower than the guideline.

Overall, the concentration of metals in the stream increases with distance from the upper catchment, likely due to discharges from the WTS. However, the increases are small and, except for copper, do not result in concentrations greater than the respective ANZECC trigger value for 95% species protection. All copper concentrations in downstream samples are less than the ANZECC trigger value for 80% protection of species (0.0018g/m^3). As demonstrated, copper is naturally occurring at concentrations higher than the ANZECC trigger value.

2.3 Biomonitoring

One biomonitoring survey was conducted for the 2023/24 year on 11 April 2023. The Council's standard 'kick-sampling' technique was used at eight monitoring sites to collect streambed macroinvertebrates from the main stem of the Haehanga Stream, an unnamed tributary and a reference site in the Waikekeho Stream. Samples were analysed to determine the number of taxa (richness), macroinvertebrate community index (MCI) and semi-quantitative macroinvertebrate community index (SQMCI) scores for each site. The indices are a measure of the health of the macroinvertebrate community and accordingly low scores or significant changes with distance downstream may indicate deteriorating conditions for in-stream biota in general. Causes of deterioration may include deteriorating water quality from direct discharges of contaminants into the stream, changes to the stream habitat or differences in flow rate or volume.

The details of the monitoring sites can be found in Table 10 and their location in Figure 4, Figure 5 and Figure 6.

Table 10 Biomonitoring sites in the Haehanga Stream Catchment and comparable reference site

Site	Site Code	GPS coordinates (Easting- Northing)	Location
1	HHG000090	1732685-5684577	Upstream of upper irrigation area
2	HHG000100	1732272-5684972	Downstream of upper irrigation area
T2	HHG000098	1732747-5685043	Tributary: upstream of wetland discharge point
T3	HHG000103	1732692-5685042	Tributary: downstream of wetland discharge point
5	HHG000115	1732124-5685478	Main stem, 25m downstream of last pond and swale collection area (composting and wastewater facilities)
6	HHG000150	1731673-5685796	30m downstream of lower irrigation area
7	HHG000190	1731611-5686514	50m upstream of State Highway 3 bridge
RS*	WKE000800	1735152-5684987	Waikekeho Stream, 10m upstream of old Ri Rd. bridge

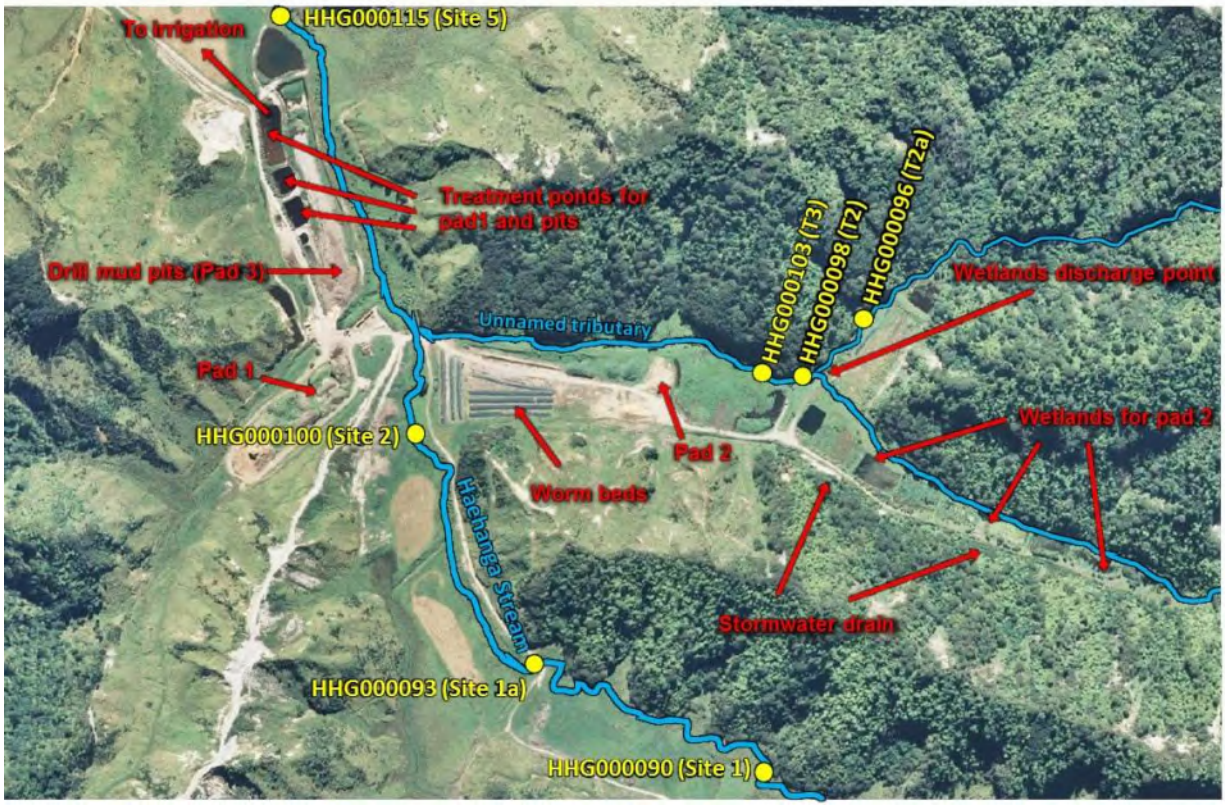


Figure 4 Map of upper Remediation NZ Ltd activities with former (designated with an 'a' after number) and current sampling sites

Figure 5 Map of the downstream sites in the Haehanga Stream

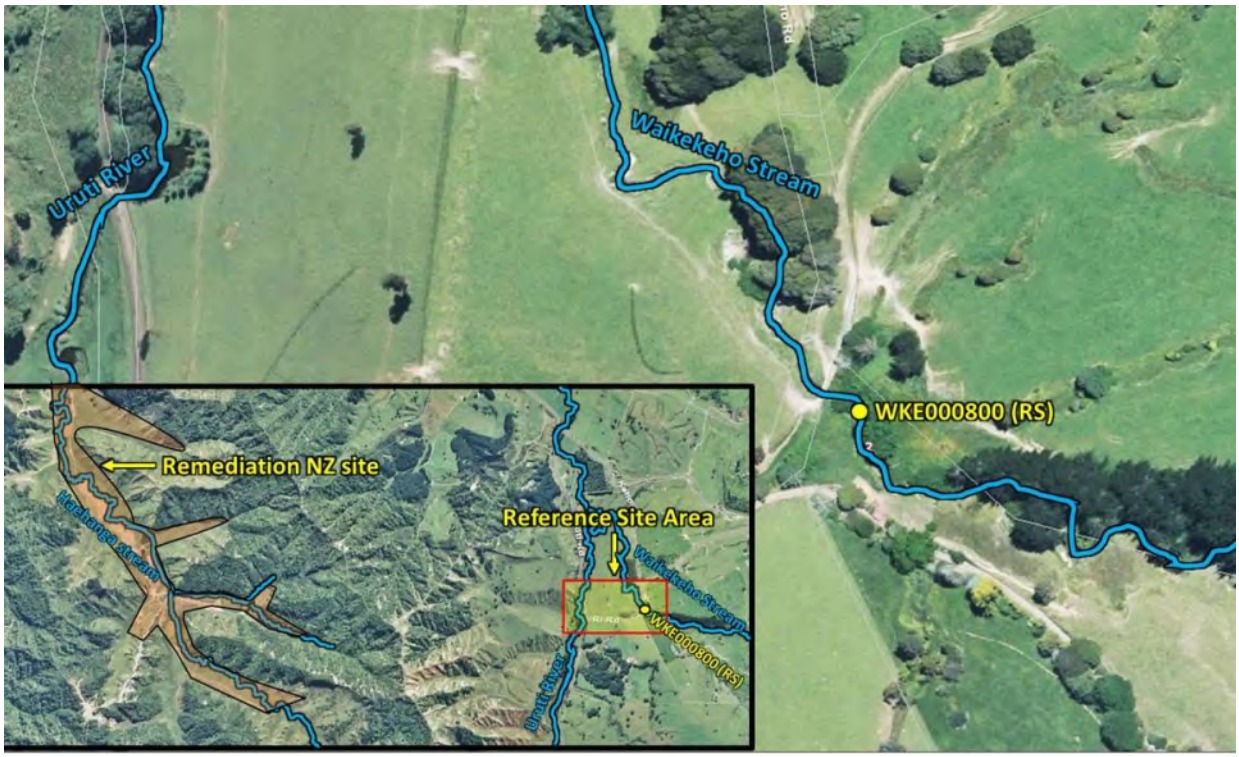


Figure 6 Map of the Waikekeho reference site. Inset shows reference site (red box) in relation to the RNZ site

This biomonitoring survey was performed 13 days after a fresh in excess of three times median flow and 15 days after a fresh in excess of seven times median flow at Waikaramarama Stream (flow gauging site "Waikaramarama at Bridge"). The water quality at the monitoring sites varied from uncoloured to brown, and clear to dirty. Stream depth was low to moderate and water speed was slow to steady.

Table 11 Taxa, MCI and SQMCI results for Haehanga Stream Catchment and reference site for current and previous surveys

Site	N	Numbers of taxa				MCI values				SQMCI values				
		Range	Median	Previous Survey	Current Survey	Range	Median	Previous Survey	Current Survey	N	Range	Median	Previous Survey	Current Survey
LOWL	32	11-30	21	-	-	62-109	79	-	-	32	2.6-7.2	4.2	-	-
1a*	14	17-27	21	-	-	62-78	71	-	-	21	2.6-4.2	3.9	-	-
1	5	12-16	14	12	23	63-77	73	73	83	5	1.9-3.6	3.1	1.9	3.5
2	13	12-30	22	13	15	79-104	87	92	84	13	3.8-7.2	5.2	5.2	4.9
T2	27	13-23	18	13	12	62-99	74	86	97	27	2.7-5.7	4.0	4.5	6.2
T2a**	1	-	19	-	-	-	-	105	-	1	-	-	5.6	-
T3	15	15-32	24	15	14	78-93	84	92	80	15	3.5-5.4	4.4	4.4	5.3
5	26	6-28	19	12	18	53-88	73	83	68	26	1.1-4.3	3.0	1.9	3.4
6	13	6-24	16	15	21	57-88	68	68	75	13	1.0-4.0	2.9	1.8	3.2
7	22	7-30	19	7	17	56-91	71	91	74	22	1.3-4.3	3.5	3.7	3.6
RS	3	11-20	17	11	15	73-97	87	87	107	3	3.3-5.8	4.2	5.8	4.1

* Former control site at HHG000093

** Site previously recorded as HHG000098 but now changed to HHG000096 (see TRC, 2022 for further details)

Macroinvertebrate taxa richness was low to moderate throughout the Haehanga Catchment, with the exception of sites 1 and 6, which had high richness. Site T2 scored the lowest taxa richness at this site to date. Taxa richness and taxa abundances are robust measures when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. When exposed to toxic chemicals

macroinvertebrates may perish or migrate downstream as an avoidance mechanism and therefore taxa richness and abundances decrease when exposed to toxic chemicals.

The MCI scores in the main stem of the Haehanga for Sites 1 and 2 were classified as having "fair" macroinvertebrate health, while sites 5, 6, and 7 were categorised as having "poor" health. In the tributary, the MCI scores for T2 and T3 were in the "fair" category for macroinvertebrate health. Site RS reported the highest MCI score since monitoring began and was in the "good" macroinvertebrate health category. The scores for site 1 (the control site) and site 2 (mid-catchment) were very similar. However, site 1 received a higher MCI score than sites 5, 6, and 7, with a significant difference between site 1 and site 5. Notably, while site 1 and site T3 had similar MCI scores, site 1 scored significantly lower than site T2. This was likely due to better habitat conditions at site T2, including more favourable substrate composition and better riparian shading. Site RS scored a significantly higher MCI score than all other sites in the Haehanga Catchment, except for site T3. Compared to the previous survey, current MCI results were lower at site 2 and significantly so at sites T3, 5 and 7; while current scores were higher at sites 1 and 6, and significantly so at sites T2 and RS. Compared to the historical medians, current MCI results were similar at sites 2, 5, T3 and 7; but were higher at sites 1 and 6, and significantly so at sites T2 and RS. When compared to the median MCI scores for other small lowland hill country sites at similar altitudes (LOWL), the current MCI results were generally comparable or better. The only exception was site 5, which had a significantly lower MCI score.

Overall, macroinvertebrate community health in the main stem of the Haehanga Stream can be regarded as poor, being dominated by pollution tolerant taxa, which is likely a result of poor habitat quality and conditions at the time of sampling. The unnamed tributary has better habitat quality and subsequently overall better macroinvertebrate health. In order to have strong confidence in the results comparisons with sites with the same habitat features are necessary. Both the control (Site 1) and reference (Site RS) sites have habitat features that differ to the main stem and unnamed tributary and therefore caution is needed when making direct comparisons. There was a no evidence indicating that Remediation NZ activities were causing discharges that had direct toxic effects, as evidenced by taxa numbers and abundances. There was also no evidence based on MCI scores or SQMCI scores of any significant effects on the macroinvertebrate communities of the Haehanga Stream and unnamed tributary of the Haehanga Stream. Given the poor habitat at the time of sampling the results do not provide sufficient evidence to conclude that Remediation NZ was having any significant effect on macroinvertebrate communities in the Haehanga catchment.

2.4 Groundwater

The groundwater bore network was installed primarily to monitor the direct effects on groundwater beneath the irrigation areas in order to

(a) measure the effects of treated wastewater irrigation on groundwater quality; and

(b) determine whether pasture is able to assimilate the wastewater nitrogen loadings, or alternatively is being overwhelmed leading to nitrogen leakage.

Four groundwater surveys were conducted this year. Samples were collected from seven monitoring bores and sent for laboratory analysis of the suite of parameters specified above. The monitoring bores are distributed through the valley and their locations can be seen in Figure 7 below. The placement of the bores has not been designed specifically to determine the quality of groundwater at time and point of egress into the Haehanga Stream, although they are largely located on the downgradient side of the irrigation areas to indicate cumulative effects of irrigation loadings. The location of all irrigation areas is shown in Figure 8. Attenuation and transformation of contaminants within the system of shallow aquifers will occur across the site and affect the concentration and rate of contaminants entering the waterways.

Key measures within the groundwater analytical programme are:

- changes in ionic strength (measured by conductivity, total dissolved solids, sodium, and chloride)

- sodicity, which affects the integrity of the soil structure (measured by ratios between sodium, calcium, and magnesium)
- nitrogen loading (measured by ammoniacal and nitrate nitrogen species)
- and evidence of the leaching of potentially toxic substances. Analytes are listed in full in Table 2 and the results are presented in section 2.4.1 below.

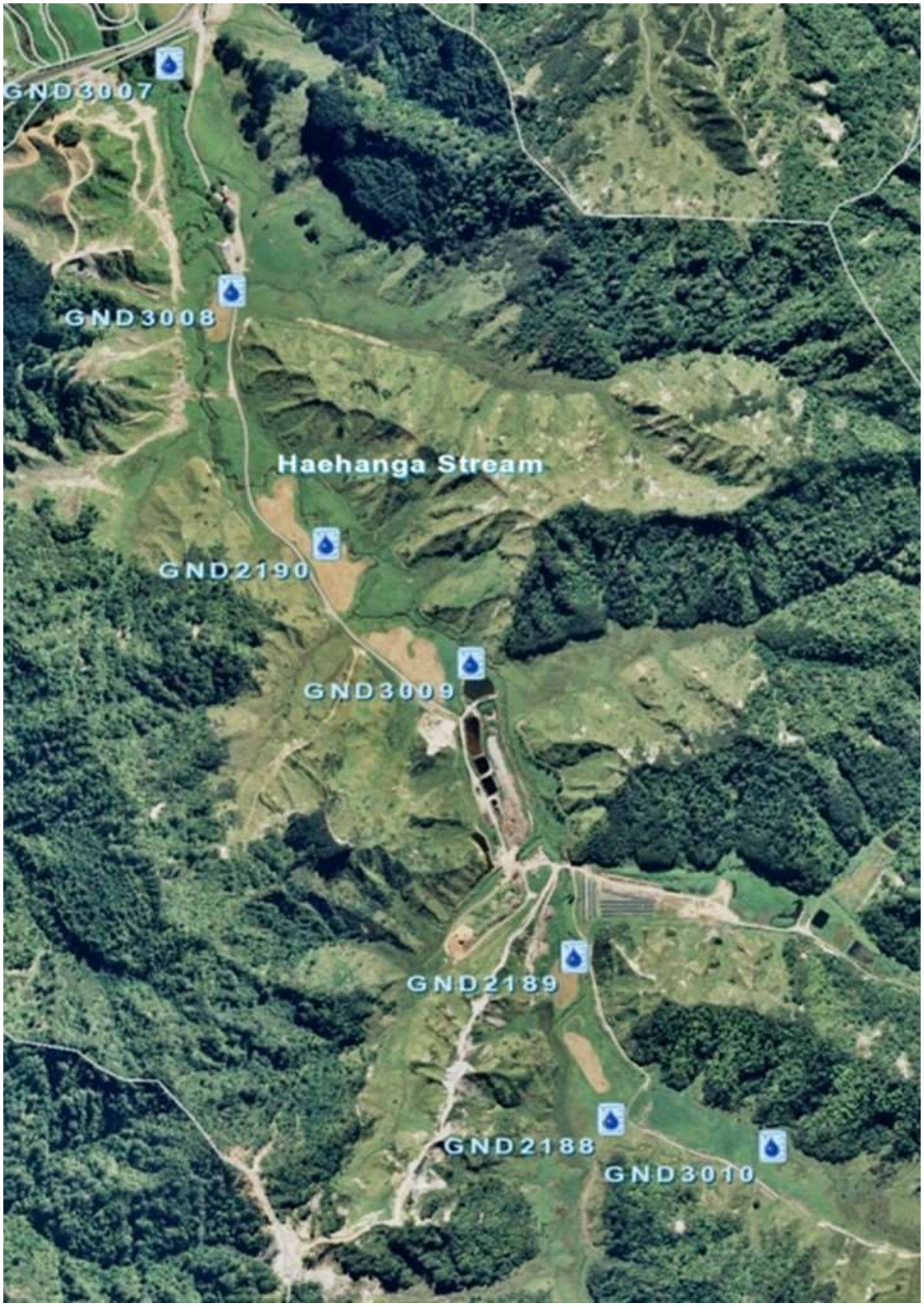


Figure 7 Locations of groundwater monitoring bores at the RNZ site

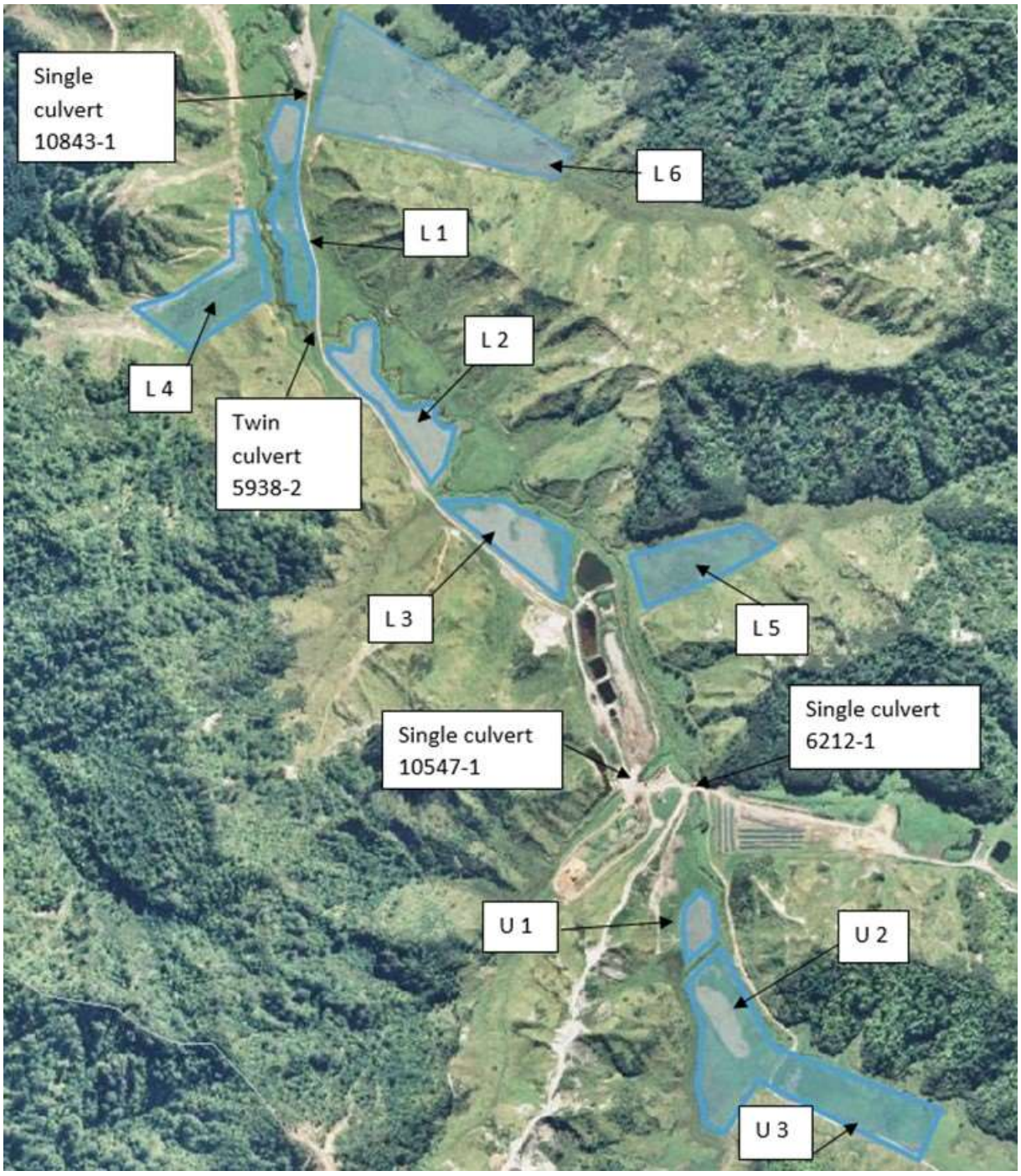


Figure 8 Irrigation areas and stream culverts

2.4.1 Results

The results from the four Council groundwater monitoring surveys are presented in Table 13 to Table 19 below.

