Remediation New Zealand Ltd

Uruti and Waitara Road

Monitoring Programme

Annual Report

2019-2020

Technical Report 2020-84

Working with people | caring for Taranaki

Taranaki Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: 2481806 (Word)
Document: 2618686 (Pdf)
July 2021

Remediation New Zealand Ltd

Uruti and Waitara Road
Monitoring Programme
Annual Report
2019-2020

Technical Report 2020-84

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: 2481806 (Word)
Document: 2618686 (Pdf)
July 2021

Executive summary

Remediation New Zealand Ltd (the Company) operates two worm farms which produce vermicast at two locations. One is located in Brixton, in the Waitara catchment, while the other is located on the Mokau Road, Uruti, Taranaki, in the Mimitangiatua catchment. The Uruti facility also undertakes remediation through composting and quarrying operations, as well as their vermiculture operation.

This report for the period July 2019 to June 2020 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds eight resource consents, which include a total of 114 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to allow for discharges to air, two consents to allow discharge to land and water, four land use consents and one consent for discharge to water.

During the monitoring period, the Company demonstrated an overall poor level of environmental performance.

The rationale for this overall grading was related to the Company receiving three infringement notices in this monitoring period.

The Council's monitoring programme for the year under review included 16 inspections, 120 water samples and nine soil samples collected for physicochemical analysis and one biomonitoring survey of receiving waters.

Monitoring of surface water quality shows that most analytes comply with criteria set out within the relevant consent conditions.

No total petroleum hydrocarbons were detected in any of the surface water monitoring rounds. However, elevated bacteria levels, measured as Escherichia coli (*E. coli*), were recorded on two occasions during summer low flows.

Monitoring of surface waters also indicated an increasing trend in chloride and ammonia down-catchment of the Haehanga Stream. A comparison of surface water monitoring site HHG000150 to the National Policy Statement for Freshwater Management (NPS-FM August 2020) for ammonia was undertaken. The resultant analysis for ammonia recorded an annual median above the national bottom line(>0.24 g/m3) for ammonia toxicity, as defined by the NPS-FM. Noting in the data set this year, the annual maximum of 0.40 g/m3 at HHG000150 was exceeded on three occasions of seven.

Estimated nitrogen and chloride loadings were significantly elevated across the long-term irrigation areas. During this monitoring period two new irrigation areas were constructed and one existing area was extended. The two new areas were not utilised for fluid applications this monitoring period. The total irrigation area now measures 13.18 ha.

Groundwater monitoring indicated elevated chloride in one monitoring well, GND2190, and a reduction in contaminants in another well, GND3009. Nitrate/nitrite nitrogen (NNN) concentration was elevated in GND3008 during the final monitoring round.

Soil analysis indicated the long-term irrigation areas held elevated chloride, barium and soluble salts, as a result of long term irrigation in these locations. The baseline soil samples of the new irrigation area L4 are indicative of true baseline conditions, pre-irrigation or compost addition, which should serve as a marker against all other irrigation areas in future.

In terms of odour, two incidents recorded objectionable odour beyond the site boundary, which resulted in two infringement notices being issued.

A review of the Company's incoming goods list identified that materials had been accepted which had no prior authorisation under the consent. The Company was issued an infringement notice for this undertaking.

The macroinvertebrate survey results show that the macroinvertebrate community is consistent across sites within the main-stem stream, but are slightly lower than what is expected for lowland, hill country streams. There are many biotic and abiotic factors, including various consented activities of the Company that can affect macroinvertebrate community health in this stream.

It is recommended that the Company undertake actions to improve the habitat quality of the stream to match that of the upstream site T2 and T3. This could involve better maintenance of the riparian margin, through stock exclusion from all parts of the Haehanga Stream within the property, and additional riparian planting. These actions will help reduce the temperature of the stream to a reasonable level of seasonal variation to better support aquatic ecosystems. This may also help to reduce the amount of sedimentation that occurs at the lower sites and potentially reduce proliferation of periphyton.

Areas up-catchment are considerably stressed, as evidenced by a lack of any fencing around the water course and stock access. The fish survey has been postponed for a period of three years to enable the Company to improve the habitat and riparian margins across the site as well as up-catchment.

There were three unauthorised incidents recording non-compliance in respect of this consent holder during the period under review.

During the year, the Company's Uruti facility demonstrated a poor level of environmental and administrative performance with the resource consents.

During the year, the Company's Waitara Road facility demonstrated a high level of environmental and administrative performance with its resource consent.

For reference, in the 2019-2020 year, consent holders were found to achieve a high level of environmental performance and compliance for 81% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 17% of the consents, a good level of environmental performance and compliance was achieved.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance at the Uruti facility remains at a level that requires improvement.

This report includes recommendations for the 2020-2021 year.

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 2019 to June 2020 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Remediation NZ Ltd (the Company). The Company operates a worm farm situated on the Waitara Road in the Waitara catchment. The Company also operate a composting, quarrying and vermiculture facility on the Mokau Road, Uruti, in the Mimitangiatua catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company that relate to discharges to land and water within the Mimitangiatua and Waitara catchments, and the air discharge permit held by the Company to cover emissions to air from the site at Uruti.