Previous annual reports have included the results of light organic solvent preservatives (LOSPs) and hydrocarbon analysis. This year all of these results were less than the laboratory level of detection and on that basis have not been included in the tables.

The concentration of analytes in groundwater as a result of wastewater irrigation can be diluted during rainfall. Table 12 below presents the amount of rainfall incident on the Site and the volume of wastewater irrigated to each paddock for two days preceding each survey.

Table 12 Rainfall and irrigation volume in the 48hrs preceding groundwater survey

Survey date	Rainfall (mm)	Irrigation volume (m^3)	Irrigation Area (m^3)
9 August 2023	6.8	0	0
3 Oct 2023	16.6	0	0
22 March 2024	5	165	L1 (35), L2 (30), L3 (30), L4 (35), L6 (30), U3 (15)
31 May 2024	8.4	120	L2 (20), L3 (20), L4 (20), L6 (20), U2 (20), U3 (20)

Monitoring bore GND2188

Table 13 Results of GND2188 monitoring 2023/24

GND2188 Parameter	Date	9 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	**m**	0.66	0.59	1.59	0.89
Sample Temperature	**°C**	12.6	14.0	17.9	15.1
pH	**pH Units**	6.3	6.6	6.6	6.1
Free Ammonia	**g/m^3**	0.0018	0.0056	0.0067	0.0042
Total Ammoniacal-N	**g/m^3**	1.5	2.3	3.3	2.3
Nitrate-N + Nitrite-N (NNN)	**g/m^3**	0.043	0.014	0.004	4.6
Electrical Conductivity (EC)	**µS/cm**	309	387	481	423
Total Dissolved Solids (TDS)	**g/m^3**	195	230	260	290
Dissolved Barium	**g/m^3**	0.039	0.037	0.034	0.066
Acid Soluble Barium	**g/m^3**	LOD	LOD	LOD	LOD
Total Calcium	**g/m^3**	26	40	47	38
Total Magnesium	**g/m^3**	5.6	7.4	10.6	7.4
Total Sodium	**g/m^3**	11.1	13.5	16.7	13.8
Chloride	**g/m^3**	3.3	10.9	16.3	32

GND2188 is located to southwest of the site in irrigation area U2. Prior to the expansion of the irrigation areas southwards (upslope) this was considered a control bore. U2 was lightly loaded with effluent during the 2023/24 period, receiving the second lowest kgN/ha/yr during the monitoring year.

Over the course of the 2023/24 monitoring year:

- pH results maintained a weakly acidic concentration ranging 6.1–6.6 pH throughout the year.
- EC results increased until the final survey when it declined slightly. All results were within a narrow range between 389 and 481µs/cm, peaking during the March 2024 survey.
- Total dissolved solids followed a similar trend to the EC, increasing over the year from 195g/m^3 in August 2023 to 290g/m^3 in May 2024.

- Dissolved barium remained measurable and stable across the first three surveys, ranging between 0.034–0.039g/m^3. The final result was 0.066g/m^3 which is nearly double the previous result. Barium is relatively immobile in soils.
- Chloride results ranged from 3.3–32.0 g/m^3 and increased steadily during the year.
- NH4 ranged between 1.5–3.3 g/m^3 and generally increased during the year. The results are significantly higher than last year's minimum result of 0.156g/m^3, but comparable to the maximum result of 2.8g/m^3. These results represent a significant decrease since the historical maximum of 22g/m^3 reported in 2021.
- The NNN results ranged between 0.04–4.6g/m^3. The latter were higher than in the 2021/22 year, and are consistent with the biologically driven processes of nitrification of ammonia to nitrate (decreasing the former, increasing the latter) followed by denitrification to nitrous oxide gas and elimination from the groundwater system.

Monitoring bore GND2189

Table 14 Results of GND2189 monitoring 2023/24

GND2189 Parameter	Date	9 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	**m**	0.66	0.38	0.93	0.65
Sample Temperature	**°C**	12.4	12.7	17.3	14.7
pH	**pH Units**	5.8	6.1	5.6	5.7
Free Ammonia	**g/m^3**	0.000040	0.000061	0.000038	0.000036
Total Ammoniacal-N	**g/m^3**	0.21	0.18	0.23	0.23
Nitrate-N + Nitrite-N	**g/m^3**	0.016	LOD	LOD	0.011
Electrical Conductivity (EC)	**µS/cm**	318	303	338	275
Total Dissolved Solids (TDS)	**g/m^3**	174	172	144	165
Dissolved Barium	**g/m^3**	0.126	0.116	0.114	0.086
Acid Soluble Barium	**g/m^3**	0.13	0.15	0.12	LOD
Total Calcium	**g/m^3**	14.9	15.3	15.3	11.9
Total Magnesium	**g/m^3**	4.8	4.5	4.7	4.0
Total Sodium	**g/m^3**	31	27	29	26
Chloride	**g/m^3**	18	62	63	54

GND2189 is located on the northern end (i.e. on the down gradient) of irrigation area U1and received a moderate loading of nitrogen over the monitoring year compared to other irrigation areas.

Over the course of the 2023/24 year:

- pH fluctuated by 0.5 units this monitoring period, between 5.6 and 6.1, and remained weakly acidic, tending slightly less acidic throughout the monitoring period.
- EC fluctuated slightly by 63µS/cm during the year.
- TDS and EC both fluctuated somewhat although not in the same pattern.
- Results for both dissolved and acid soluble barium suggested a slight reduction during the monitoring period, and both were lower than for any measurement of barium in 2021/22.
- Chloride and sodium did not show any particular trend over the course of the year and varied only slightly.
- All nitrogen-based parameters showed only slight variation throughout the year and were present at fairly low levels. NH4 was highest during the March and May surveys, each reporting 0.23g/m^3, although these are only marginally higher than the minimum reported value of 0.18g/m^3.

Monitoring bore GND2190

Table 15 Results of GND2190 monitoring 2023/24

GND2190 Parameter	Date	11 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	m	0.32	0.35	1.19	0.45
Sample Temperature	°C	12.7	13.8	17.7	14.9
pH	pH Units	5.8	5.7	5.3	5.6
Free Ammonia	g/m³	0.000074	0.000079	0.000040	0.000065
Total Ammoniacal-N	g/m³	0.41	0.50	0.47	0.48
Nitrate-N + Nitrite-N	g/m³	0.137	0.014	0.015	8.0
Electrical Conductivity (EC)	µS/cm	1207	1421	1169	846
Total Dissolved Solids (TDS)	g/m³	670	770	650	510
Dissolved Barium	g/m³	0.53	0.48	0.39	0.30
Acid Soluble Barium	g/m³	0.51	0.60	0.39	0.30
Total Calcium	g/m³	45	55	37	34
Total Magnesium	g/m³	7.3	8.4	6.7	6.3
Total Sodium	g/m³	117	119	129	65
Chloride	g/m³	310	390	300	192

GND2190 is located in irrigation area L2 which received the second highest nitrogen loading rate during the 2023/24 monitoring year. This is evident in markers such as EC and total dissolved solids, NH4, and nitrate nitrogen which were high compared to other groundwater bores.

Over the course of the 2023/24 year:

- Groundwater pH remained relatively stable this monitoring period. All results were in the moderately acidic range (<6.0 pH), ranging between 5.3 and 5.8.
- During the first three surveys the EC level was particularly high, 1169-1421µS/cm, before decreasing to 846µS/m³ at the final survey. These levels are likely a result of the elevated chloride, sodium and other dissolved solids concentrations which are among the highest recorded at any bore during this year.
- TDS was also elevated compared to other groundwater samples.
- Sodium remained elevated throughout the monitoring period and remained at the concentration observed at the end of the previous monitoring period. The sodium concentration results are all lower than historical levels, the results have been trending downwards since May 2021 when the concentration was 260g/m³.
- Chloride concentration this monitoring year ranged from 192 and 390g/m³. Historical results show a nearly identical trend to sodium, also decreasing from a high of 940g/m³ in February 2021.
- While free and ammoniacal nitrogen showed little variation over the monitoring year and remained at levels consistent with previous years, the nitrate N+nitrite N (NNN) result in May 2024 was 8.0g/m³, the second highest result of any monitoring bore this year. The highest result, 15g/m³ in bore GND3008 (irrigation area L1), also occurred during the May 2024 survey. The Company's records show that the highest volume of wastewater was irrigated to land in the month of May, and areas L1 and L2 received the highest nitrogen loading rates that month.

Monitoring bore GND3007

Table 16 Results of GND3007 monitoring 2023/24

GND3007 / Parameter	Date	11 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	m	2.04	2.02	2.84	2.33
Sample Temperature	°C	13.8	12.5	15.9	15.1
pH	pH Units	5.65	5.77	5.35	5.57
Free Ammonia	g/m³	0.000024	0.000032	0.000019	0.000014
Total Ammoniacal-N	g/m³	0.040	0.052	0.048	0.049
Nitrate-N + Nitrite-N	g/m³	0.062	0.23	0.006	LOD
Electrical Conductivity (EC)	µS/cm	123	132	137	119
Total Dissolved Solids (TDS)	g/m³	78	84	75	71
Dissolved Barium	g/m³	0.027	0.032	0.025	0.024
Acid Soluble Barium	g/m³	LOD	LOD	LOD	LOD
Total Calcium	g/m³	9.3	10.8	10.6	9.0
Total Magnesium	g/m³	2.9	2.9	3.3	2.8
Total Sodium	g/m³	8.2	8.5	8.9	7.9
Chloride	g/m³	7.0	8.1	7.2	7.9

GND3007 is located at the entrance of the site, in close proximity to the State Highway. The bore lies between the RNZ irrigation zones and downslope receptors offsite. However, much of the groundwater in the site likely flows into the Haehanga Stream rather than parallel to the stream and via any aquifer system close to GND3007. Groundwater in this location is unlikely to show a significant influence from the activities of RNZ, but GND3007 has been installed to provide certainty around the potential for offsite effects.

Results from the 2023/24 monitoring year are generally lower than results from all other bores, with a few exceptions including NNN which was elevated (0.23g/m³) during the October 2023 survey. The bore consistently shows the lowest levels of markers of contamination of any bore.

The data indicates that the migration of irrigation contaminants to the property boundary is negligible. RNZ commenced using irrigation area (L6) during the 2021/22 year, which is closer to bore GND 3007 than other fields, and may impact the results over time.

Monitoring bore GND3008

Table 17 Results of GND3008 monitoring 2023/24

GND3008 Parameter	Date	11 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	m	1.67	1.68	2.67	2.02
Sample Temperature	°C	13.7	13.4	16.1	14.2
pH	pH Units	7.0	6.9	6.3	6.3
Free Ammonia	g/m^3	0.00196	0.0020	0.00062	0.00037
Total Ammoniacal-N	g/m^3	0.66	0.82	0.76	0.59
Nitrate-N + Nitrite-N	g/m^3	4.4	0.96	< 0.002	15.3
Electrical Conductivity (EC)	µS/cm	677	556	657	888
Total Dissolved Solids (TDS)	g/m^3	380	330	410	560
Dissolved Barium	g/m^3	0.29	0.195	0.161	0.33
Acid Soluble Barium	g/m^3	0.28	0.20	0.18	0.34
Total Calcium	g/m^3	65	63	60	64
Total Magnesium	g/m^3	15.6	12.9	15.6	17.3
Total Sodium	g/m^3	40	23	40	56
Chloride	g/m^3	93	55	100	161

GND3008 is located on the northern (downslope) end of irrigation area L1 and the western fringe of irrigation area L6. Irrigation area L1 received a moderate loading of wastewater compared to the other irrigation areas during the monitoring year, while L6 received the least.

Over the longer term, concentrations of sodium in bore GND3008 have been steady since the start of calendar year 2021, and conductivity has been reducing from a peak at about the same time (Figures 7 and 10).

Over the course of the 2023/24 year:

- pH remained weakly acidic and stable, ranging pH 6.3-7.0, generally reflecting the pattern of 2021/22.
- EC and TDS results were stable over the monitoring year, although significantly higher than in the other fields.
- Dissolved barium and acid soluble barium are higher in these results than most other bores, indicating the presence of the metal from the drilling stockpile on Pad 2. This year the acid soluble barium results ranged from 0.18-0.34g/m^3, and the dissolved barium results ranged from 0.161g/m^3-0.33g/m^3. The most elevated concentrations were recorded in August 2020 (0.96 g/m^3 acid soluble and 0.91 g/m^3 dissolved) and have reduced since then.
- Chloride (55-161g/m^3) and sodium (23-56g/m^3) concentrations fluctuated during the monitoring year but were significantly lower than the results reported from June 2020 to May 2021.
- Nitrate/ nitrite nitrogen in the result from the May 2024 survey was 15g/m^3 which is significantly higher than other results from this monitoring year, and the highest at this bore since August 2020. The remaining results from this year's survey were between <LOD and 4.4g/m^3 which are not of environmental concern.
- Overall, the results observed at GND3008 indicate ongoing usage of L1 and/or L6 for the irrigation of wastewater by RNZ. None of the laboratory results raise any environmental concerns.

Monitoring bore GND3009

Table 18 Results of GND3009 monitoring 2023/24

GND3009 Parameter	Date	11 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	m	1.9	2.12	2.15	2.33
Sample Temperature	°C	13.4	14.6	17.3	14.6
pH	pH Units	6.6	6.7	6.5	6.5
Free Ammonia	g/m³	0.0168	0.024	0.0145	0.0090
Total Ammoniacal-N	g/m³	13.9	15.0	14.2	7.9
Nitrate-N + Nitrite-N	g/m³	0.019	< 0.02	< 0.002	< 0.002
Electrical Conductivity (EC)	µS/cm	1812	1756	1691	1622
Total Dissolved Solids (TDS)	g/m³	1030	970	900	1040
Dissolved Barium	g/m³	0.160	0.170	0.137	0.130
Acid Soluble Barium	g/m³	0.33	0.35	0.28	0.23
Total Calcium	g/m³	66	63	57	118
Total Magnesium	g/m³	15.5	14.2	14.2	23
Total Sodium	g/m³	195	188	171	134
Chloride	g/m³	270	350	300	280

GND3009 is located to the north (downslope) of the duck pond and to the east of irrigation area L3. The wastewater application loading rate on L3 during this monitoring year was 513kgN/ha which is the third-highest application rate. The survey results for GND3009 are among the highest this monitoring year, particularly for EC and ammoniacal nitrogen.

Over the course of the 2023/24 year:

- pH remained close to neutral, between 6.5 and 6.7, in line with results since August 2018.
- EC results were among the highest this monitoring year, ranging from 1,622 – 1,812µs/cm. Although elevated, EC has been declining since February 2021 when it was 2600µs/cm. EC can be influenced by suspended solids in the water column, accordingly the TDS results were also generally higher than other bores, but it has been declining since February 2021.
- Concentrations of sodium and chloride were stable during the monitoring year. The maximum chloride result was 350g/m³, 80g/m³ higher than the minimum concentration. The difference between the minimum and maximum sodium concentrations was narrow, with a difference of 61g/m³.
- Ammoniacal nitrogen concentrations were between 7.9 -15g/m³, the highest result of this monitoring year, and in the mid-range of historical results for this bore which range between 0.52 and 26g/m³.
- Nitrate nitrite nitrogen remained at low concentrations across the four monitoring surveys, indicating soil conditions remain sour (anaerobic) with a high continuing concentration of ammoniacal nitrogen.
- In summary, the groundwater in this location showed concentrations of some contaminants (particularly ammoniacal nitrogen) that were of concern in respect of protecting surface water quality in the vicinity.

Monitoring bore GND3010

Table 19 Results of GND3010 monitoring 2023/24

GND3010 Parameter	Date	9 Aug 2023	3 Oct 2023	22 Mar 2024	31 May 2024
Level	m	1.63	1.485	2.03	1.585
Sample Temperature	°C	13.1	13.4	16.4	14.2
pH	pH Units	6.2	6.3	5.9	6.1
Free Ammonia	g/m³	0.00030	0.00027	0.000140	0.000156
Total Ammoniacal-N	g/m³	0.65	0.46	0.43	0.44
Nitrate-N + Nitrite-N	g/m³	0.057	0.191	< 0.002	0.003
Electrical Conductivity (EC)	µS/cm	229	261	203	224
Total Dissolved Solids (TDS)	g/m³	146	161	100	182
Dissolved Barium	g/m³	0.032	0.037	0.026	0.031
Acid Soluble Barium	g/m³	< 0.11	< 0.11	< 0.11	< 0.11
Total Calcium	g/m³	15.9	25	13.9	19.4
Total Magnesium	g/m³	7.4	7.8	6.3	8.5
Total Sodium	g/m³	12.0	11.5	11.5	11.1
Chloride	g/m³	10.5	10.1	8.9	9.5

GND3010 is located to the southeast boundary of irrigation area U3. This monitoring year the area received 569kgN/ha, the highest of any irrigation area. Bore GND3010 has been considered a control site in the past but is likely being affected by irrigation activities on the property.

Over the course of the 2023/24 year:

- pH remained weakly acidic, fluctuating between 5.9 and 6.2.
- EC results also remained relatively throughout the monitoring year, between 203 and 261µs/cm. All results were some of the lowest since monitoring began in October 2019, and concentrations have been trending downwards since December 2020 when the concentration was 487 µs/cm.
- Chloride and sodium results showed little variation during this monitoring year. All results are among the lowest since monitoring began in November 2018. The chloride results have decreased substantially since June 2022, and sodium has declined significantly since June 2023.
- NNN was elevated in samples from the first two surveys, while the last two results were <LOD or just above LOD.
- No BTEX or other hydrocarbon compounds have been detected at this location since August 2020.
- These results indicate that groundwater under irrigation area U3 experienced moderate impacts from nitrogen in the wastewater as a result of the high loading rate, this year despite receiving the highest nitrogen loading, and the effects appear to be declining over time.

2.5 Air

When taken in isolation the effects of isolated odour events may be below the threshold of being offensive and objectionable, but collectively over a longer term they may amount to being considered offensive and objectionable due to their frequency or duration. Additionally, the response time to complaints by Council officers is limited by the distance to be travelled or availability of staff. In 2022 the Council commenced weekly proactive odour surveys, irrespective of complaints, to monitor the long-term odour levels beyond the boundary of the site.

Table 20 Counts of complaints and proactive inspections per month 2023/24

Year	2023						2024						Total
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Complaints	3	16	2	4	5	5	7	23	20	17	11	9	131
Proactive inspections	4	3	4	4	5	5	4	5	4	5	4	4	51

Council officers conducted 51 proactive odour surveys during the period under review, 43 had been conducted during the 2022/23 monitoring year. The majority of surveys were taken outside normal working hours, focusing on early morning and evening periods when wind conditions were more likely to cause offsite odour episodes. Each survey included individual assessments at up to five separate locations beyond the boundary of the RNZ property.

Attending officers at two of the proactive odour surveys deemed that the odour experienced at the time was offensive in accordance with the assessment method. The first occurred on 4 August 2023 (IN/48109) when an officer observed offensive odour at several locations on Mōkau Road. The source of the odour was found to be the main composting pad and several poor practices were thought to be the cause. An infringement notice was issued to the Company.

Observations of odour incidents and their causes on 7 March; 17, 19, 23 and 24 April; 3and 11 May; and 6 and 18 June are subject to Environment Court proceedings and will not be discussed further in this report.

2.6 Land and soil

2.6.1 Irrigation wastewater storage IND002044

Leachates generated from both pad 1 (greenwaste pad) and pad 3 (drilling mud pad) flow through a series of sediment collection ponds prior to reaching the irrigation pond. From here, the leachate is irrigated across the irrigation areas (Figure 8). These had been extended during the 2021/22 year from 13.18ha to 15.96ha, by incorporating the new L6 area. The fluid leachate was sampled on six occasions this monitoring period. Results are provided in the table below. The range of results for each analyte since 2018 are provided.

Table 21 IND002044 irrigation pond monitoring 2023/24

IND002044 Parameter	Date	Range 2018-2023	20 July 2023	31 August 2023	9 November 2023	24 January 2024	22 March 2024	31 May 2024
Sample Temperature	°C	8.4-26.1	12.5	11.4	18.2	23.1	15.5	11.4
Acid Soluble Barium	g/m^3	0.28-2.1	LOD	0.11	0.12	0.16	0.16	-
Acid Soluble Lead	g/m^3	0.002-0.25	0.006	0.006	0.005	LOD	0.013	-
C15 - C36	g/m^3	0.5-22	0.5	LOD	LOD	0.9	LOD	LOD
Total hydrocarbons (C7 -	g/m^3	1-23	LOD	LOD	LOD	0.9	LOD	LOD

IND002044 Parameter	Date	Range 2018-2023	20 July 2023	31 August 2023	9 November 2023	24 January 2024	22 March 2024	31 May 2024
C36)								
Carbonaceous Biochemical Oxygen Demand (cBOD^5)	g O_2/m^3	103-1,660	300	179	260	230	101	162
Electrical Conductivity (EC)	mS/m	462-1,836	745	546	641	654	422	758
Chloride	g/m^3	430-730	440	290	380	400	380	440
Dissolved Arsenic	g/m^3	0.026-0.25	0.056	0.043	0.054	0.067	0.074	0.076
Dissolved Barium	g/m^3	0.127-0.77	0.057	0.070	0.067	0.119	0.122	0.124
Dissolved Cadmium	g/m^3	LOD	LOD	LOD	LOD	LOD	LOD	LOD
Dissolved Chromium	g/m^3	0.008-0.069	0.011	0.008	0.009	0.009	0.0112	0.0102
Dissolved Copper	g/m^3	0.004-0.016	LOD	LOD	LOD	LOD	0.0105	0.0039
Dissolved Lead	g/m^3	0.0009-0.0154	0.0020	0.0030	0.0017	0.0059	0.0095	0.0054
Dissolved Mercury	g/m^3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dissolved Nickel	g/m^3	0.026-0.136	0.020	0.018	0.017	0.019	0.024	0.023
Dissolved Zinc	g/m^3	0.005-2.7	0.012	0.014	0.013	0.020	0.050	0.024
Escherichia coli	cfu / 100ml	LOD - 2,400,000	32,000	170,000	51,000	12,000	8,000	97,000
Free Ammonia as N	g/m^3	1.84-56	44	27	46	95	0.076	50
Nitrate-N + Nitrite-N	g/m^3	0.006-13.8	0.03	LOD	LOD	2.4	240	LOD
Total Ammoniacal-N	g/m^3	165-830	660	520	570	560	102	770
Total Kjeldahl Nitrogen (TKN)	g/m^3	230-950	770	640	620	660	164	900
pH	pH Units	7.4-8.6	8.5	8.4	8.4	8.6	6.4	8.5
Sodium Absorption Ratio (Total)		2.5-11	4.3	3.1	3.5	3.6	3.3	4.3
Total Barium	g/m^3	0.42-5.6	0.132	0.23	0.21	0.53	0.87	0.22
Total Calcium	g/m^3	73-550	65	65	87	132	152	108
Total Magnesium	g/m^3	18.1-62	47	31	40	42	39	29
Total Nitrogen	g/m^3	230-950	770	640	620	660	410	900
Total Potassium	g/m^3	290-2,700	480	330	440	500	470	490
Total Sodium	g/m^3	124-950	188	121	155	186	176	194
Total Sulphide Trace	g/m^3	LOD -22	0.14	0.16	0.41	0.27	LOD	0.22
Un-ionised hydrogen sulphide	g/m^3	LOD -2.7	0.005	0.007	0.016	0.005	LOD	0.008
Methylene Blue Active Substances	g/m^3	1-1.7	1.2	0.3	0.8	0.6	6.8	1.5
Propiconazole		0.0002-0.0199	0.0018	0.00086	0.00098	0.00082	0.0015	0.00006
Tebuconazole	g/m^3	LOD -0.029	0.0043	0.00107	0.00178	0.00132	0.0020	LOD
Terbuthylazine	g/m^3	0.00003-0.0038	0.0038	0.00097	0.0004	LOD	LOD	0.00098

Condition 10 of Discharge Consent 5838-2.2 limits the TPH in the irrigation water to 5%, and the sodium absorption ratio (SAR) to 18. Sample results from the irrigation pond this year demonstrated full compliance with each of these limits. All other parameters in the samples were within the range of historical results, except for unionised ammonia and a group of surfactants called methylene blue active substances (MBAS).

The sample collected on 24 January 2024 contained 95g/m³ of unionised ammonia, nearly twice the historical maximum of 56g/m³. The concentration of MBAS in the sample collected on 22 March 2024 was 6.8g/m³, significantly higher than the historical maximum of 1.7g/m³.

Pesticides associated with LOSP have been routinely detected in the irrigation pond wastewaters in historical samples which indicates leaching from the drilling wastes stockpile into the wider environment. There are indications the rate of leaching is reducing (based on concentrations, not on mass release over time). The LOSP compound terbuthylazine was detected for the first time in August 2022 and was again detected this monitoring year during the July, August, November and May surveys. Additionally, Tebuconazole was detected in five surveys this year. Terbuthylazine is a selective herbicide for grass and broadleaf weed control in forestry, non-cropland and selected crops. It is the active agent in a number of herbicides marketed for use in New Zealand. Tebuconazole is a fungicide used to treat pathogenic fungi. The source of these compounds on the RNZ property could be from use of authorised pesticides, a discharge while washing out a container, or they may be present in greenwaste imported to the site. Terbuthylazine has an LC50 (lethal effects after 96 hr exposure period) to crustacean species of 0.1g/m^3, and an EC50 (adverse effects for 5 day exposure period) for algae of 0.0032g/m^3. Tebuconazole has an LC50 (48 hr exposure) to crustaceans of 10g/m³. and an EC50 (48hr exposure) of 97ppb.

The concentrations at which these have been found in the irrigation wastewater do not appear to pose an environmental risk.

2.6.2 Soil samples (irrigation areas)

Nine areas on the property are used for irrigation of wastewater from the irrigation pond which collects stormwater and wastewater from the pads (Figure 8). On 18 April 2024 two composite soil samples were collected from each irrigation area, a shallow and a deep sample.

The results of the laboratory analysis can be found in the tables below. The tables include a column which shows the range of results from previous surveys. The results from the current survey are separated into shallow and deep surveys, while the historical results are a composite of shallow and deep results. There were no pesticide compounds present in any sample which were higher than the LOD so the results have not been included in the tables. Similarly, hydrocarbon compound results were largely below the LOD so are not included in the tables, but. results which are above the LOD are discussed below each table.

Irrigation area U1

Table 22 Irrigation area U1 soil sample results 2018-2024

Soil results	Area	Range	U1 shallow	U1 deep
Parameter	Unit/Date	2018-2023	18 April 2024	
Dry Matter	g/100 g as rcvd	54-69	61	71
Soluble Salts	g/100 g dry wt	LOD	LOD	LOD
Conductivity from soluble salts	mS/cm	LOD	LOD	LOD
Total Recoverable Barium	mg/kg dry wt	540-2,200	1,590	450
Total Recoverable Calcium	mg/kg dry wt	33.5-4,900	4,800	4,400
Total Recoverable Magnesium	mg/kg dry wt	4-6,900	6,500	6,900
Total Recoverable Potassium	mg/kg dry wt	23.7-1,610	1,400	1,330
Total Recoverable Sodium	mg/kg dry wt	46.8-199	145	112
Chloride	g/m^3	20-240	18	5
pH	pH Units	5.3-6.1	6.0	6.0
Total Recoverable Arsenic	mg/kg dry wt	4-5	4	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10-0.13	0.11	LOD
Total Recoverable Chromium	mg/kg dry wt	18-22	18	21
Total Recoverable Copper	mg/kg dry wt	11-14	14	12
Total Recoverable Lead	mg/kg dry wt	12.4-15.4	13.2	14.4
Total Recoverable Mercury	mg/kg dry wt	< 0.10	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	13-17	14	15
Total Recoverable Zinc	mg/kg dry wt	61-77	70	69
Sodium Absorption Ratio (SAR)		0.7-2.0	0.7	-

Area U1 (0.51ha) is located up gradient from the drilling mud pad, towards the southeast side of the Uruti composting site. The results of this year's samples are summarised below and compared to historical results:

- Soluble salts and the conductivity from the soluble salts were all below the laboratory LOD.
- Barium rapidly increased between 2020 and 2021. The results of this year's survey were 1,590mg/kg (shallow) and 450mg/kg (deep) which are within the range of results from the previous five years. The barium concentration in the deep sample was significantly lower than the surface concentration.
- Calcium results were 4,800mg/kg (shallow)_ and 4,400mg/kg (deep) which are less than the maximum results since 2018, but at the upper end of that range.
- The survey results reported for calcium, potassium and sodium were all at the upper end of the five-year range
- Chloride results in both shallow (18mg/kg) and deep (5mg/kg) soil were the lowest in five years.
- The results of heavy metal concentrations for this survey and all surveys are within the expected background ranges for the soil order on the site (Landcare Research NZ Ltd, Maps of Total Soil Concentrations (background levels) of Chromium, Copper, Lead, Nickel, Vanadium and Zinc in the Taranaki Region, 2002).
- There are no clear increasing trends for any parameter from the April 2024 survey, although the results of most contaminants were at the upper end of their respective five year range.

Irrigation area U2

Table 23 Irrigation area U2 soil sample results 2018-2024

Soil results	Area	Range	U2 shallow	U2 deep
Parameter	Unit/Date	2018-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	49-76	63	75
Soluble Salts	g/100g dry wt	LOD -0.09	0.08	LOD
Conductivity from soluble salts	mS/cm	LOD - 0.3	0.2	LOD
Total Recoverable Barium	mg/kg dry wt	156-780	2,900	128
Total Recoverable Calcium	mg/kg dry wt	3,700-9,200	15,000	4,100
Total Recoverable Magnesium	mg/kg dry wt	4,300-7,000	5,600	5,900
Total Recoverable Potassium	mg/kg dry wt	1,210-1,950	1,680	1,310
Total Recoverable Sodium	mg/kg dry wt	126-260	340	139
Chloride	g/m^3	8-200	47	29
pH	pH Units	5.5-7.2	7.6	5.7
Total Recoverable Arsenic	mg/kg dry wt	4-6	8	4
Total Recoverable Cadmium	mg/kg dry wt	LOD -0.19	0.21	LOD
Total Recoverable Chromium	mg/kg dry wt	18-21	20	19
Total Recoverable Copper	mg/kg dry wt	11-20	34	12
Total Recoverable Lead	mg/kg dry wt	13.2-53	34	13.2
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	12-20	16	14
Total Recoverable Zinc	mg/kg dry wt	56-93	130	59
Sodium Absorption Ratio (SAR)		0.8-1.9	1.1	-

Irrigation area U2 (2.53ha) is located in the upper reaches of the Uruti composting facility. Seven soil surveys have been undertaken at this location since June 2018.

- Conductivity from the soluble salts was below the LOD in the shallow soil sample, and at the LOD in the deep soil sample.
- Barium results were 2,900mg/kg (shallow) and 128mg/kg (deep). The shallow result is significantly higher than the maximum 5-year result of 780mg/kg, while the deep result is the lowest reported during the same period.
- The calcium concentration reported from the shallow sample was 15,000mg/kg, higher than the previous highest result of 9,200mg/kg and the highest during this survey. Additionally, the shallow sample sodium result (340mg/kg) was slightly higher than the 5-year maximum of 260mg/kg.
- The concentrations of magnesium, potassium, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc were all either below the LOD, within the 5-year range, or only slightly higher than the 5-year maximums.
- Zinc and lead concentrations were slightly higher than the recognised background concentrations, while the remaining metals were within the recognised background ranges.
- Carbon chain C15-C36 contamination in the shallow sample was reported marginally above the LOD at 76mg/kg. No other hydrocarbon was recorded above the LOD.
- Barium and calcium concentrations reported this year were substantially higher than historical maximums. The remaining results were within the historical range or below the LOD.

Irrigation area U3

Table 24 Irrigation area U3 soil sample results 2019-2024

Soil results	Area	Range	U3 shallow	U3 deep
Parameter	Unit/Date	2019-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	62-80	70	81
Soluble Salts	g/100g dry wt	LOD -0.17	LOD	0.06
Conductivity from soluble salts	mS/cm	LOD -0.5	LOD	LOD
Total Recoverable Barium	mg/kg dry wt	270-1,080	940	300
Total Recoverable Calcium	mg/kg dry wt	4,300-6,200	8,500	4,400
Total Recoverable Magnesium	mg/kg dry wt	6,300-7,500	6,900	6,600
Total Recoverable Potassium	mg/kg dry wt	1,290-1,700	1,430	1,510
Total Recoverable Sodium	mg/kg dry wt	146-240	260	153
Chloride	g/m^3	8-290	40	30
pH	pH Units	5.6-6.7	6.5	5.8
Total Recoverable Arsenic	mg/kg dry wt	5-6	6	5
Total Recoverable Cadmium	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Chromium	mg/kg dry wt	19-23	20	20
Total Recoverable Copper	mg/kg dry wt	14-16	18	12
Total Recoverable Lead	mg/kg dry wt	16.0-22.0	18.0	14.7
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	18-21	17	18
Total Recoverable Zinc	mg/kg dry wt	64-76	82	63
Sodium Absorption Ratio (SAR)		0.7-1.7	1.3	-

Irrigation area U3 is the highest in the catchment, spanning an area of 1.98 ha. Five soil surveys have been undertaken in this area since 2019.

- Most of the results from this year's survey were within the 5-year range or marginally higher.
- The calcium concentration in the shallow soil sample was 8,500mg/kg which is higher than the 5-year maximum of 6,200mg/kg.
- The shallow sample contained copper (18mg/kg) and zinc (82mg/kg) at a concentration slightly higher than the historical maximum (16 and 76mg/kg respectively), however both results were less than the recognised maximum naturally occurring background levels for the soil class (40 and 110mg/kg respectively).
- Soluble salts have ranged from below the LOD through to 0.17g/100g since 2019. This year the concentration was below the LOD in the shallow soil sample and 0.06 g/100g in the deep soil sample.
- Conductivity from the soluble salts ranged from below the LOD, through to 0.5 mS/cm.
- Barium recorded an increase in concentration until 2021, ranging from 270–1,080mg/kg, but more recently have plateaued. This year the barium samples were within the five-year range, at 940mg/kg in the shallow sample and 300mg/kg in the deep sample.
- Chloride results were 40mg/kg in the shallow sample and 30 mg/kg in the deep sample. Both results are at the lower end of historical results which range between 8 and 290mg/kg.
- Soil pH has remained weakly acidic during monitoring, between 5.6 and 6.7, and this year's results are both within that range.
- Carbon chain C15-C36 in the shallow sample was reported marginally above the LOD at 54mg/kg. No other hydrocarbon was recorded above the LOD. Perylene is the only PAH which has been recorded at low concentration previously. This year it was less than LOD in both samples.

Irrigation area L1

Table 25 Irrigation area L1 soil sample results 2018-2024

Soil results	Area	Range	L1 shallow	L1 deep
Parameter	Unit/Date	2018-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	53-73	63	78
Soluble Salts	g/100g dry wt	LOD -0.15	0.06	0.14
Conductivity from soluble salts	mS/cm	LOD -0.4	LOD	0.4
Total Recoverable Barium	mg/kg dry wt	380-1,940	1,150	670
Total Recoverable Calcium	mg/kg dry wt	103-13,100	8,100	9,200
Total Recoverable Magnesium	mg/kg dry wt	13-7,000	5,900	7,900
Total Recoverable Potassium	mg/kg dry wt	40-1,990	1,540	1,970
Total Recoverable Sodium	mg/kg dry wt	59-340	200	240
Chloride	g/m^3	28-470	22	11
pH	pH Units	6.2-7.7	7.0	7.6
Total Recoverable Arsenic	mg/kg dry wt	4-6	13	5
Total Recoverable Cadmium	mg/kg dry wt	LOD -0.28	0.13	LOD
Total Recoverable Chromium	mg/kg dry wt	16-22	32	23
Total Recoverable Copper	mg/kg dry wt	14-26	18	16
Total Recoverable Lead	mg/kg dry wt	16.3-25.0	19.3	17.6
Total Recoverable Mercury	mg/kg dry wt	LOD -0.18	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	10-21	14	20
Total Recoverable Zinc	mg/kg dry wt	72-105	86	80
Sodium Absorption Ratio (SAR)		0.9-1.9	0.8	-

Irrigation area L1 (1.31ha) is located at the northern end of the site, near the main gate. It is one of the lowest irrigation areas at the site as it is second furthest down catchment.

- Eight soil surveys have been undertaken in this area since 2018 (Table 25).
- Historical barium results ranged from 930–1,940mg/kg, with the highest result recorded in the 2021 survey in the shallow core. The concentration of barium in shallow soil remains high with this year's sample containing 1,150mg/kg, while the deep sample was 670mg/kg.
- The concentration of magnesium in the deep soil sample, 7,900mg/kg, was the highest recorded of any survey, while the shallow result was lower at 5,900mg/kg which is within the historical range. The results indicate that magnesium concentrations in this irrigation area may be increasing as noted in the 2022/23 annual report.
- The concentration of arsenic in the shallow soil sample was 13mg/kg which is higher than the previous maximum result of 6mg/kg. However, these concentrations are low and likely to represent naturally occurring background levels and are less than human health-based assessment criteria.
- The concentrations of potassium, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc were all either below the LOD, within the 5-year range, or only slightly higher than the 5-year maximums.
- Apart from magnesium the results do not represent increasing trends in contaminants. There are no environmental or human health based criteria for magnesium, and therefore the results from the 2024 survey do not give rise to environmental concerns at this time.

Irrigation area L2

Table 26 Irrigation area L2 soil sample results 2018-2024

Soil results	Area	Range	L2 shallow	L2 deep
Parameter	Unit/Date	2018-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	54-74	59	69
Soluble Salts	g/100g dry wt	LOD -0.31	LOD	LOD
Conductivity from soluble salts	mS/cm	LOD -0.9	LOD	LOD
Total Recoverable Barium	mg/kg dry wt	250-2,300	900	290
Total Recoverable Calcium	mg/kg dry wt	279-17,200	5,800	4,300
Total Recoverable Magnesium	mg/kg dry wt	24.3-6,300	6,100	6,200
Total Recoverable Potassium	mg/kg dry wt	466.9-3,300	1,680	2,100
Total Recoverable Sodium	mg/kg dry wt	162-690	210	240
Chloride	g/m^3	7-1,254	59	51
pH	pH Units	6.1-7.2	6.4	6.8
Total Recoverable Arsenic	mg/kg dry wt	4-6	5	3
Total Recoverable Cadmium	mg/kg dry wt	LOD -0.32	0.17	0.11
Total Recoverable Chromium	mg/kg dry wt	18-23	20	20
Total Recoverable Copper	mg/kg dry wt	11-32	16	12
Total Recoverable Lead	mg/kg dry wt	11-29	16.9	13.4
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	13-18	15	14
Total Recoverable Zinc	mg/kg dry wt	55-109	78	67
Sodium Absorption Ratio (SAR)		0.9-9.6	1.3	-

Irrigation L2 (1.61ha) is one of the oldest irrigation areas on site. Seven soil surveys have been collected since 2018 (Table 26).