An intent of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all domains, 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 these programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 19th combined annual report published by the Council in relation to the Company's activities.

1.1.2 Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by the Company in the Waitara and Mimitangiatua catchments;
- 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 2020-2021 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
b. physical effects on the locality, including landscape, amenity and visual effects;

c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
e. risks to the neighbourhood or environment.

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

Improvement required: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

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

Administrative performance

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

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

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

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

For reference, in the 2019-2020 year, consent holders were found to achieve a high level of environmental performance and compliance for 81% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 17% of the consents, a good level of environmental performance and compliance was achieved. [1]

1.2 Process description

The Company's operation consists of a remediation, composting, quarrying and vermiculture operation at Mokau Road, Uruti, and vermiculture operations at Waitara Road. The Waitara Road site also has a processing facility which blends and refines the finished products.

The Mokau Road, Uruti composting site was established in late 2001, following removal of composting operations from the old Winstone Aggregates quarry site, Manutahi Road, Bell Block (the Company no longer operates at this site). The closure of the composting operations was due to the incompatible nature of the activity with the surrounding land use (nearby residential houses), which resulted in odour incidents. The vermiculture production facilities have been operating at Waitara Road since 1998.

A range of waste streams are processed and converted, via vermiculture and composting, into a marketable biological product that can be used as a fertiliser and or soil conditioner.

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

The current site at Uruti accepts a range of waste streams which include paunch grass, poultry waste, poultry mortalities, greenwaste, sheep skin and drilling waste (though noted by the consent holder is the eventual phase out of drilling waste by 31 December 2020). The acceptable material list is provided in appendix I, 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 to the treatment of the proposed composting waste stream.

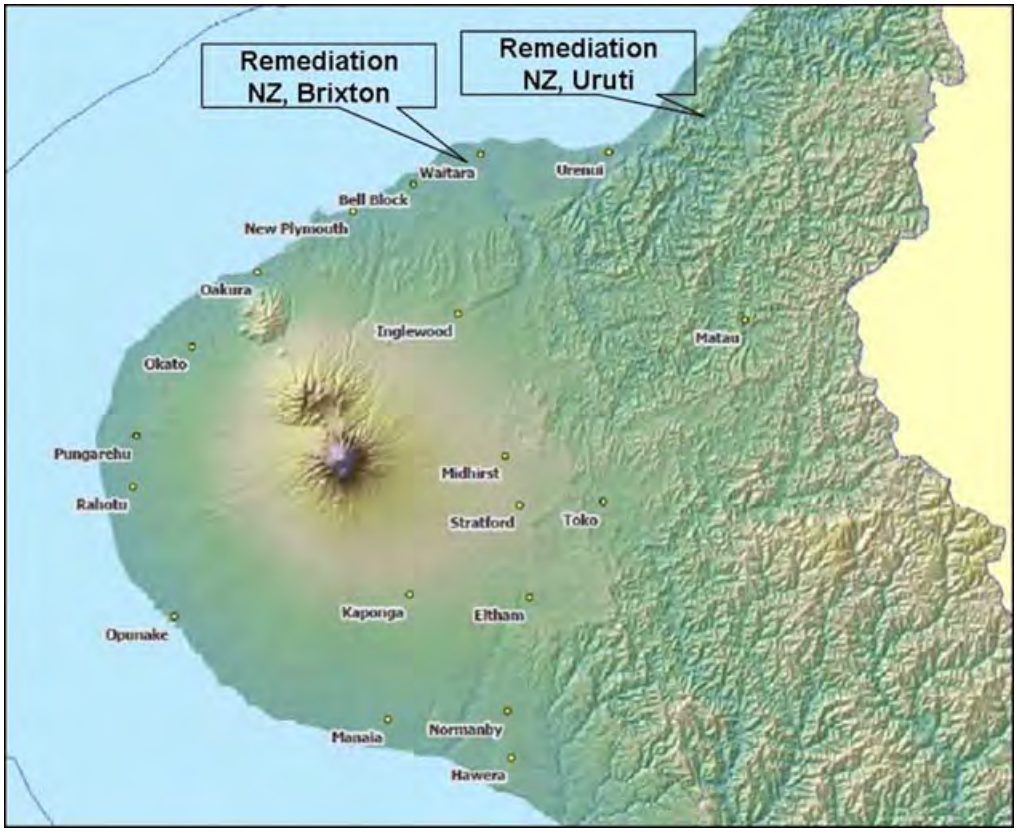

Figure 1 Regional locations of the RNZ assets of Waitara Road, Brixton and Mokau Road,Uruti

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 pad (Pad 1), the paunch pad (pad 2) and drilling waste pad (pad 3).

Pad 3, holds drilling muds, fluids and cuttings which are mixed with sawdust and/or other organic material such as poultry waste. This is then composted in one very large pile which is turned to stimulate the composting process in the initial phase.