- Soluble salts, conductivity and mercury were all reported below LOD in this survey. In particular, mercury has never been detected at levels above LOD. Sodium and chloride concentrations during this survey were low compared to previous years. Historical data suggests that the salt concentration in soil has reduced over time.
- Barium results for this survey were 900 (shallow) and 290mg/kg (deep), which are at the lower end of the long-term range of 250-2,300mg/kg.
- The results of total heavy metal concentrations for this survey and all surveys are within the expected background ranges for the soil order on the site (Landcare, 2002), except for one historical sample which contained lead which was 4mg/kg higher.
- This site has a history of elevated hydrocarbons in samples. This year carbon chain C15-C36 in the shallow sample was reported marginally above the LOD at 50mg/kg. No other hydrocarbon was recorded above the LOD.

Irrigation area L3

Table 27 Irrigation area L3 soil sample results 2018-2024

Soil results	Area	Range	L3 Shallow	L3 Deep
Parameter	Unit/Date	2018-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	56-78	66	72
Soluble Salts	g/100g dry wt	LOD -0.13	0.08	0.06
Conductivity from soluble salts	mS/cm	LOD -0.4	0.2	LOD
Total Recoverable Barium	mg/kg dry wt	320-2,300	740	490
Total Recoverable Calcium	mg/kg dry wt	6,000-14,000	8,000	6,600
Total Recoverable Magnesium	mg/kg dry wt	4,700-7,100	7,000	6,500
Total Recoverable Potassium	mg/kg dry wt	1,480-2,200	2,100	2,200
Total Recoverable Sodium	mg/kg dry wt	230-570	360	320
Chloride	g/m^3	52-680	147	101
pH	pH Units	6.7-7.3	7.3	7.2
Total Recoverable Arsenic	mg/kg dry wt	5-7	6	5
Total Recoverable Cadmium	mg/kg dry wt	LOD -0.15	LOD	0.17
Total Recoverable Chromium	mg/kg dry wt	20-23	21	23
Total Recoverable Copper	mg/kg dry wt	14-21	15	13
Total Recoverable Lead	mg/kg dry wt	15.2-24.0	16.8	15.7
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	16-18	16	17
Total Recoverable Zinc	mg/kg dry wt	73-100	78	77
Sodium Absorption Ratio (SAR)		1.2-4.6	3	-

Irrigation area L3 (1.47ha) is also a long term irrigation area. Five surveys have been collected from this area since 2018.

- Historical soluble salts results range from below the LOD - 0.13g/100 g, and the latest results are 0.08g/100g (shallow) and 0.08g/100g (deep).
- The results of total heavy metal concentrations for this survey and all previous surveys are within the expected background ranges for the soil order on the site (Landcare, 2002).
- Last year the reported concentrations of calcium were the highest since monitoring began. This year the results show calcium decreased to 8,000 (shallow) and 6,600mg/kg (deep).
- Magnesium and potassium results were high compared to the results from the previous six years. The shallow sample contained 7,000mg/kg of magnesium which is marginally lower than the highest historical result of 7,100mg/kg. The potassium concentration in the samples was 2,100 and 2,200mg/kg, the highest historical result was 2,200mg/kg. The range of results is narrow, indicating that there is no significant trend in the results.

Irrigation area L4

Table 28 Irrigation area L4 soil sample results 2019-2024

Soil results	Area	Range	L4 Shallow	L4 Deep
Parameter	Unit/Date	2019-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	57-77	66	74
Soluble Salts	g/100g dry wt	LOD -0.14	LOD	0.07
Conductivity from soluble salts	mS/cm	LOD -0.4	LOD	0.2
Total Recoverable Barium	mg/kg dry wt	36-3,300	380	930
Total Recoverable Calcium	mg/kg dry wt	2,800-24,000	5,400	7,100
Total Recoverable Magnesium	mg/kg dry wt	5,100-7,200	6,300	6,600
Total Recoverable Potassium	mg/kg dry wt	800-1,880	1,270	1,670
Total Recoverable Sodium	mg/kg dry wt	80-410	197	230
Chloride	g/m^3	6-121	44	37
pH	pH Units	5.6-7.3	6.6	7.0
Total Recoverable Arsenic	mg/kg dry wt	3-10	5	5
Total Recoverable Cadmium	mg/kg dry wt	LOD -0.22	LOD	LOD
Total Recoverable Chromium	mg/kg dry wt	16-23	19	21
Total Recoverable Copper	mg/kg dry wt	9-41	16	20
Total Recoverable Lead	mg/kg dry wt	10.4-44.0	16.4	19.3
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	14-19	17	18
Total Recoverable Zinc	mg/kg dry wt	54-96	74	77
Sodium Absorption Ratio (SAR)		0.8-1.2	1.2	-

Irrigation area L4 (2.25ha) is one of the newest irrigation areas, constructed during the 2018/19 monitoring period. The first soil samples were collected in November 2019 before irrigation commenced and the results are considered baseline levels to compare subsequent results against.

- Soluble salts and conductivity were either below LOD or only marginally higher, and all results were less than the historical maximum. Concentrations of sodium and chloride were within the historical range, and approximately 50% (sodium) and 30% (chloride) of the maximum historical value.
- The barium in the soil increased substantially from 36 and 39mg/kg in November 2019 to a maximum of 3,300mg/kg which was reported from the shallow sample taken in 2023. This year's results were 380 (shallow) and 930mg/kg (deep), substantially lower than the maximum historical result, but still more than 10 times higher than the baseline concentration.
- The concentrations of most heavy metals in samples collected this year are largely within the historical range and naturally occurring background levels. There has been very little change in the concentration of these metals as a result of the irrigation.
- Soil pH results have changed from weakly acidic (5.6-5.8 pH) to neutral (6.6-7.0 pH)

Irrigation area L5

Table 29 Irrigation area L5 soil sample results 2020-2024

Soil results	Area	Range	L5 Shallow	L5 deep
Parameter	Unit/Date	2020-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	57-67	58	68
Soluble Salts	g/100g dry wt	LOD -0.08	LOD	LOD
Conductivity from soluble salts	mS/cm	< 0.2	LOD	LOD
Total Recoverable Barium	mg/kg dry wt	67-93	79	65
Total Recoverable Calcium	mg/kg dry wt	3,400-4,100	3,900	4,200
Total Recoverable Magnesium	mg/kg dry wt	5,800-6,800	6,500	6,900
Total Recoverable Potassium	mg/kg dry wt	1,320-2,000	1,510	1,600
Total Recoverable Sodium	mg/kg dry wt	116-280	200	210
Chloride	g/m^3	22-240	34	78
pH	pH Units	5.3-6.1	5.6	5.6
Total Recoverable Arsenic	mg/kg dry wt	4-6	5	5
Total Recoverable Cadmium	mg/kg dry wt	0.11-0.16	0.11	0.13
Total Recoverable Chromium	mg/kg dry wt	19-24	23	19
Total Recoverable Copper	mg/kg dry wt	10-12	12	11
Total Recoverable Lead	mg/kg dry wt	13.3-15.7	14.5	12.0
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	15-18	17	15
Total Recoverable Zinc	mg/kg dry wt	63-68	68	63
Sodium Absorption Ratio (SAR)		0.8-2.9	2.5	-

Irrigation area L5 (1.42ha) is located in the centre of the site and to the east of the duck pond. This area has been recently established. Three surveys have been conducted within this area since 2020.

- The majority of parameters analysed were within the four year historical range The exceptions were calcium and magnesium which were only marginally higher than the historical maximum. The deep sample contained 4,200mg/kg of calcium which is 2.5% higher than the maximum historical result. The concentration of magnesium was 1.5% higher than the maximum historical result.
- Soluble salts and conductivity from the soluble salts results were below the LODs, returning to the levels reported from the first soil survey of this area. The soil salinity has been reducing over time.
- Barium continues to remain very low (79 and 65mg/kg) in this area by comparison with other irrigation fields. (e.g. L3 has barium concentrations 20 times higher).
- The concentrations of most heavy metals in samples collected this year are largely within the historical range and naturally occurring background levels (Landcare, 2002).
- The pH level in samples from this area has always been moderately acidic, ranging from 5.3 to 6.1. This year both shallow and deep samples had a pH of 5.6, continuing the trend of moderate acidity, and increasing the mobility of metals within the soil.

Irrigation area L6

Table 30 Irrigation area L6 soil sample results 2021-2024

Soil results	Area	Range	L6 shallow	L6 Deep
Parameter	Unit/Date	2021-2023	18 April 2024	
Dry Matter (Env)	g/100g as rcvd	50-77	5,062	70
Soluble Salts	g/100g dry wt	LOD -0.9	LOD	LOD
Conductivity from soluble salts	mS/cm	LOD -0.3	0.20	LOD
Total Recoverable Barium	mg/kg dry wt	390-2,500	2,400	630
Total Recoverable Calcium	mg/kg dry wt	6,000-19,300	10,800	5,900
Total Recoverable Magnesium	mg/kg dry wt	5,000-8,800	5,200	6,800
Total Recoverable Potassium	mg/kg dry wt	1,220-2,100	1,960	1,580
Total Recoverable Sodium	mg/kg dry wt	184-390	400	270
Chloride	g/m^3	14-75	89	72
pH	pH Units	6.7-7.8	6.9	6.9
Total Recoverable Arsenic	mg/kg dry wt	4-7	8	5
Total Recoverable Cadmium	mg/kg dry wt	LOD -0.27	0.23	0.16
Total Recoverable Chromium	mg/kg dry wt	19-23	18	20
Total Recoverable Copper	mg/kg dry wt	16-32	25	16
Total Recoverable Lead	mg/kg dry wt	13.6-40.0	25.0	15.4
Total Recoverable Mercury	mg/kg dry wt	LOD	LOD	LOD
Total Recoverable Nickel	mg/kg dry wt	14-17	13	14
Total Recoverable Zinc	mg/kg dry wt	70-126	103	76
Sodium Absorption Ratio (SAR)		0.9-1.2	1.9	-

Irrigation area L6 (2ha) was constructed in the 2019/20 monitoring period. It had not been used for irrigation before that time. Three Council surveys, together with a survey commissioned by the Company, have been undertaken in this area.

- Soluble salts (< 0.05g/100g) and conductivity (< 0.2mS/cm) from the soluble salts were at or below the laboratory's LODs after maximum results were recorded from last year's survey.
- Barium results in the Council surveys has ranged between 630-2,400mg/kg. The shallow sample result was marginally lower than the maximum historical results and is significantly higher than the deep soil sample. The 2022/23 annual report suggested that the high results could be due to drilling mud being deposited in the irrigation area.
- Likewise, there was a significant difference between the calcium results in the shallow and deep samples. The concentration in the shallow sample was 10,800mg/kg, nearly two times the concentration of the deep sample. However, both samples were less than their historical maximum.
- In previous surveys for TPH, carbon chain C15-C36 was recorded in the range 47-360mg/kg, while chain C10-14 was recorded in the shallow sample from October 2021 at 28mg/kg. In 2024 the carbon chain C15-C36 in the shallow sample was reported marginally above the LOD at 52mg/kg. Additionally, benzene was present above the LOD at 0.1mg/kg. No other hydrocarbon was recorded above the LOD.

2.6.3 Irrigation loading rates

Condition 8 of Consent 5838-2.2 requires that:

'The consent holder shall record the following information in association with irrigating wastewater to land:

a. The date, time and hours of irrigation;
b. The volume of wastewater irrigated to land;
c. The conductivity of the irrigation fluid (measured in mS/m)
d. The source of the wastewater (e.g. pond or WTS), and
e. The location and extent where the wastewater was irrigated.

The above records shall be made available to the Chief Executive, Taranaki Regional Council, on request.

The current (expired) consent does not impose a limit upon the annual mass loading of total nitrogen per area of irrigation field. Nitrogen loading limits in other consents from the Taranaki region can range from 200 to 600kg N/ha/year, and during the recent hearing Council officers recommended a limit of 400kg N/ha/year which was supported by the Company.

The Company collected samples from the irrigation holding pond at a frequency of between two and five times per month which were analysed for the concentration of nitrogen. The range of individual sample results, and the monthly averages, for the 2023/24 year are presented below in Table 31. The average of the monthly concentrations is 391g/m^3, with a range of monthly averages from 259 to 640g/m^3. The data from the Council surveys for corresponding months is also reproduced in the table.

Table 31 Nitrogen concentration in samples from irrigation pond (RNZ and council data)

Results	7/23	8/23	9/23	10/23	11/23	12/23	01/24	02/24	03/24	04/24	05/24	06/24	Annual average
Min/ Max (N g/m^3)	358/ 575	250/ 308	245/ 425	172 452	248/ 620	585/ 695	273/ 550	245/ 380	275/ 398	248/ 270	335/ 625	398/ 520	303/ 485
Average (RNZ)	474	273	333	304	403	640	403	311	320	259	482	463	391
Council	770	640	Not sampled	Not sampled	620	Not sampled	660	Not sampled	164	Not sampled	900	Not sampled	666

The results presented in Table 31 show a significant discrepancy between the analytical results of samples collected by the Council and the analytical results provided by the Company. With the exception of the March 2024 sample, the monthly average of the Company's results are between 43 and 65% lower than the Council results. A similar discrepancy was noted in last year's annual report, although last year the difference was in the order of 100%. As noted above, the Council uses the services of a laboratory that carries international accreditation for its analytical methodology and performance.

Two inter-lab comparisons were conducted this monitoring year. In brief, two sets of samples were collected from the HHG000168 and IND002044 monitoring sites. One was sent to Hill Laboratories (Council's analysis provider) and one to Industrial Chemistry Services (ICS, the Company's analysis provider). Each was analysed for total nitrogen, ammoniacal nitrogen and nitrate-nitrite nitrogen. With two exceptions, the results from Hill Laboratories were higher by between 18 and 94%.

Table 32 Summary of nitrogen loadings per irrigation area (as supplied by RNZ and as determined by the Council). Proposed consent limit 400kg/ha/yr

Area	L1	L2	L3	L4	L5	L6	U1	U2	U3
Nitrogen applied kg/yr	482	393	594	596	422	812	104	659	576
Area (ha)	1.2	0.99	1.55	2.02	1.42	3.17	0.3	2.27	1.43
N loading kgN/ha/yr (RNZ)	402	397	393	295	297	256	347	290	403
N loading kg/ha/yr (Council)	445	520	513	399	478	338	482	397	569

Calculations using RNZ's own data (Table 32, row 3) shows that the irrigation resulted in nitrogen loading of paddocks which ranged from 256kgN/ha/yr (L6) to 403kgN/ha/yr (U3)(Table 32). The nitrogen loading calculations using the Council's results (when available) from an accredited lab are presented in row five of Table 32. The results range from 338kgN/ha/yr (L6) to 569kgN/ha/yr (U3). The nitrogen loading results based on Council data is notably higher than the results based on RNZ data, differing by between 11 and 61%. The consent does not impose a nitrogen loading limit on the irrigation activity, and the RFWP does not provide standards or guidelines. During the recent Environment Court hearing a limit of 400kgN/ha/yr was proposed, similar resource consents in the region have limits for cut and carry paddocks of between 400 (piggery) and 1,000kgN/ha/yr. The limit in the most recently issued consent (2019) is 400kgN/ha/yr.

Table 33 below sets out a summary of monthly pumping and loading data provided by the Company. Based on these figures, the volume of wastewater irrigated by Company in the 2023/24 year was 56% greater than the previous year. The amount of nitrogen applied to land during 2023/24 was 4,637kg which is 68% more than in 2022/23. The nitrogen loading rate was 84% less than that applied in 2021/22, because of the increased concentration of nitrogen in the wastewater.

The highest monthly volume of wastewater irrigated to land was 2,890m³ in May 2024. This coincided with the lowest monthly rainfall. In June 1,290m³ of wastewater was irrigated and 79mm of rain was recorded, the third lowest in the year. This represents good practice for irrigation because the soil is likely to be drier and can more easily assimilate the wastewater and minimise the risk of it entering the waterways. Correspondingly, the wettest months tended to have lower irrigation rates.

Table 33 Summary of irrigation data (as supplied by the Company)

Month 2023/24	Pump hrs	Volume irrigated (m³)	Nitrogen applied[2]	Rainfall (mm)
Jul	19.0	379	12.5	75
Aug	29.0	615	26.7	124
Sept	24.5	500	37.9	119
Oct	32.0	640	52.3	87
Nov	30.0	600	66.8	151
Dec	24.0	480	86.9	190
Jan	29.5	590	107.6	185
Feb	19.0	420	116.5	110
Mar	36.5	690	131.1	103
Apr	115.0	2540	185.9	173
May	156.5	2890	277.6	46
Jun	65	1,290	323.2	79
Cumulative: 2023/24	579.5	11,633	4,637.0	N/A
Cumulative: 2022/23	371.0	8,633	3,161.0	N/A

Notes: [1]: unit not stated. Presume m³ [2]: unit not stated. Presume kg nitrogen as total Kjeldahl Nitrogen. RNZ data as provided. See text for discussion of discrepancy between RNZ data and Council data.

2.6.4 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 further advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A proactive 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. The record includes events where the individual/organisation has 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 may be an issue of legal liability the Council must be able to prove by investigation that the individual/organisation is the source of the incident (or that the allegation cannot be proven).

Details of all incidents and investigations during this monitoring year are discussed in sections 2.1 and 2.5. As these are largely subject to Environment Court proceedings there is no further discussion of these in this report.

3. Discussion

3.1 Site performance

The Company's performance with respect to consent compliance and managing activities and discharges appropriately is discussed below. Due to Environment Court proceedings some information has been withheld from this section.

The irrigation of wastewater derived from activities on site is authorised by Consent 5838 subject to several conditions which impose limits on wastewater quality and application to minimise effects on soil quality and the risk of contamination entering waterways the Haehanga Stream and tributaries.

The analytical results of six samples collected from the wastewater irrigation pond during the 2023/24 monitoring year complied with the consent limits. Total petroleum hydrocarbon results ranged from LOD to 0.9g/m, less than the limit of 5% (equivalent to 50,000g/m^3). Similarly, sodium absorption ratio complied with the consent limit of 18, with all results between 3.1 and 4.3. On this basis the discharges of wastewater to land was within the scope of the consent.

Adverse effects on the waterways from irrigation to land are regulated by condition 11 which imposes limits on in-stream water quality parameters. These are largely taken from section 70 of the RMA, but also include specific limits on DCBOD, NH_3, TPH, and chloride. Analysis of the samples collected from six surveys this year show there was no exceedances of the DCBOD, total recoverable hydrocarbons or chloride limits. The first of the six samples collected this year contained NH_3 at a concentration of 0.048g/m^3 which exceeded the consent limit of 0.025g/m^3. In freshwater NH_3 may have ecotoxic effects on aquatic organisms. The Company records show that there was no irrigation to any area during the preceding two days, and no irrigation to areas L1 or L6 (the nearest irrigation areas) in the preceding 10 days. On this basis it's unclear if the cause of this elevated result was irrigation, however activities on site can be the only significant source of NH_3 in the catchment. The remainder of results during the same survey and all subsequent surveys were less than the consent limit.

Management of the nitrogen loading to the irrigation areas improved overall this year. The volume of wastewater irrigated to land increased by 3,000m^3 compared to last year, or approximately 40%. Using the Council's more conservative nitrogen concentration data the number of paddocks which had a higher nitrogen loading rate than 400kgN/ha/year was six which is the same as last year. Additionally, the highest loading rate this year was 569kgN/ha/year on area U3 compared the highest rate last year, which was 1,635kgN/ha/year.

The consent requires the consent holder to maintain and supply Council with records of the following;

- Raw materials received
- Irrigation records; and
- Groundwater monitoring.

These records were all submitted to Council on time or on request. The data in these records have been used in the preparation of this report.

Onsite management of the compost, drilling mud and paunch pads was regularly identified by inspections as needing improvement. On several occasions the compost pile was deemed to have inadequate structure for efficient aerobic decomposition, or there was inadequate coverage of fresh material with cover material, or fresh material was exposed. On two occasions a section of the compost pile had collapsed into the ring drain. However, most inspections found that the odour from the compost pile was low, even during turnover, and not likely to be significant beyond the boundary. These observations highlight that good management of the compost pile's structure, internal conditions, and cover material are critical in

minimising odour. The ring drain diverts stormwater and leachate to the treatment ponds and potential effects of standing water include odour and overflow into clean water diversions or water ways.

The pad containing drilling waste was generally well vegetated during the monitoring year. The vegetation provides stabilisation of material which contains elevated levels of contaminants including heavy metals.

Early in the monitoring year the ring drain around the paunch pad was identified as needing to be modified or stabilised, in particular to avoid damage from vehicles using the road around the pad. By August the ring drain was considered to have good structure. In December 2023 a discharge of sludge into a waterway occurred during the cleaning of the paunch pad pond, and some paunch piles had inadequate leachate collection. During the year the paunch pad pond was reduced in size, with the contents pumped to the top of the WTS. The pad was modified to provide for storage of mature compost in order to reduce the amount of material on the compost pad. This was to create space to recommence the use of windrows for composting. The compost storage area on the paunch pad was bunded to collect leachate which was diverted to the smaller pond. By April 4,000$m^3$of compost was being stored on the pad and covered by a tarpaulin.

The final pond in the WTS discharges into a tributary of the Haehanga Stream and irrigation consent imposes several limits on the quality of the discharge in order to minimise effects on water quality. The limits on the discharge are for suspended solids and pH (condition 24) and limits the parameters at the nearest monitoring location which is considered to be the end of the mixing zone (condition 25). This year the suspended solids concentration in the samples ranged from 7-28g/m^3, well below the limit of 100g/m^3. The pH in samples ranged between 7.5-7.9 which is within the consent limit range of 6-9. The results of samples from the mixing zone were less than the relevant limits, and none of the monitoring officers observed the other effects listed in the condition.

Management of the site generally complied with the requirements of Resource Consent 5839-2. The Company maintained and provided records of incoming waste on a monthly basis and there was no evidence of prohibited material being received

The consent required the preparation and submission of two management plans which were provided soon after the consent commenced. There were no significant dust discharges or effects noted during any inspections, and the Company continues to operate two meteorological stations and submits a monthly report on various parameters, most importantly wind direction and strength.

Condition 15 of the consent requires the consent holder to undertake annual odour surveys during worst case meteorological conditions. This was not undertaken this year.

Owing to the open nature of the composting operation and the risk of significantly odorous discharges and associated effects, close management of activities to minimise odour is critical.

The Company holds four consents related to the use of four culverts on the site. Inspections of these culverts during the monitoring year found them to be compliant on all occasions. There were two occasions when inspecting officers recommended maintenance measures, on one occasion an overflow had caused minor damage to the access road which needed to be repaired. On another occasions one culvert was partially blocked and the Company was advised to remove the obstruction before the next rainfall event. Otherwise, there were no reports of damage to headwalls or outlets, erosion or scour of the stream banks or beds, and all culverts provided adequate fish passage.

Over the course of the 2023/24 monitoring year six monitoring surveys of the Haehanga Stream, Mimitangiatua River were conducted. The primary impact on these water bodies was from nitrogen species found in the wastewater irrigated to land and from the WTS discharge. These contaminants include unionised ammonia, ammoniacal nitrogen and NNN. These contaminants entered the Haehanga either through chronic diffuse discharges via groundwater or from acute incidents where wastewater discharged

directly into the stream, likely due to overland flow arising from saturated soil. Ammoniacal nitrogen and unionised ammonia are particularly significant toxicants for aquatic life. Consent 5838-? Imposes a limit of 0.025g/m^3 on the concentration of unionised ammonia in surface water below the WTS discharge point to protect aquatic life. The threshold represents an acceptable level of affect rather than a no-effects threshold. The limit was exceeded only once this monitoring year which is an improvement on previous years. However, at times the concentration approached the limit, and this would likely have an adverse effect on any aquatic organisms still living in the Haehanga, whether through mortality or reduced reproductive function or rendering the stream habitat unsuitable.

Likewise, the concentration of ammoniacal nitrogen likely had adverse effects on aquatic organisms. As discussed in section 2.2.2 the results of the samples from the Haehanga Stream placed it in the 'B' attribute band, above the national bottom line. On this basis 95% of species are protected, although the species most sensitive to pollution are still impacted. The NPS-FM attribute values are based on long-term (annual) exposure to ammoniacal nitrogen and does not address effects on aquatic life from short-term, high concentration discharges into freshwater.

As discussed in section 2.2.3 the Haehanga Stream was in the lowest attribute band E based on *E. coli* results. The levels of *E. coli* recorded over the monitoring year posed a significant risk to human health in the event that people had come in to direct contact with the water. The NPS-FM gives swimming as an example of direct contact. The Site is private property with no public access and no recreational contact or mahinga kai activities are likely to occur, and therefore the actual effects on human health are negligible. However, the data shows that discharges of *E. coli* from the Haehanga Stream enter the Mimitangiatua River and contribute to *E. coli* levels in that waterbody. The Mimitangiatua River is of significant cultural and recreational value at points downstream.

Most other parameters measured by the surveys often increased with distance downstream, likely as a result of activities on the site. For example, sodium, chloride, EC tended to be greater downstream in association with irrigation than they were upstream. However, at no time did these approach consent limits of environmental assessment criteria (where there are criteria) and on this basis any effects were negligible or unable to be quantified.

The biomonitoring report concluded that the health of the monitoring sites in the Haehanga and tributary was 'poor 'to 'good' for macroinvertebrate health. The 'good' sites, or those that had improved since last year, were partly due to better quality habitat. The report states that the macroinvertebrate community was comparable to, or better than, similar sites in the region. Taxa richness in the catchment sites was mostly classified as low to moderate, although the taxa at two sites was considered to have high richness.

This assessment has focussed on a few contaminants that impact water quality, particularly effects on aquatic organisms. There are several other factors that impact organisms as identified in the biomonitoring report including water temperature, suitable habitat and unobstructed access to upstream locations. While discharges of contaminants directly or indirectly into the Haehanga Stream need to be reduced further through better site controls, a site-wide management approach must continue in order to improve the quality of water for aquatic organisms and to reduce the effects on human health by reducing contaminant loads entering the Mimitangiatua Stream.

Almost all results from this year's groundwater monitoring programme were within the long-term range of historical results at each location. No petroleum hydrocarbons, including BTEX compounds, were detected in any of the bores this monitoring period. There have not been any positive detections of any of these compounds since the 2020/21 monitoring year. Additionally, no LOSP compounds were present above the level of detection.

Groundwater bores 3009 (down gradient of the composting area and adjacent to area L3) and 2190 (irrigation area L2) continue to show the greatest impact by RNZ on the quality of groundwater in their

vicinity. Concentrations of ammonia and nitrate were generally lower than historical results, however they remained elevated in some bores despite the expanded irrigation areas. Ongoing management of the day to day and annual loadings of wastewater to each area must continue if groundwater quality (and consequently the quality of the Haehanga Stream) is to be conserved.

All analytes in results from GND3007, located at the site entrance were at low concentrations indicating that most contaminants are assimilated or diluted on the site before reaching the wider environment.

The concentration of sodium in the wastewater irrigated to land is a particular focus of the Council's monitoring programme. Excessive soil sodicity can lead to:

- reduced flow of water through soil, which limits leaching and can cause salt to accumulate over time and the development of saline subsoils
- dispersion in the soil surface, causing crusting and sealing, which then impedes water infiltration
- dispersion in the subsoil, accelerating erosion, which can cause the appearance of gullies and tunnels
- dense, cloddy and structureless soils, as sodicity destroys aggregation.

Measurements of the concentrations of ionic sodium over the past decade show that concentrations have been steadily reducing and have been consistently low since December 2020 when drilling wastes stopped being accepted. The results of this year's sampling found that the declining trend generally continued across all irrigation areas.

Hydrocarbon compounds were found above the level of detection in samples from U2, U3, L2 and L6 irrigation areas. The results were slightly above the LOD and were not at a level which raises environmental concerns. The source is likely to be the drilling muds and, like sodium concentrations, these are likely to continue to decline as no more of this product is accepted on site.

Barium concentrations in several irrigation areas remained high. A sample from U2 reported the highest concentration recorded in that area, and the shallow sample result for L1 was only slightly lower than the historical maximum. In addition to the high result from L4, the results indicate that barium continues to affect the soil, either as a consequence of legacy activities or the irrigation of barium-tainted wastewater.

3.2 Environmental effects

The effects of odour on people ranges from short-term annoyance from acute discharges of odour, to 'odour worry' which can occur due to chronic exposure to low level odour, or to frequent exposure to acute odour. There was an increase in the number of complaints this monitoring year. The effect of odour discharges from the site can be difficult to quantify because only a small proportion of the complaints could be attended. Additionally, the number of complaints may not accurately reflect the frequency neighbours were exposed to unpleasant odour because they only indicate times when the odour was intolerable.

The quarry did not operate this monitoring year and on this basis, there were no discharges of concern. There were some improvements made to the sediment control structures and to stabilise the access road. One inspection considered that these actions would likely improve sediment management once the quarry recommenced operation.

Of particular concern to the community, including Ngāti Mutunga is the effects on the Mimitangiatua River of discharges from the site. Contaminants generated onsite may enter the Haehanga Stream and its tributaries and outflow into the Mimitangiatua River and impact water quality downstream. The effects of the Haehanga Stream outflow can be somewhat quantified by comparing the sample results from upstream and downstream of the outflow. On most occasions during this monitoring year the concentration of nitrogen-based contaminants such as unionized ammonia, ammoniacal nitrogen and nitrate-nitrite were higher in the downstream sample than the upstream sample, evidence that the was contributing to

degraded water quality in the river. Often the difference between the results was slight, and no results exceeded environmental criteria referenced in this report.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 34 to Table 41.

Table 34 Summary of performance for Consent 5838-2.2

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream Catchment and directly into an unnamed tributary of the Haehanga Stream		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practical option	Programme management/site inspections	Matters before the Environment Court
2. Only acceptable waste received	Site inspections/review of supplied records	Yes
3. Representative sample of each type of drilling waste.	Records to be provided	N/A. Drilling wastes ceased acceptance 31 December 2020 or shortly thereafter
4. DAF residue not to be accepted	Site inspections/review of supplied records not listed as accepted	Yes
5. Maintenance of sediment in stormwater systems	Inspections	Yes
6. Maintenance of treatment systems	Inspections	No. Standing water in ring drains
7. Adequate pond construction to prevent any leak to surface water or groundwater from any leachate or stormwater holding pond	Inspections and monitoring	Uncertain. Potential leakage and groundwater contamination from ponds is to be investigated further
8. Keep and supply irrigation records	Supply of records	Yes
9. No direct discharges to water to occur as a result of irrigation to land	Site inspections /sampling	Yes. None observed during inspections
10. Irrigated fluids not to exceed 5% hydrocarbon content or SAR of 18	Site inspections and sampling	Yes
11. Discharges shall not cause certain adverse effects downstream of irrigation areas	Surface water sampling and inspections	No One result exceeded unionised ammonia limit
12. Soil sampling to be undertaken for TPH and BTEX	Soil sampling undertaken by the Council	Yes. Samples collected but not as frequently as specified.
13. Soil sampling to be undertaken for chloride, sodium, magnesium, calcium, potassium, soluble salts and conductivity	Soil sampling undertaken by the Council	Yes. Samples collected but not as frequently as specified.
14. Adhere to composting facility management plan	Inspections, reviews	Yes
15. Establish groundwater monitoring bores	Site inspections	Yes
16. Groundwater monitoring bores installed as per standard	Undertaken	Yes
17. Consent holder monitoring and record groundwater in each monitoring well monthly for level, temperature, and conductivity	Undertaken by consent holder	Yes
18. Groundwater sampled per six month interval for TPH and BTEX.	Undertaken by Council	Yes. Samples collected but not as frequently as specified.

Purpose 5838-2.2: To discharge of waste material to land for composting; and treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream Catchment and directly into an unnamed tributary of the Haehanga Stream		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
19. Groundwater sampled per 3 month interval for chloride, sodium, magnesium, calcium, TDS and conductivity	Undertaken by Council	Yes. Samples collected but not as frequently as specified.
20. Prepare Pond Treatment System Management Plan	Plan provided	Yes Draft leachate and stormwater management plan currently included in consent replacement application
21. Adhere to Pond Treatment System Management Plan	Inspections	Yes
22. Prepare Wetland Treatment System Management Plan	Management plan (Wetland Treatment Management Plan) submitted for consent renewal	Yes
23. Adhere to Wetland Treatment System Management Plan	Inspections	Yes
24. Wetland discharge not to exceed certain parameters	Sampling	Yes
25. Wetland discharge not to cause certain effects at site HHG000103	Sampling	Yes
26. Maintain riparian plantings	Inspection	Yes
27. Notify the Council of significant incidents on site	No notifications received	None received
28. Prepare a Site Exit Plan prior to site closure	Not supplied	N/A
29. Adhere to Site Exit Plan	N/A	N/A
30. Optional Review	Consent renewal occurring. No review option	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**Improvement required**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

N/A = not applicable

Table 35 Summary of performance for Consent 5839-2

Purpose 5839-2.0: To discharge emissions to air at Mokau Road, Uruti		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adopt best practical option	Programme management/site inspections	Matters before the Environment Court
2. Composting area not to exceed certain limits	Programme management and site inspections	Yes
3. Only acceptable waste received onto site	Site inspections and a review of records	Yes
4. DAF residue not to be accepted	Site inspections/review of supplied records	Yes
5. Maintain and supply an inwards good register	Inwards goods records supplied	Yes
6. Prepare a Site Practices Plan	Plan submitted with AEE	Yes
7. Adhere to Site Practices Plan	Inspections	Matters before the Environment Court

Purpose 5839-2.0: To discharge emissions to air at Mokau Road, Uruti		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
8. Arrange professional assessment of Site Practices Plan	Supplied in 2010/11 monitoring year.	Yes
9. Submit Proposed Implementation Plan	Plans submitted to Court for appeal hearing	Yes
10. Adhere to Proposed Implementation Plan		N/A
11. Dust deposition not to exceed certain limits	Observations during inspections	Yes
12. PM10 and suspended particulate not to exceed certain limits	Observations during inspections	Yes
13. No offensive or objectionable odour beyond the boundary	Inspections	Matters before the Environment Court
14. Install a weather station and provide data	Inspection and weather updates	Yes
15. Conduct odour surveys	Undertaken by the Council during inspections and during complaints	No
16. Hold community meeting		
17. Notify the Council of onsite incidents	No notification received	N/A
18. Prepare a Site Exit Plan prior to site closure	Not supplied	N/A
19. Adhere to Site Exit Plan upon site closure	N/A	N/A
20. Optional review	A review was not 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		**Pending due to Matters before the Environment Court** **Good**

Table 36 Summary of performance for Consent 5938-2

Purpose 5938-2.0: To use a twin culvert in the Haehanga Stream for vehicle access purposes		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Ensure stream bed downstream is adequately constructed and does not prevent fish passage	Site inspections	Yes
2. Maintains the structure so: a. It does not become blocked and is free flowing b. Any erosion or instability of the stream bank is remedied by the consent holder	Site inspections	Yes
3. Review condition	No review pursued	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall administrative performance with respect to this consent		**High** **High**

Table 37 Summary of performance for Consent 6212-1

Purpose 6212-1.0: To establish and maintain a culvert at Mokau Road, Uruti		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to commencement of works	Inspections	Yes
2. Replacement of temporary culvert	N/A	Yes
3. Construction in accordance with application	Site inspections	Yes
4. Best practicable option	Inspections	Yes
5. Minimisation of riverbed disturbance	Site inspections	Yes
6. Provision of fish passage	Inspections	Yes.
7. Reinstatement of site	N/A	N/A
8. Optional review of consent	No review due this period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall administrative performance with respect to this consent		**High**

N/A = not applicable

Table 38 Summary of performance for Consent 10063-1.0

Purpose 10063-1.0: To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Authorises the discharge of treated stormwater into unnamed tributary of Haehanga Stream in line with the original application	Inspection	Yes
2. Notification of quarry works	Communication during inspections	N/A. Not operating
3. Adopt best practicable option	Inspection the quarry was not operated this monitoring period	N/A
4. Shall operate and progressively reinstate the quarry site in a manner which ensures exposed areas are kept to a minimum at all times		NA
5. Ensure no area greater than 1ha is exposed at any one time	Online assessment	N/A
6. The stormwater discharged shall not exceed 4ha	Not assessed this period	N/A
7. Stormwater treatment system shall be installed before any site works commence	Inspection	Yes Some upgrades this year
8. Stormwater treatment system shall be maintained for the life of the quarry operation	Inspection	Yes
9. All stormwater to be directed to stormwater treatment system prior to discharge to Haehanga Stream tributary	Inspection	Yes

Purpose 10063-1.0: To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
10. Constituents of the discharge shall meet the following standards: a. pH: 6.0-9.0 b. suspended solids: <100g/m^3 c. total hydrocarbons: <15g/m^3	Sampling	N/A
11. The pH may exceed 9.0 if the exceedance is the result of photosynthetic activity, however the discharge shall not alter the receiving waters by more than 0.5 pH after a mixing zone of 25m	Sampling	NA
12. After mixing the discharge shall not give rise to certain effects.	Inspection and sampling	Yes
13. The discharge shall not give rise to any of the following effects: a. A change in turbidity measurements upstream of the discharge point and below the discharge point of more than 5NTU b. A change in turbidity measurements of greater than 5NTU as a result of the discharge	Sampling	N/A
14. Maintain and update Contingency plan	Notification and supply of records	Yes
15. Site shall be operated in a management plan	Supply of management plan	N/A
16. Notification pertaining to the change of nature of discharge	Notification	N/A
17. Consent lapse	Consent in effect	N/A
18. Review condition	No review required	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall administrative performance with respect to this consent		**High**

Table 39 Summary of performance for Consent 10547-1.0

Purpose 10547-1.0: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. The culvert pipe design specifications	Inspections	Yes
2. Culvert pipe fill and embankment specifications.	Inspections	Yes
3. The fill over the top of the culvert pipe shall be 2.3m above the invert of the culvert	Inspections	Yes
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the	Notification	NA

Purpose 10547-1.0: To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
commencement of work		
5. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water		NA
6. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert.	Inspections	Yes
7. A reinforced concrete headwall shall be installed at the inlet to the culvert	Inspections	Yes
8. Rock riprap specifications	Inspections	Yes
9. The culvert shall not restrict fish passage	Inspections	Yes
10. The invert of the culvert shall be set below the existing stream bed by 200mm so that it fills with bed material and simulates the natural bed	Inspections	N/A
11. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site	Inspections	Yes
12. Completion of works requirements.	Inspections	Yes
13. Culvert maintenance	Inspections	Yes
14. Actions for discovery of archaeological remains.		None reported.
15. Lapse condition.		Exercised
16. Review condition	Not required	NA
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall administrative performance with respect to this consent		**High**

Table 40 Summary of performance for Consent 10843-1

Purpose 10843-1.0: To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. The culvert pipe specifications	Inspections	Yes
2. Culvert fill specifications.	Inspections	Yes
3. Culvert overfill specifications	Inspections	Yes
4. Notification of works	Inspections	Yes
5. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water	Notification received via inspectorate	Yes

Purpose 10843-1.0: To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert.		NA
7. Rock riprap specifications	Inspections	Yes
8. At all times after 1 May 2021 the culvert shall provide for fish passage	Inspections	Yes
9. The invert of the culvert shall be set below the existing stream bed by 225mm that it fills with bed material and simulates the natural bed	Inspections	NA
10. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site	Inspections	Yes
11. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical	Inspections	Yes
12. Culvert maintenance.	Inspections	Yes
13. Lapse condition		Exercised
14. Review condition	Next opportunity for review June 2027	NA
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall administrative performance with respect to this consent		**High**

Table 41 Summary of performance for Consent 10825-1.0

Purpose 10825-1: To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. This consent authorises the permanent diversion of the full stream flow through two sections of reconstructed channel on two unnamed tributaries, between grid references as set out in consent	Inspections	Yes
2. The new stream channels shall have a flow capacity no less than that of the existing stream channels	Inspections	Yes
3. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive')	Inspections	Yes
4. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during	Inspections	Yes

Purpose 10825-1: To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
installation of the culvert.		
5. The channels shall be constructed to include sequences of runs and riffles that simulate the natural bed where the original stream bed is no longer present or stable	Inspections	Yes
6. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.		N/A
7. The consent holder shall prepare and implement a fish recovery plan that has been certified by the Chief Executive of the Taranaki Regional Council. The plan shall detail how the impacts on fish during culvert installation are avoided as far as practical, and shall include as a minimum how fish will be salvaged, how often fish will be salvaged, and recording the number and types of fish salvaged	Provided to the Council	Yes
8. The new channel shall not restrict fish passage	Inspections	Yes
9. At all times during the works the consent holder shall ensure that the stream flow downstream of the affected reach is not significantly diminished	Inspections	Yes
10. On completion of the realignment work: a. the banks of the reconstructed channel shall have a slope no steeper than 1.5 horizontal to 1 vertical; and b. the bed of the reconstructed channel shall be at an appropriate grade so as to provide for upstream fish passage	Inspections	Yes
11. The consent holder shall ensure that rock riprap in placed in the stream bed at all bends in the new channels. The riprap shall be placed within the entire bed width and up the banks of the new stream channel	Inspections	Yes
12. Rock riprap specifications.	Inspections	Yes
13. The consent holder shall maintain the realigned channel by repairing any erosion, scour or instability of the stream bed or banks	Inspections	Yes
14. The consent holder shall undertake and maintain riparian fencing and planting on the tributaries affected by the realignment, in accordance with the Riparian Management Plan for the property. An area of not less than 5 m shall be planted between the stream bed and fence	Inspections	Yes
15. The fencing and riparian planting required in condition 14 shall be completed before August 2021	Inspections	Yes
16. To remedy and mitigate the adverse environmental effects of this consent, the consent holder shall establish and maintain riparian planting and a wetland as detailed in the 'Wetland Restoration Management Plan' provided with the application and attached as Appendix 1 of the consent. The works shall be undertaken within the timeframes specified in	Inspections	Yes

Purpose 10825-1: To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
that plan		
17. All earthwork areas shall be stabilised as soon as is practicable immediately following completion of soil disturbance activities	Inspections	Yes
18. This consent lapses 5 years after its commencement date (shown on the front of this document), unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period in accordance with section 125(1)(b) of the Resource Management Act 1991		Exercised
19. Review condition	Next opportunity for review June 2027	NA
Overall assessment of consent compliance and environmental performance in respect of this consent Overall administrative performance with respect to this consent		**High** **High**

Table 42 Summary of performance for all consents

Consent	Environmental Performance	Administrative performance
5838-2.2 Discharge waste to land and water	Pending due to matters before the Environment Court	Improvement required
5839-2 Discharge emissions to air	Pending due to matters before the Environment Court	Good
5938-2.0 Twin culvert	High	High
6212-1 Culvert	High	High
10063-1.0 Quarry discharge	High	High
10547-1.0 Culvert unnamed tributary	High	High
10843-1.0 To modify a culvert to provide for fish passage	High	High
10825-1.0 To realign a section of two unnamed tributaries	High	High

The overall gradings that the Council has assigned to RNZ over the last ten years are set out below in Table 43.

Table 43 Evaluation of environmental performance over time

Year	Consent numbers	High	Good	Improvement req	Poor
2019/20	5839-2, 5838-2.2, 5938-2, 6212-2, 10547-1, 10825-1*, 10843-1, 10063-1	-	-	-	1
2020/21	5839-2, 5838-2.2, 5938-2, 6212-2, 10547-1, 10825-1*, 10843-1, 10063-1	-	-	-	1
2021/22	5839-2, 5838-2.2, 5938-2, 6212-2, 10547-1, 10825-1*, 10843-1, 10063-1	-	-	-	1
2022/23	5839-2, 5838-2.2, 5938-2, 6212-2, 10547-1, 10825-1*, 10843-1, 10063-1	-	-	-	1
2023/24	5839-2, 5838-2.2, 5938-2, 6212-2, 10547-1, 10825-1*, 10843-1, 10063-1	-	-	1	-

During the year, the Company's environmental and administrative performances with the resource consents required improvement, as defined in Appendix II. Multiple incidents are subject to Environment Court

proceedings. A further alleged non-compliant event remained under Council review at the end of the year. Abatement notices issued in previous years continue to be in force.

3.4 Recommendations from the 2022/23 Annual Report

The 2022/23 Annual Report recommended:

1. That, in the first instance, monitoring of consented activities at the Uruti facility of Remediation New Zealand in the 2023/24 year be as implemented during 2022/23 and reported herein.
2. THAT should there be issues with environmental or administrative performance in 2023/24, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the Council liaise with RNZ and respective analytical laboratories to resolve discrepancies in measurements of ammoniacal and total nitrogen in irrigated wastewaters.

The monitoring programme was largely unchanged at the start and throughout the 2023/24 monitoring year. Two inter-lab comparisons were conducted this monitoring year. In brief, two sets of samples were collected from the HHG000168 and IND002044 and sent to separate laboratories for analysis. Each was analysed for total nitrogen, ammoniacal nitrogen and nitrate-nitrite nitrogen. With two exceptions, the results from Hill Laboratories were higher by between 18 and 94%.

3.5 Alterations to monitoring programmes for 2024/25

In designing and implementing the monitoring programmes for air, land and 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 replacement of permits and the need to maintain a sound understanding of industrial processes within Taranaki exercising resource consents.

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 2024/25. Further changes may arise contingent upon any decision of the Court. While the Environment Court declined replacement of the Company's consents, the Company has appealed the decision to the High Court. The decision was pending at the time of preparing this report.

4. Recommendations

1. THAT monitoring of consented activities at the Uruti facility of Remediation New Zealand in the 2024/25 year continue at the same level as in 2023/24.
2. THAT should there be issues with environmental or administrative performance in 2024/25 monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the monitoring programme shall be reviewed in light of any changes to the operation of the site following the determination of the Environment Court and High Court.

Glossary of common terms and abbreviations

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

As*	Arsenic.
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.
EC	Electrical Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in µS/cm.
Cu*	Copper.
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.
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.
FNU	Formazin nephelometric units, a measure of the turbidity of water.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
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.
LOD	Laboratory limit of detection
LOSP	Light Organic Solvent Preservatives
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.
MfE	Ministry for the Environment
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, a measure of conductivity.
NH_4	Ammoniacal nitrogen, also referred to as 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).
NPS-FM	National Policy Statement for Freshwater Management 2020.
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 or FNU.

WTS	Wetland Treatment System
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 (and readily available) rather than in particulate or solid form.

For further information on analytical methods, contact a manager in the Environment Quality Department.

Bibliography and references

Landcare Research New Zealand Ltd. 2002. Maps of Total Soil Concentrations (background levels) of Chromium, Copper, Lead, Nickel, Vanadium and Zinc in the Taranaki Region. LC0102/152. Palmerston North, Landcare Research New Zealand Ltd.

Ministry for the Environment. 2018. A Guide to Attributes In Appendix 2 of the National Policy Statement for Freshwater Management 2014 (as amended 2017), Wellington, Ministry for the Environment.

Ministry for the Environment. 2018b. Best Practice Guidelines for Compliance, Monitoring and Enforcement under the Resource Management Act 1991. Wellington: Ministry for the Environment.

Ministry for the Environment. 2016. Good practice guide for assessing and managing odour. Wellington: Ministry for the Environment.

New Zealand Government National Policy Statement for Freshwater Management 2020 (August 2020).

Taranaki Regional Council: Binsbergen, FB002: 2023 Fish Survey of the Haehanga Stream in relation to Remediation NZ composting site at Uruti, April 2023.

Taranaki Regional Council: Bittner, AB006: 2024 Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, April 2023.

Taranaki Regional Council: Sutherland, DS157: 2022 Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, January 2022.

Taranaki Regional Council: Sutherland, AB006: Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, April 2023.

Taranaki Regional Council 2023: Remediation NZ Ltd Uruti composting facility Monitoring Programme Annual Report Technical Report 2023-05. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2023: Remediation NZ Ltd Uruti composting facility Monitoring Programme Annual Report 2021-2022 Technical Report 2022-24. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2022: Remediation NZ Ltd Uruti composting facility Monitoring Programme Annual Report 2020-2021 Technical Report 2021-81. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2020: Remediation NZ Ltd Uruti and Waitara Road Monitoring Programme Annual Report 2019-2020 Technical Report 2020-84. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2019: Remediation NZ Ltd Uruti Waitara and Pennington Road Monitoring Programme Annual Report 2018-2019 Technical Report 2019-50. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2018: Remediation NZ Ltd Uruti Waitara and Pennington Road Monitoring Programme Annual Report 2017-2018 Technical Report 2018-79. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2017: Remediation NZ Ltd Monitoring Programme Annual Report 2016-2017 Technical Report 2017-11. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2016: Remediation NZ Monitoring Programme Annual Report 2015-2016. Technical Report 2016-83. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2015: Remediation NZ Monitoring Programme Annual Report 2014-2015. Technical Report 2015-68. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2014: Remediation NZ Monitoring Programme Annual Report 2013-2014. Technical Report 2014-53. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2013: Remediation NZ Monitoring Programme Annual Report 2012-2013. Technical Report 2013-64. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2011: Remediation NZ Monitoring Programme Annual Report 2011-2012. Technical Report 2012-39. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2011: Remediation NZ Monitoring Programme Annual Report 2010-2011. Technical Report 2011-44. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2010: Remediation NZ Monitoring Programme Annual Report 2009-2010. Technical Report 2010-44. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2009: PEL Waste Services/Remediation NZ Monitoring Programme Annual Report 2008-2009. Technical Report 2009-49. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2009: PEL Waste Services Limited (formerly Perry Environmental Limited) Monitoring Programme Annual Report 2007-2008. Technical Report 2008-94. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2007: PEL Waste Services Limited (formerly Perry Environmental Limited) Monitoring Programme Annual Report 2006-2007. Technical Report 2007-112. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2006: Perry Environmental Limited Monitoring Programme Annual Report 2005-2006. Technical Report 2006-26. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2005: Perry Environmental Limited Monitoring Programme Annual Report 2004-2005. Technical Report 2005-12. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2004: Perry Environmental Limited Monitoring Programme Annual Report 2003-2004. Technical Report 2004-26. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2003: Perry Environmental Limited Monitoring Programme Annual Report 2002-2003. Technical Report 2003-37. Taranaki Regional Council, Stratford.

Taranaki Regional Council 2002: Global Vermiculture Limited Monitoring Programme Annual Report 2001-2002. Technical Report 2002-25. Taranaki Regional Council, Stratford.

Appendix I

Resource consents held by Remediation New Zealand Ltd

(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:	Remediation (NZ) Limited PO Box 8045 New Plymouth 4342
Decision Date (Change):	20 August 2015
Commencement Date (Change):	20 August 2015 (Granted Date: 27 May 2010)

Conditions of Consent

Consent Granted:	To discharge: a) waste material to land for composting; and b) treated stormwater and leachate from composting operations; onto and into land in circumstances where contaminants may enter water in the Haehanga Stream catchment and directly into an unnamed tributary of the Haehanga Stream
Expiry Date:	1 June 2018
Review Date(s):	June 2016, June 2017
Site Location:	1450 Mokau Road, Uruti
Legal Description:	Sec 34 Pt Sec 4 Blk II Upper Waitara SD (Discharge site)
Grid Reference (NZTM)	Between 1731656E-5686190N, 1733127E-5684809N, 1732277E-5685101N, 1732658E-5684545N & 1732056E-5684927N
Catchment:	Mimi
Tributary:	Haehanga

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.

Acceptable wastes

2. The raw materials accepted onsite shall be limited to the following:
    - Paunch grass;
    - Animal manure from meat processing plant stock yards and dairy farm oxidation pond solids;
    - Green vegetative wastes;
    - Biosolids wastes including, but not limited to, pellets from wastewater treatment plants;
    - Mechanical pulping pulp and paper residue (excluding any pulping wastes that have been subject to chemical pulping or treated or mixed with any substance or material containing chlorine or chlorinated compounds);
    - Solid drilling cuttings from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0% total petroleum hydrocarbon within 3 days of being received onsite;
    - Water based and synthetic based drilling fluids from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0% total petroleum hydrocarbon content within 3 days of being brought onto the site;
    - Produced water from hydrocarbon exploration;
    - Vegetable waste solids (being processing by-products);
    - Grease trap waste (from food service industries);
    - Fish skeletal and muscle residue post filleting (free from offal); and
    - Poultry industry waste (eggshells, yolks, macerated chicks and chicken mortalities).

    The acceptance of any other materials shall only occur if the Chief Executive, Taranaki Regional Council advises in writing that he is satisfied on reasonable grounds that the other materials will have minimal effects beyond those materials listed above.

3. Before bringing waste to the site the consent holder shall take a representative sample of each type of drilling waste permitted under condition two from each individual source, and have it analysed for the following:

   a. total petroleum hydrocarbons (C_6-C_9, C_{10}-C_{14}, C_{15}-C_{36});
   b. benzene, toluene, ethylbenzene, and xylenes;
   c. polycyclic aromatic hydrocarbons screening;
   d. heavy metals screening; and
   e. chloride, nitrogen, pH, potassium, and sodium.

   The results of the analysis require by this condition shall be forwarded to the Chief Executive, Taranaki Regional Council every three months or upon request.

4. Material produced as a result of a dissolved air flotation process shall not be accepted on site.

Maintenance of measures

5. All sediment ponds and silt traps on site, that are located upstream of the pond treatment system or wetland treatment system, shall be managed so that they are no more than 20% full of solids at any one time.

   Note: For the purposes of this condition, the location of the pond treatment system and wetland treatment system are shown on Figure 1, attached as Appendix 1 of this consent.

6. All treatment measures on site shall be implemented and maintained so that:
   - clearwater runoff is prevented from entering Pad 1, Pad 2 and the Drill Mud Pad; and
   - all stormwater and/or leachate from Pad 1, Pad 2, the Drill Mud Pad and any other exposed areas within the composting site is directed for treatment through the Pond or Wetland Treatment System.

   Note: For the purposes of this condition, the location and extent of Pad 1, Pad 2 and the Drill Mud Pad are shown on Figure 1, attached as Appendix 1 of this consent.

7. Any pond(s) used on site for the purposes of stormwater and leachate treatment shall be constructed and maintained in a manner which prevents the seepage of wastewater through the pond liners entering surface water or groundwater.

Irrigation

8. The consent holder shall record the following information in association with irrigating wastewater to land:

   a) the date, time and hours of irrigation;
   b) the volume of wastewater irrigated to land;
   c) the conductivity of the irrigation fluid (measured in mS/m);
   d) the source of the wastewater (e.g. Pond or Wetland Treatment System); and
   e) the location and extent where the wastewater was irrigated.

   The above records shall be made available to the Chief Executive, Taranaki Regional Council, on request.

9. There shall be no direct discharge to water as a result of irrigating wastewater to land. This includes, but is not necessarily limited to, ensuring the following:
    - No irrigation shall occur closer than 25 metres to any surface water body;
    - The discharge does not result in surface ponding;
    - No spray drift enters surface water;
    - The discharge does not occur at a rate at which it cannot be assimilated by the soil/pasture system; and
    - The pasture cover within irrigation areas is maintained at all times.

10. Treated wastewater discharged by irrigation to land shall not have a hydrocarbon content exceeding 5% total petroleum hydrocarbon or a sodium adsorption ratio exceeding 18.

11. Discharges irrigated to land shall not give rise to any of the following adverse effects in the Haehanga Stream, after a mixing zone extending 30 metres from the downstream extent of the irrigation areas;

    a) a rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm^{-3};
    b) a level of unionised ammonia greater than 0.025 gm^{-3};
    c) an increase in total recoverable hydrocarbons;
    d) chloride levels greater than 150 g/m^3;
    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; and
    i) any significant adverse effects on aquatic life.

Soil quality

12. Representative soil samples shall, be taken from each irrigation area at intervals not exceeding 6 months and analysed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylene.

13. Representative soil samples shall be taken from each irrigation area at intervals not exceeding 3 months and analysed for chloride, sodium, magnesium, calcium, potassium, total, soluble salts, and conductivity.

14. Before 30 November 2015 the holder shall review and update the Uruti Composting Facility Management Plan supplied in support of application 5838-2.2 and any changes shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity The plan shall be adhered to and reviewed on an annual basis (or as required) and any changes shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The shall plan include but not limited to:

    a) Trigger limits for the three tier management system tiers set out in section 3.1 of the Uruti Composting Facility Management Plan;
    b) Monitoring frequencies of soil and groundwater in Tiers one, two, and three;
    c) Remediation options for Tier three irrigation areas;
    d) Riparian planting of irrigation areas;
    e) Stormwater improvements at the site ;
    f) Water storage for dilution and remediation; and
    g) Soil and groundwater data analysis.

Groundwater quality

15. The consent holder shall establish and maintain at least one groundwater monitoring well at each of the following locations for the purpose of monitoring the effect of the wastewater discharges on groundwater quality:

    a. up gradient of the irrigation areas in an un-impacted area;
    b. down gradient of the extent of the irrigation of each area;
    c. down gradient of the duck pond and drill mud pits and up gradient of irrigation area H for the purpose of assessing integrity clay liners of drilling waste treatment ponds, and
    d. at NZTM 1731518N-5686536E (approximately 40 metres south of SH3) for the purpose of assess groundwater near the northern boundary.

    For the purposes of clarification this condition requires four new bores to be installed for the purposes of establishing irrigation areas F & E and in accordance with the Uruti Composting Facility Management Plan 2015 supplied with application 5838-2.2.

16. Any new groundwater monitoring wells required by condition 15 shall be installed to the following standards;

    a) Prior to installation of any new wells, confirmed NZTM GPS locations shall be provided to the Taranaki Regional Council for approval;
    b) All new wells shall be at least 25 metres from any water way (unless otherwise authorised by a separate consent) and be accessible by vehicle;
    c) All new wells shall be installed by a qualified driller and designed to encounter groundwater and accommodate expected annual fluctuations in water level -i.e. screened sections and filter packs to be located next to the water bearing horizons;
    d) Soils encountered during installation shall be logged by a suitably qualified and graphic logs of the soils and well construction are to be supplied to the Taranaki Regional Council;
    e) All new wells shall be surveyed for topographical elevation by a suitably qualified person;
    f) All wells shall completed with an appropriate riser, riser cap, toby and be fenced to prevent stock access;
    g) Prior to any irrigation occurring in any new irrigation area, a groundwater sample shall be collected from the down gradient well by a suitably qualified person, using a method approved by the Chief Executive of the Taranaki Regional Council and analysed and analysed for sodium, calcium, magnesium, nitrate, ammoniacal nitrogen, pH, chloride, and conductivity.

    Adherence to New Zealand Standard 4477:2001 will ensure compliance with this condition.

17. The consent holder shall undertake weekly groundwater level, temperature, and conductivity readings from each well within a single eight hour period using a method approved by the Chief Executive, Taranaki Regional Council. Results shall be recorded in a cumulative spread sheet, a copy of which shall be forwarded to the Taranaki Regional Council every three months, or upon request.

18. Groundwater samples shall be collected from all monitoring wells required under condition 15 at intervals not exceeding 6 months by a suitably qualified person using a method approved by the Chief Executive, Taranaki Regional Council and analysed for; total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylene, lead and arsenic.

19. Groundwater samples shall be collected from all monitoring wells required under condition 15 at intervals not exceeding 3 months by a suitably qualified person using a method approved by the Chief Executive, Taranaki Regional Council and analysed for; chloride, sodium, magnesium, calcium, total soluble salts, and conductivity.

Pond Treatment System

20. The consent holder shall prepare a Pond Treatment System Management Plan which details management practices undertaken to maximise treatment capabilities of the system. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the commencement date of this consent.

    The Management Plan shall address, but not necessarily be limited to, the following matters:

    a) how the build up of sediment and/or sludge will be managed within the entire system, how the level of build-up will be monitored including factors that will trigger management, and the frequency of undertaking the identified measures or procedures;
    b) how overloading of the system will be prevented; and
    c) how any offensive or objectionable odours at or beyond the site boundary will be avoided in accordance with condition 13 of consent 5839-2.

21. Operations on site shall be undertaken in accordance with the Pond Treatment System Management Plan, approved under condition 20 above, except in circumstances when the Proposed Implementation Plan, approved under condition 9 of consent 5839-2, specifies otherwise.

Wetland Treatment System

22. The consent holder shall prepare a Wetland Treatment System Management Plan that details management practices undertaken to maximise treatment capabilities of the system. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the commencement date of this consent.

    The Management Plan shall address, but not necessarily be limited to, the following matters:

    a) how the build up of sediment and/or sludge will be managed within the entire system, how the level of build-up will be monitored including factors which will trigger management, and the frequency of undertaking the identified measures or procedures; and
    b) how plant die-off within the system will be managed, and the frequency and/or timing of undertaking the identified measures or procedures.

23. Operations on site shall be undertaken in accordance with the Wetland Treatment System Management Plan, approved under condition 22 above.

24. The discharge from the Wetland Treatment System shall meet the following standards (at monitoring site IND003008):

    a) the suspended solids concentration shall not exceed 100 g/m^3; and
    b) the pH shall be between 6.0 and 9.0.

25. Discharges from the Wetland Treatment System shall not give rise to any of the following effects in the unnamed tributary of the Haehanga Stream, after a mixing zone of 40 metres, at established monitoring site HHG000103 (at or about grid reference 1732695E-5685050N):

    a) a rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm^{-3};
    b) a level of unionised ammonia greater than 0.025 gm^{-3};
    c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    d) any conspicuous change in the colour or visual clarity;
    e) any emission of objectionable odour;
    f) the rendering of fresh water unsuitable for consumption by farm animals; and
    g) any significant adverse effects on aquatic life.

Riparian planting

26. The consent holder shall maintain the areas of riparian planting, undertaken in accordance with option 1 of riparian management plan RMP383, by ensuring the ongoing replacement of plants which do not survive, the eradication of weeds until the plants are well established, and the exclusion of stock from the planted areas.

Incident notification

27. The consent holder shall keep a permanent record of any incident related to this consent that results, or could result, in an adverse effect on the environment. The consent holder shall make the incident register available to the Taranaki Regional Council on request.

    Details of any incident shall be forwarded to the Taranaki Regional Council immediately. At the grant date of this consent, the Taranaki Regional Council's phone number is 0800 736 222 (24 hour service).

Site reinstatement

28. The consent holder shall prepare a Site Exit Plan which details how the site is going to be reinstated prior to the consent expiring or being surrendered. The Plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, at least 6 months prior to this consent expiring or being surrendered.

    The Site Exit Plan shall address, but not necessarily be limited to, the following matters:

    a) How the site will be reinstated so that no raw materials listed or approved under condition 2 of this consent remain on site;

    b) How the site will be reinstated so that no partially decomposed material remains on site;

c) How any remaining leachate or sludge, resulting from the operation, will be either removed from the site, buried, treated or otherwise to avoid any adverse effects on groundwater or surface water;

d) The remediation of irrigated soils and groundwater; and

e) Timeframes for undertaking the activities identified in association with a) to c) above.

Note: The requirement of this condition shall not apply if the consent holder applies for a new consent to replace this consent when it expires.

29. The consent holder shall reinstate the site in accordance with the plan approved under condition 28 above prior to this consent expiring or being surrendered.

Review

30. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review within one month of approving the plan required under condition 9 of consent 5839-2 and/or during the month of June in any year for any of the following purposes:

a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to odour discharges from the site and/or water quality issues;

b) To incorporate into the consent any modification to the operation and maintenance procedures or monitoring that may be necessary to deal with any adverse effects on the environment arising from changes in association with condition 9 of consent 5839-2; and

c) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges and/or odour from the site.

Signed at Stratford on 20 August 2015

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Appendix 1 of consent 5838

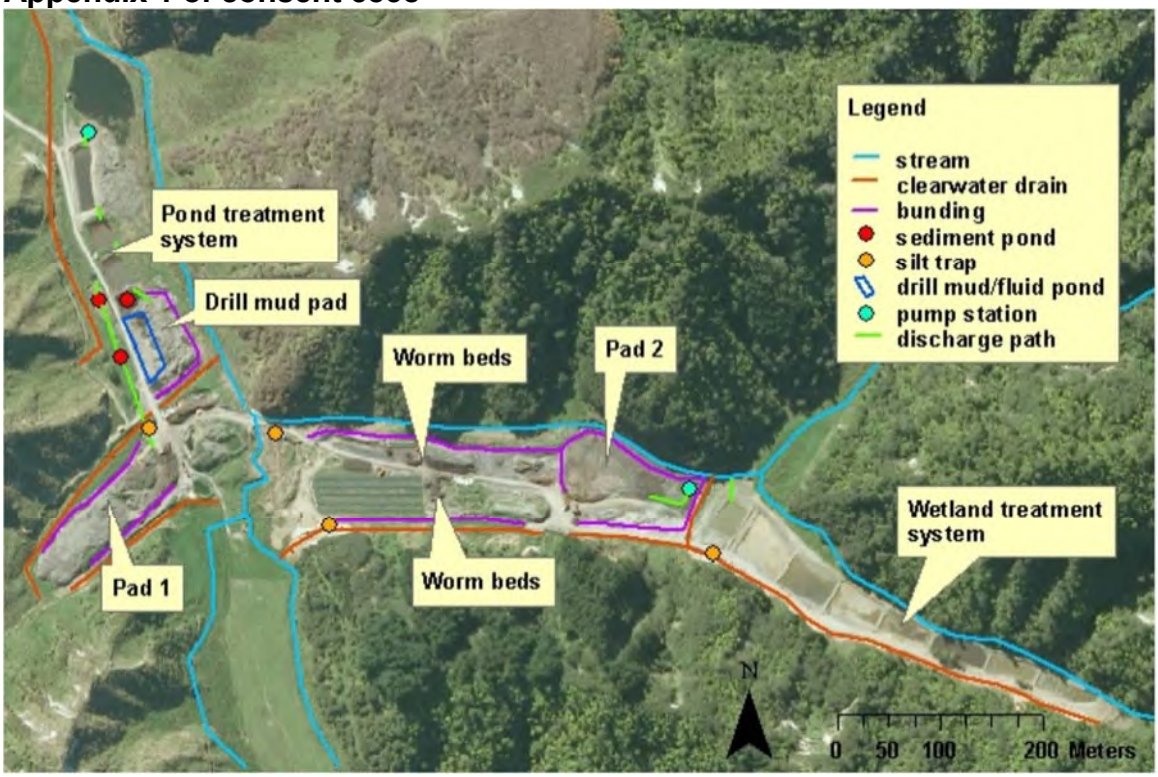


Figure 1 The location and extent of the Pond Treatment System, Wetland Treatment System, Pads 1 and 2, and the Drill Mud Pad.

Discharge Permit

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

Name of Consent Holder:	Remediation (NZ) Limited P O Box 8045 NEW PLYMOUTH 4342
Decision Date:	27 May 2010
Commencement Date:	18 June 2010

Conditions of Consent

Consent Granted:	To discharge emissions into the air, namely odour and dust, from composting operations between (NZTM) 1731704E-5685796N, 1733127E-5684809N, 1732277E-5685101N, 1732451E-5684624N and 1732056E-5684927N
Expiry Date:	1 June 2018
Review Date(s):	June 2011, June 2012, June 2013, June 2014, June 2015, June 2016, June 2017
Site Location:	1450 Mokau Road, Uruti
Legal Description:	Sec 34 Pt Sec 4 Blk II Upper Waitara SD

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

General condition

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

General

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

2. The surface areas of Pad 1 and Pad 2 shall not exceed 3,500 m² and 4,000 m², respectively.

   Note: For the purposes of this condition, the location and extent of Pad 1 and Pad 2 are shown on Figure 1, attached as Appendix 1 of this consent.

Incoming material

3. The raw materials accepted onsite shall be limited to the following:

   - Paunch grass;
   - Animal manure from meat processing plant stock yards and dairy farm oxidation pond solids;
   - Green vegetative wastes;
   - Biosolids wastes including, but not limited to, pellets from wastewater treatment plants;
   - Mechanical pulping pulp and paper residue [excluding any pulping wastes that have been subject to chemical pulping or treated or mixed with any substance or material containing chlorine or chlorinated compounds];
   - Solid drilling cuttings from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0 % total petroleum hydrocarbon within 3 days of being received onsite;
   - Water based and synthetic based drilling fluids from hydrocarbon exploration provided they are blended down to a maximum hydrocarbon content of 5.0 % total petroleum hydrocarbon content within 3 days of being brought onto the site;
   - Produced water from hydrocarbon exploration;
   - Vegetable waste solids [being processing by-products];
   - Grease trap waste [from food service industries];
   - Fish skeletal and muscle residue post filleting [free from offal]; and
   - Poultry industry waste [eggshells, yolks, macerated chicks and chicken mortalities].

   The acceptance of any other materials shall only occur if the Chief Executive, Taranaki Regional Council advises in writing that he is satisfied on reasonable grounds that the other materials will have minimal effects beyond those materials listed above.

4. Material produced as a result of a dissolved air flotation process shall not be accepted on site.

5. The consent holder shall record the following information in association with accepting all incoming material on site:

   a) the date and time that the material is accepted;
   b) description of the material; and
   c) the approximate volumes of material.

   The above records shall be made available to the Chief Executive, Taranaki Regional Council, on request.

Management practices

6. The consent holder shall prepare a Site Practices Management Plan which details management practices undertaken to ensure that offensive or objectionable odours at or beyond the site boundary will be avoided in accordance with condition 13 of this consent. The plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the commencement date of this consent.

   The Management Plan shall address, but not necessarily be limited to, the following matters:

   a) identification of all activities on site which have the potential to generate odour [e.g. turning compost piles, removing sludge from ponds];
   b) the conditions and/or time of day when activities identified under a) above should be undertaken [e.g. during favourable weather conditions and the identification of those conditions] and/or measures that shall be implemented to avoid odours arising [e.g. containment measures];
   c) measures undertaken to minimise odours during receiving and storing material on Pad 1 and Pad 2 and throughout the composting and vermiculture processes [e.g. method[s] used to cover material once received, how anaerobic conditions are maintained];
   d) measures undertaken to minimise odours arising in the Wetland Treatment System, and identification of the time of year and/or frequency when undertaken;
   e) measures undertaken to minimise odours arising in the Pond Treatment System and associated treatment measures [e.g. silt traps located upstream], and identification of the time of year and/or frequency when undertaken; and
   f) details of how a complaint investigation procedure shall operate, including what data shall be collected and what feedback is to be provided to the complaint.

7. Operations on site shall be undertaken in accordance with the Site Practices Management Plan, approved under condition 6 above, except in circumstances when the Proposed Implementation Plan, approved under condition 9 of this consent, specifies otherwise.

Site audit and implementation

8. The consent holder shall engage a suitably qualified and experienced professional to prepare and submit an Odour Assessment Report for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within three months of the commencement date of this consent. The professional that the consent holder engages shall be to the reasonable approval of the Chief Executive, Taranaki Regional Council.

   The report shall include, but not necessarily be limited to, the following:

   a) The appropriateness of the management practices and control measures undertaken in avoiding offensive and/or objectionable odours arising beyond the property boundary in association with the composting processes on Pad 1;
   b) Recommendations in association with a) above;
   c) The appropriateness of the design and management of the Pond Treatment System and associated pre-treatment devices (e.g. silt ponds) in effectively managing odours arising from treating leachate derived from Pad 1 and avoiding offensive and/or objectionable odours arising beyond the property boundary; and
   d) Recommendations in association with c) above.

   For assisting with the above assessment, the consent holder shall provide a copy of the documents listed below to the engaged and approved professional:

   - The Taranaki Regional Council final officers report and hearing decision report for applications 5276 and 5277;
   - Consent certificates [including conditions] for consents 5838-2 and 5839-2;
   - The Pond Treatment System Management Plan approved under condition 18 of consent 5838-2; and
   - The Site Practices Management Plan approved under condition 6 of this consent.

9. The consent holder shall prepare and submit a Proposed Implementation Plan for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, within one month of the Odour Assessment Report being approved under condition 8 above.

   The Plan shall include, but not necessarily be limited to, the following:

   a) Management practices and/or control measures proposed to be implemented in association with the composting processes on Pad 1, of which are from the recommendations of the Odour Assessment Report, approved in accordance with condition 8;
   b) Management practices and/or control measures proposed to be implemented in association with the Pond Treatment System, of which are from the recommendations of the Odour Assessment Report, approved in accordance with condition 8;
   c) The reasons for the chosen practices and/or measures identified in accordance with a) and b) above
   d) A timeframe by when each of the practices and/or measures identified in accordance with a) and b) above will be implemented

e) Identification of appropriate management practices to ensure the on-going functionality of any chosen control measures identified in accordance with a) and b) above

10. Operations and activities on site shall be undertaken in accordance with the Proposed Implementation Plan, approved under condition 9 above.

Dust

11. The dust deposition rate beyond the boundary of the consent holder's site arising from the discharge shall be less than 4.0 $g/m^2/30$ days.

Note: For the purposes of this condition, the consent holder's site is defined as Sec 34 Pt Sec 4 Blk II Upper Waitara SD.

12. 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 consent holder's site, and in any case, total suspended particulate matter shall not exceed 120 $\mu g/m^3$ as a 24 hour average [measured under ambient conditions] beyond the boundary of the consent holder's site.

Note: For the purposes of this condition, the consent holder's site is defined as Sec 34 Pt Sec 4 Blk II Upper Waitara SD.

Odour

13. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the consent holder's site that is offensive or objectionable.

Note: For the purposes of this condition:

- The consent holder's site is defined as Sec 34 Pt Sec 4 Blk II Upper Waitara SD; and
- Assessment under this condition shall be in accordance with the *Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.*

Monitoring

14. The consent holder shall install a monitoring device that continuously records wind speed and direction in the area of the composting activity. The device shall be capable of logging collected data for at least six months and shall be installed and be operational within three months of the commencement date of this consent.

The data shall be provided telemetrically to the Taranaki Regional Council. If this method is not technically feasible, the data shall be provided to the Taranaki Regional Council at a frequency and a form advised by the Chief Executive, Taranaki Regional Council until such a time it is technically feasible to telemetric the data.

Odour surveys

15. The consent holder shall undertake an odour survey within six months of the Plan approved under condition 9 of this consent being implemented and thereafter at yearly intervals during periods when metrological conditions are most likely to result in offsite odour. The methodology for the survey shall be consistent with German Standard VDI 3940 "Determination of Odorants in Ambient Air by Field Inspection", or similar. Prior to the survey being carried out, the methodology shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

    The results of the survey shall be provided to the Chief Executive, Taranaki Regional Council, within three months of the survey being completed.

Community liaison

16. The consent holder and the Director – Resource Management, Taranaki Regional Council, or his delegate, shall meet locally as appropriate, six monthly or at such other frequency as the parties may agree, with submitters to the application of this consent and any other interested party at the discretion of the Chief Executive, Taranaki Regional Council, to discuss any matter relating to the exercise of this consent, in order to facilitate ongoing community consultation.

Incident notification

17. The consent holder shall keep a permanent record of any incident related to this consent that results, or could result, in an adverse effect on the environment. The consent holder shall make the incident register available to the Taranaki Regional Council on request.

    Details of any incident shall be forwarded to the Taranaki Regional Council immediately. At the grant date of this consent, the Council's phone number is 0800 736 222 [24 hour service].

Site reinstatement

18. The consent holder shall prepare a Site Exit Plan which details how the site is going to be reinstated prior to the consent expiring or being surrendered. The Plan shall be submitted for approval to the Chief Executive, Taranaki Regional Council, acting in a certification capacity, at least 3 months prior to this consent expiring or being surrendered.

    The Site Exit Plan shall address, but not necessarily be limited to, the following matters:

    a) How the site will be reinstated so that no raw materials listed or approved under condition 3 of this consent remain on site;

    b) How the site will be reinstated so that no partially decomposed material remains on site;

    c) How any remaining leachate or sludge, resulting from the operation, will be either removed from the site, buried, treated or otherwise to avoid any adverse effects on groundwater or surface water; and

d) Timeframes for undertaking the activities identified in association with a) to c) above.

Note: The requirement of this condition shall not apply if the consent holder applies for a new consent to replace this consent when it expires.

19. The consent holder shall reinstate the site in accordance with the Plan approved under condition 18 above prior to this consent expiring or being surrendered.

Review

20. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review within one month of approving the plan required under condition 9 of this consent and/or during the month of June in any year for any of the following purposes:

a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to odour discharges from the site;

b) To incorporate into the consent any modification to the operation and maintenance procedures or monitoring that may be necessary to deal with any adverse effects on the environment arising from changes in association with condition 9 of this consent; and

c) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects of odour from the site.

Signed at Stratford on 27 May 2010

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Appendix 1 of consent 5839-2

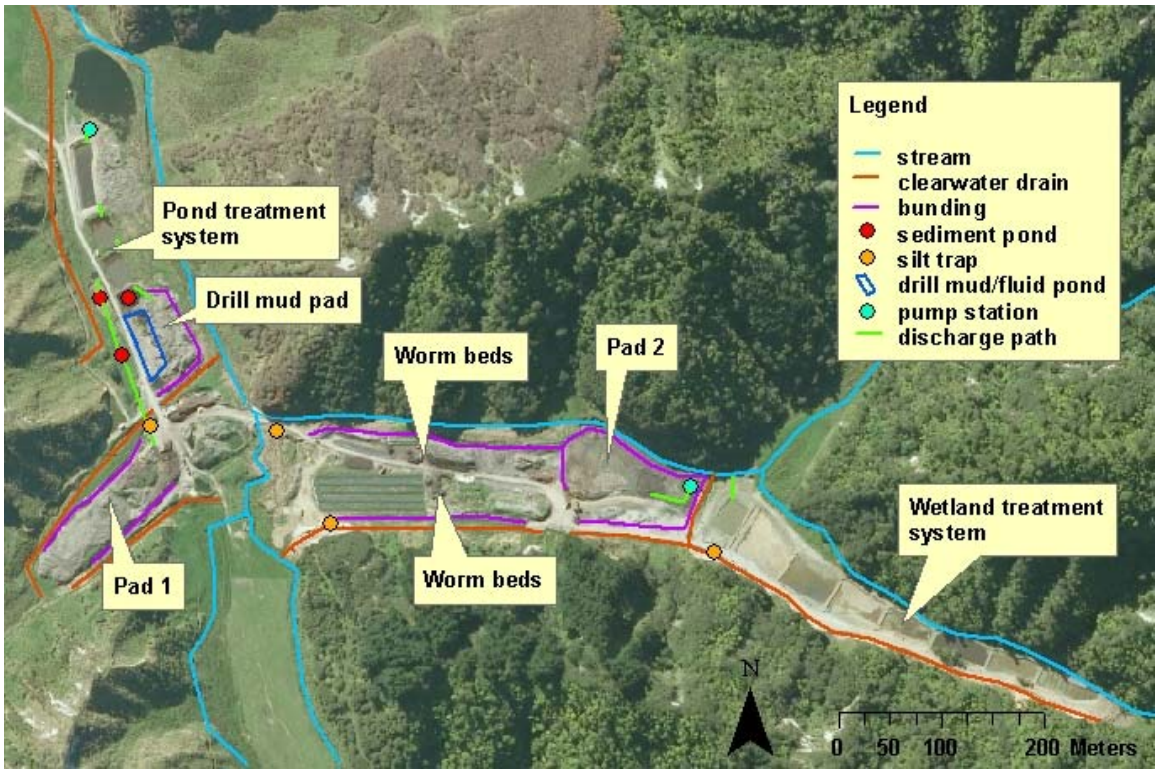


Figure 1 The location and extent of the composting operation including Pads 1 and 2.

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:	Remediation (NZ) Limited PO Box 8045 New Plymouth 4342
Decision Date:	01 September 2015
Commencement Date:	01 September 2015

Conditions of Consent

Consent Granted:	To use a twin culvert in the Haehanga Stream for vehicle access purposes
Expiry Date:	01 June 2033
Review Date(s):	June 2021 and June 2027
Site Location:	1460 Mokau Road, Uruti
Legal Description:	Sec 34 Pt Sec 4 Blk II Upper Waitara (site of structure)
Grid Reference (NZTM)	1731706E - 5685779N
Catchment:	Mimi
Tributary:	Haehanga

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 ensure that the stream bed downstream from the structure is built up with appropriate material before 31 March 2016 to allow for fish passage and from this date forward the structure shall not prevent the passage of fish.

2. The consent holder shall maintain the structure so that:

   (a) it does not become blocked and at all times allows the free flow of water through it;
   (b) any erosion, scour or instability of the stream bed or banks is remedied by the consent holder.

3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and/or June 2027, 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 01 September 2015

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Land Use Consent

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

Name of Consent Holder:	Remediation (NZ) Limited P O Box 8045 NEW PLYMOUTH 4342
Consent Granted Date:	26 September 2003

Conditions of Consent

Consent Granted:	To realign and divert the Haehanga Stream in the Mimi catchment for land improvement purposes at or about (NZTM) 1732402E-5684777N
Expiry Date:	1 June 2021
Review Date(s):	June 2009, June 2015
Site Location:	1460 Mokau Road, Uruti
Legal Description:	Pt Sec 4 Blk II Upper Waitara SD
Catchment:	Mimi
Tributary:	Haehanga

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 notify the Taranaki Regional Council at least 48 hours prior to and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.

2. The realignment authorised by this consent shall be undertaken generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.

3. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise erosion and scouring as a result of channel realignment.

4. 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.

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

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2009 and/or June 2015, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 22 September 2008

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Land Use Consent

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

Name of Consent Holder:	Remediation (NZ) Limited P O Box 8045 NEW PLYMOUTH 4342
Consent Granted Date:	26 September 2003

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a culvert and associated structure[s] in the bed of the Haehanga Stream in the Mimi catchment for access purposes at or about (NZTM) 1732402E-5684777N
Expiry Date:	1 June 2021
Review Date(s):	June 2009, June 2015
Site Location:	1460 Mokau Road, Uruti
Legal Description:	Pt Sec 4 Blk II Upper Waitara SD
Catchment:	Mimi
Tributary:	Haehanga

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 notify the Taranaki Regional Council in writing at least 48 hours prior to the commencement and upon completion of removal of the temporary culvert [being the 800mm diameter culvert] and installation of the permanent culvert and associated structures, 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 riverbed or discharges to water.

2. The consent holder shall replace the existing temporary culvert with a permanent culvert and associated structure[s] by 1 April 2004. Prior to the installation of the permanent culvert and associated structure[s] the consent holder shall forward designs of the proposed culvert and associated structure[s] for the written approval of the Chief Executive.

3. The structures authorised by this consent shall be constructed generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.

4. The consent holder shall adopt the best practicable option 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.

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

6. The structures, which are the subject of this consent, shall not obstruct fish passage.

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 structures removal and reinstatement.

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2009 and/or June 2015, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 22 September 2008

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Remediation New Zealand 107 Corbett Road Bell Block 4373
Decision Date:	09 March 2015
Commencement Date:	09 March 2015

Conditions of Consent

Consent Granted:	To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream
Expiry Date:	01 June 2033
Review Date(s):	June 2021 and/or June 2027
Site Location:	1460 Mokau Road, Uruti
Legal Description:	Sec 34 Pt Sec 4 Blk II Upper Waitara SD (Discharge source & site)
Grid Reference (NZTM)	1732059E-5684796N
Catchment:	Mimi
Tributary:	Haehanga

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

General condition

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

Special conditions

1. This consent authorises the discharge of treated stormwater into an unnamed tributary of the Haehanga Stream, as described in the information provided with the application, and specifically:

   a) The Assessment of Environmental Effects prepared by BTW Company Limited dated 9 January 2015; and
   b) Additional Information prepared by BTW Company Limited dated 16 February 2015.

   In the case of any contradiction between the details of information provided and the conditions of this consent, the conditions of this consent shall prevail.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing, at least 48 hours prior to the exercise of this consent (including vegetation removal). Notification shall include:

   a) the consent number;
   b) a brief description of the activity consented; and
   c) the extent or stage of the activity to be commenced.

   Notification shall be emailed to worknotification@trc.govt.nz.

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

4. The consent holder shall operate and progressively reinstate the quarry site in a manner which ensures that the area of exposed, un-vegetated earth, within the quarry's stormwater catchment is kept to a minimum at all times.

5. The consent holder shall ensure that no area greater than 1 ha is exposed at any one time.

6. The stormwater discharged shall be from a catchment area not exceeding 4 ha.

7. This stormwater treatment system shall be installed before any site works commences.

8. The stormwater treatment system shall be maintained for the life of the quarry operation.

9. All stormwater shall be directed for treatment through the stormwater treatment system prior to discharge into the Haehanga Stream tributary.

10. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm^{-3}
total hydrocarbons	Concentration not greater than 15 gm^{-3}

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

11. The pH may exceed 9.0 if the exceedance is a result photosynthetic activity within the detention ponds, but in any case the discharge shall not result in the pH of the receiving water increasing by more than 0.5 pH units after allowing for a mixing zone of 25 metres.

12. After allowing for reasonable mixing, within a mixing zone extending 500 metres downstream of any discharge point, the discharge shall not give rise to any of the following effects in the receiving waters:

    a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    b) any conspicuous change in the colour or visual clarity;
    c) any emission of objectionable odour;
    d) the rendering of fresh water unsuitable for consumption by farm animals;
    e) any significant adverse effects on aquatic life.

13. After allowing for reasonable mixing, within a mixing zone extending 500 metres downstream of any discharge point, the discharge shall not give rise to any of the following effects in the receiving waters:

    a) an increase in the suspended solids concentration within the unnamed tributary of the Haehanga Stream in excess of 10 grams per cubic metres when the turbidity as measured immediately upstream of the discharge point is equal to or less than 5 NTU (nephelometric turbidity units); or

    b) an increase in the turbidity within the unnamed tributary of the Haehanga Stream of more than 50%, where the stream turbidity measured upstream if the discharge is greater than 5 NTU, as determined using NTU (nephelometric turbidity units).

14. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

15. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:

    a) the loading and unloading of materials;
    b) maintenance of conveyance systems;
    c) general housekeeping; and
    d) management of the interceptor system.

    A Stormwater Management Plan template is available in the Environment section of the Taranaki Regional Council's web site www.trc.govt.nz.

16. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.

17. 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.

18. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and/or June 2027, 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 09 March 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Land Use Consent

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

Name of Consent Holder:	Remediation (NZ) Limited PO Box 8045 New Plymouth 4342
Decision Date:	02 March 2018
Commencement Date:	02 March 2018

Conditions of Consent

Consent Granted:	To replace an existing culvert in an unnamed tributary of the Haehanga Stream, including the associated disturbance of the stream bed
Expiry Date:	01 June 2033
Review Date(s):	June 2021 and or June 2027
Site Location:	1460 Mokau Road, Uruti
Grid Reference (NZTM)	1732180E-5685096N
Catchment:	Mimi
Tributary	Haehanga

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 culvert pipe shall be a smooth bore plastic pipe and have an internal diameter of no less than 1 metre and be no longer than 40 metres.

2. The fill over the top of the culvert pipe shall be comprised of suitable soils free of wood, humus and other organic matter. The embankment shall be well compacted in uniform layers not exceeding 300 mm loose depth to achieve a compaction of at least 95 % of maximum dry density.

3. The fill over the top of the culvert pipe shall be 2.3 m above the invert of the culvert.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of work. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

5. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.

6. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by:
   a) completing all works in the minimum time practicable;
   b) avoiding placement of excavated material in the flowing channel;
   c) keeping machinery out of the actively flowing channel, as far as practicable; and
   d) reinstating any disturbed areas as far as practicable.

7. A reinforced concrete headwall shall be installed at the inlet to the culvert.

8. A layer of rock riprap 1000 mm thick shall be installed in the stream bed. The riprap shall extend 5 metres downstream of the culvert outlet and 1 metre up the banks on both sides of the stream. The rock shall have the following grading:
   - 100% less than 800 mm diameter;
   - 50% greater than 600 mm diameter;
   - 90% greater than 350 mm diameter.

9. The culvert shall not restrict fish passage.

10. The invert of the culvert shall be set below the existing stream bed by 200 mm so that it fills with bed material and simulates the natural bed.

11. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.

12. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical.

13. The culvert shall remain the responsibility of the consent holder and be maintained so that:
    a) it does not become blocked, and at all times allows the free flow of water through it; and
    b) the consent holder repairs any erosion, scour or instability of the stream bed or banks that the culvert causes.

14. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.

15. This consent shall lapse on 31 March 2023, 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.

16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and/or June 2027, 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 02 March 2018

For and on behalf of
Taranaki Regional Council

Director – Resource Management

Land Use Consent

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

Name of Consent Holder:	Remediation (NZ) Limited PO Box 8045 New Plymouth 4342
Decision Date	24 June 2020
Commencement Date	24 June 2020

Conditions of Consent

Consent Granted:	To realign a section of two unnamed tributaries of the Haehanga Stream for land improvement purposes
Expiry Date:	1 June 2039
Review Date(s):	June 2027, June 2033
Site Location:	1460 Mokau Road, Urenui
Grid Reference (NZTM)	Between: 1731695E-5686147N & 1731840E-5686084N; and 1732341E-5685496N & 1732422E-5685525N
Catchment:	Mimi
Tributary:	Haehanga

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

General condition

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

Special conditions

1. This consent authorises the permanent diversion of the full stream flow through two sections of reconstructed channel on two unnamed tributaries, between grid references:
   - (NZTM) 1731695E-5686147N and 1731840E-5686084N; and
   - (NZTM) 1732341E-5685496N and 1732422E-5685525N.

2. The new stream channels shall have a flow capacity no less than that of the existing stream channels.

3. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive'). Notification shall include the consent number, a brief description of the work, and the intended commencement date. Unless the Chief Executive advises that an alternative method is required this notice shall be served by completing and submitting the 'Notification of work' form on the Council's website (http://bit.ly/TRCWorkNotificationForm).

4. The consent holder shall take all practicable steps to minimise sedimentation and increased turbidity of the stream during the construction, implementation and maintenance of the works, including:
   (a) completing all works in the minimum time practicable;
   (b) avoiding placement of excavated material in the flowing channel; and
   (c) keeping machinery out of the actively flowing channel, as far as practicable.

5. The channels shall be constructed to include sequences of runs and riffles that simulate the natural bed where the original stream bed is no longer present or stable.

6. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.

7. The consent holder shall prepare and implement a fish recovery plan that has been certified by the Chief Executive of the Taranaki Regional Council. The plan shall detail how the impacts on fish during culvert installation are avoided as far as practical, and shall include as a minimum how fish will be salvaged, how often fish will be salvaged, and recording the number and types of fish salvaged.

8. The new channel shall not restrict fish passage.

9. At all times during the works the consent holder shall ensure that the stream flow downstream of the affected reach is not significantly diminished.

10. On completion of the realignment work:

    (a) the banks of the reconstructed channel shall have a slope no steeper than 1.5 horizontal to 1 vertical; and
    (b) the bed of the reconstructed channel shall be at an appropriate grade so as to provide for upstream fish passage.

11. The consent holder shall ensure that rock riprap in placed in the stream bed at all bends in the new channels. The riprap shall be placed within the entire bed width and up the banks of the new stream channel.

12. The rock riprap shall be no less than 0.9 metres thick, and of the following grading:

    (a) 100% less than 600 mm diameter;
    (b) 50% greater than 450 mm diameter;
    (c) 90% greater than 200 mm diameter.

13. The consent holder shall maintain the realigned channel by repairing any erosion, scour or instability of the stream bed or banks.

14. The consent holder shall undertake and maintain riparian fencing and planting on the tributaries affected by the realignment, in accordance with the Riparian Management Plan for the property. An area of not less than 5 metres shall be planted between the stream bed and fence.

15. The fencing and riparian planting required in condition 14 shall be completed before August 2021.

16. To remedy and mitigate the adverse environmental effects of this consent, the consent holder shall establish and maintain riparian planting and a wetland as detailed in the 'Wetland Restoration Management Plan' provided with the application and attached as Appendix 1. The works shall be undertaken within the timeframes specified in that plan.

17. All earthwork areas shall be stabilised as soon as is practicable immediately following completion of soil disturbance activities.

    Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Guidelines for Soil Disturbing Activities- Waikato Regional Council. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

18. This consent lapses 5 years after its date of commencement, 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.

19. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2027 and/or June 2033, 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 24 June 2020

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Appendix 1

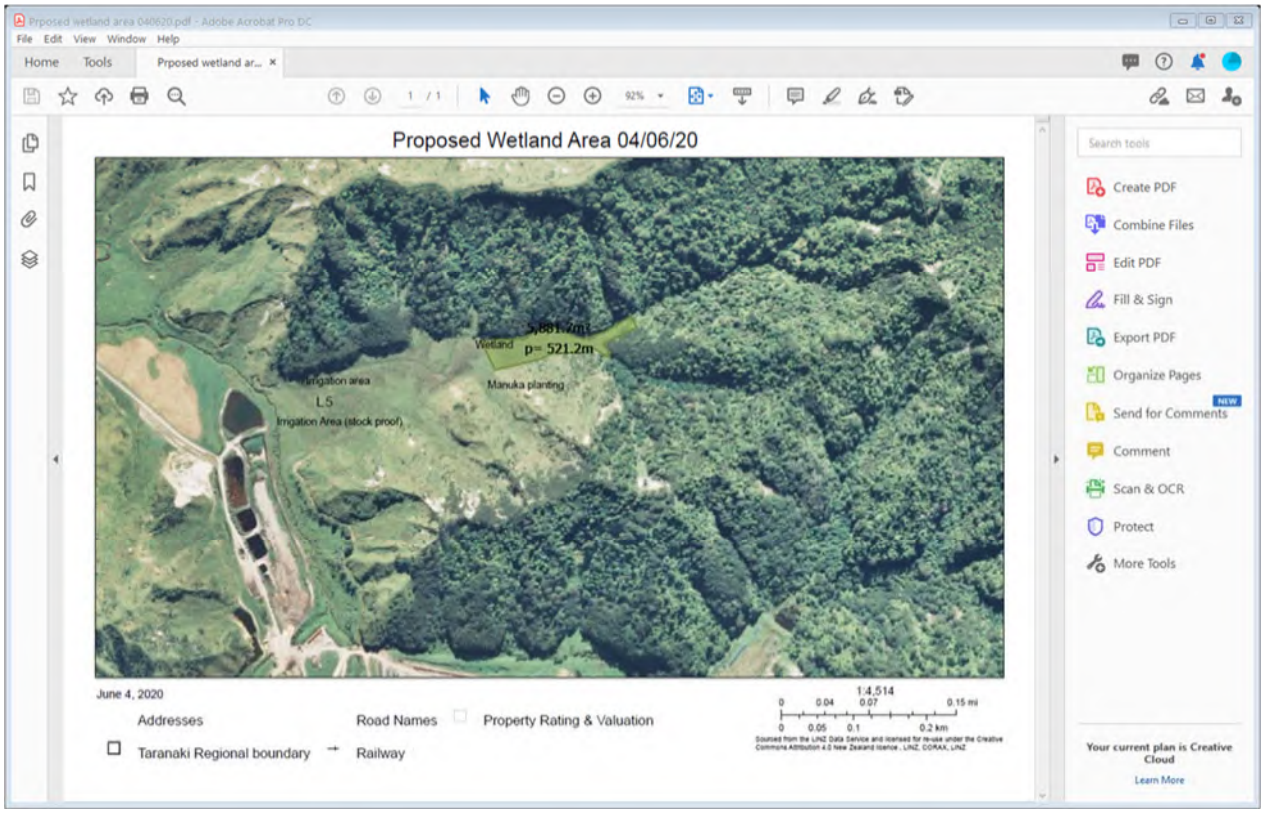
Wetland Restoration/Management Plan-Remediation (NZ) Ltd Uruti Site

13.1 Location

It is proposed to carry out a wetland restoration project on Remediation (NZ) Ltd land situated at 1460 Mokau Road.

The location of the proposed wetland is upstream of the L5 irrigation area. The wetland will have an approximate area of 0.588ha.

Diagram 1-Site of proposed wetland



Regenerative native bush is to the north and east of the proposed wetland. It is proposed to plant manuka on the southern hillside. To the western side of the proposed wetland is irrigation area L5.

The proposed wetland area has been grazed in the past and has little or no swamp vegetation. There is Juncus sp. growing in the wetland area.

It has been suggested by Sophie Arnoux (TRC Land Management Officer) that the proposed wetland area was likely to have been kahikatea/pukatea swamp forest (email dated 13/5/2020).

13.2 Description of water flow and drainage

There is a defined tributary of the Haehanga Stream to the west of the wetland. There is no defined stream through the wetland, with water flow either overland in periods of heavy rain, and underground during periods of no rain. Water seeps from the downstream bank that the wetlands have created which then forms the over ground tributary that runs between the irrigation area and bush margin.

13.3 Enhancement Proposal

It is proposed to replant the wetland area so as to re-create a kahikatea/pukatea swamp forest that would have been found in this area. Flax, cabbage tree, manuka and carex will also be planted. On the hill sides to the south of the wetland it is planned to plant manuka. The wetland and lower irrigation area will be fenced off summer 2020/21.

13.4 Plant numbers and plant spacing

The planting area is 5,880 m2. Distance between plants will be 2 m. 5,880 divided by 2, divided by 2 again is 1,470 plants required to fill the area. There will be spacing of 1 m between sedges on the wetland margin.

Table 1: Planting

Location	Species	Spacing	Number
Centre area	Kahikatea	3 m	30 (year 3-4)
Centre area	Pukatea	3 m	30 (year 3-4)
Outer areas	Cabbage Tree	2 m	100
Outer areas	Flax	2 m	300
Outer areas	Manuka	2 m	500
Dispersed	Carex secta	1 m	150
Dispersed	Carex virgate	1 m	150

Plants will be sourced from local native plant nurseries, with planting out being carried out by Remediation staff. Weeding around plants will be carried out on an annual basis. Any regenerating native plants will be encouraged with these filling up the area.

13.5 Animal Pest Control

Goats and possums are the two pests that will need to be kept under control.
Remediation has a contract with a goat culler to ensure the population of goats is kept under control. Possum traps will be set around the wetland area.

13.6 Timing

Ideally we would like to start planting this year. This may be flax and carex around the perimeter of the area. Planting of trees will occur in year 3 and remainder of planting in year 4.

Year 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pest Control									x			
Pre planting herbicide							x					
Planting								x				
Post planting release											x	

Year 2	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pest Control			x					x				
Pre planting herbicide				X								
Planting						X						
Post planting release											x	

Year 3	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pest Control			x					x				
Pre planting herbicide				X								
Planting						X						
Post planting release											x	

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:	Remediation (NZ) Limited PO Box 8045 New Plymouth 4342
Decision Date	24 June 2020
Commencement Date	24 June 2020

Conditions of Consent

Consent Granted:	To modify a culvert to provide for fish passage, in an unnamed tributary of the Haehanga Stream, including associated disturbance of the stream bed
Expiry Date:	1 June 2039
Review Date(s):	June 2027, June 2033
Site Location:	1460 Mokau Road, Uruti
Grid Reference (NZTM)	1731692E-5686143N
Catchment:	Mimi
Tributary:	Haehanga

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 culvert pipe shall have a diameter no less than 900 mm and be no longer than 10 metres.

2. The fill over the top of the culvert pipe shall be comprised of suitable soils free of wood, humus and other organic matter. The embankment shall be well compacted in uniform layers not exceeding 300 mm loose depth to achieve a compaction of at least 95% of maximum dry density.

3. The fill over the top of the culvert pipe shall be no less than 4 metres.

4. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive'). Notification shall include the consent number, a brief description of the work, and the intended commencement date. Unless the Chief Executive advises that an alternative method is required this notice shall be served by completing and submitting the 'Notification of work' form on the Council's website (http://bit.ly/TRCWorkNotificationForm).

5. Between 1 May and 31 October no work shall be undertaken on any part of the stream bed that is covered by water.

6. The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by:

   (a) completing all works in the minimum time practicable;
   (b) avoiding placement of excavated material in the flowing channel;
   (c) keeping machinery out of the actively flowing channel, as far as practicable; and
   (d) reinstating any disturbed areas as far as practicable.

7. A layer of rock riprap 900 mm thick shall be installed in the stream bed. The riprap shall extend 3 metres upstream of the culvert inlet and 5 metres downstream of the culvert outlet and - up the banks on both sides of the stream. The rock shall have the following grading:

   (a) 100% less than 600 mm diameter;
   (b) 50% greater than 450 mm diameter;
   (c) 90% greater than 20 mm diameter.

   Note: The rock riprap shall be installed so that smaller grade rocks and gravels are placed within the larger rock to create a lasting stream bed appropriate for fish passage.

8. At all times after 1 May 2021 the culvert shall provide for fish passage.

9. The invert of the culvert shall be set below the existing stream bed by 225 mm that it fills with bed material and simulates the natural bed.

10. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.

11. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical.

12. The culvert shall remain the responsibility of the consent holder and be maintained so that:

    (a) it does not become blocked, and at all times allows the free flow of water through it; and
    (b) the consent holder repairs any erosion, scour or instability of the stream bed or banks that the culvert causes.

13. This consent lapses 5 years after its commencement date (shown on the front of this document), unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period in accordance with section 125(1)(b) of the Resource Management Act 1991.

14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2027 and/or June 2033, 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 24 June 2020

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Appendix II

Categories used to evaluate environmental and administrative performance

Categories used to evaluate environmental and administrative performance

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. Administrative performance is concerned with the 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.