Any rainfall runoff and leachate that is generated, drains into a series of ponds for treatment referred to as the pond treatment system (PTS). Between each pond is a baffle that skims off any floating hydrocarbons as the leachate passes through. These ponds also treat the leachate and stormwater from pad 1 where greenwaste and sheep skin is routinely composted. The treated liquid from PTS is then irrigated to cut and carry pasture on a number of irrigation areas. The cut pasture is then taken offsite for sale.

Pad 2, the paunch pad, is where paunch from suppliers is delivered. This is one large pond, where the leachate generated from the paunch is pumped up to the top of a seven-tier constructed wetland. This wetland is planted out 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.

The Company are also developing a pea gravel quarry at the Uruti site.

1.3 Resource consents

The Company holds eight resource consents, the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in Section 3.2 of this report.

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

Table 1 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 2017	June 2018 S.124 Protection
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 2017	June 2018 S.124 Protection
5892-2	To discharge stormwater from worm farming operations onto and into land and into an unnamed tributary of the Waiongana Stream	September 2006	June 2014	June 2020 S.124 Protection
Land use permits				
5938-2	To use a twin culvert in the Haehanga Stream for vehicle access purposes	September 2015	June 2021	June 2033
6211-1	To realign and divert the Haehanga Stream in the Mimitangiatua catchment for land improvement purposes	September 2003	June 2015	June 2021
6212-1	To erect, place, use and maintain a culvert and associated structure (s) in the bed of the Haehanga Stream in the Mimitangiatua catchment for access purposes	September 2003	June 2015	June 2021
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 2021	June 2033
Discharge to water				
10063-1	To discharge treated stormwater from a quarry site, into an unnamed tributary of the Haehanga Stream	March 2015	June 2021	June 2027

1.3.1 Introduction

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

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

The monitoring programme for the Company sites consisted of four primary components.

1.3.2 Programme liaison and management

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

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

1.3.3 Site inspections

The Company facility at Uruti was inspected on 14 occasions during the period 1 July 2019 to 30 June 2020, and the Company facility on Waitara Road was inspected on two occasions. Additional inspections were also undertaken in respect to incidents or non-compliances. The main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewater.

Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.3.4 Chemical sampling

The Council undertook compliance sampling across the Company operations, primarily related to the Uruti facility in the 2019-2020 monitoring period. As the Company holds resource consents specifically related to discharges to land and water, the Council monitors the surface water, groundwater and soil at the Uruti site. There is also facility to undertake surface water sampling at their Waitara Road facility.

The analytes specifically related to the mediums of surface, groundwater and soil are provided in the following Table 2.

Surface water analysis

Surface water samples were collected from 15 specific monitoring locations on the unnamed tributary of the Haehanga Stream and the main stem (Figure 2 and 3) which bisects the Uruti site. The samples collected from these 15 locations were tested for a range of analytes which are detailed in Table 2. The Council assessed these 15 surface water locations five times during the monitoring period, two mini surveys were also conducted to target summer low flows. Spot field parameters were also collected for field screening

purposes. These were collected via Yellow Springs Instrument (YSi) multi-parameter probe and assessed for the following: pH, dissolved oxygen, conductivity, temperature and oxidation and reduction potential.

Groundwater analysis

The Uruti site contains an active groundwater monitoring network, an obligation of resource consent 5838-2.2. The monitoring well network is comprised of seven wells (Figure 4). The network was monitored quarterly this period and was assessed for the analytes provided in Table 2.

Prior to sample collection, Council field staff undertook a well stabilisation procedure. This requires that field parameters (which are assessed through the use of a YSi multiple parameter probe) have stabilised within 8% over a five minute period, or within three well volumes, prior to the sample being collected.

Table 2 Monitoring analytes by medium

Surface Water Analytes	
Calcium	Conductivity
Chloride	Total Petroleum Hydrocarbons (TPH) C_7-C_{36}
pH	C_7-C_9
Biochemical Oxygen Demand (BOD)	C_{10}-C_{14}
Benzene	C_{15}-C_{36}
Toluene	Potassium
Ethylene	Magnesium
Xylene	Un-ionised ammonia
Temperature	Ammoniacal Nitrogen
Suspended Solids	Nitrite-Nitrate Nitrogen
Discharge Analytes (Irrigation pond and WTS discharge)	
Un-ionised Ammonia	Dissolved Chromium
pH	Dissolved Copper
Conductivity	Dissolved Lead
Total suspended solids	Acid Soluble Lead
Temperature	Dissolved Mercury
Ammoniacal nitrogen	Dissolved Nickel
Nitrite-Nitrate Nitrogen	Dissolved Zinc
Total Calcium	Total Kjeldahl Nitrogen (TKN)
Total Magnesium	Carbonaceous Biochemical Oxygen Demand
Total Potassium	Total Petroleum Hydrocarbons (TPH) C_7-C_{36}
Sodium Absorption Ratio	Benzene
Total Sodium	Toluene
Chloride	Ethylene
Total Nitrogen	Xylene (BTEX)
Dissolved Arsenic	Acid soluble barium
Dissolved Barium	Total Barium
Dissolved Cadmium	
Groundwater Analytes	
Benzene	Un-ionised ammonia
Toluene	Ammoniacal Nitrogen
Ethylene	Nitrite-Nitrate Nitrogen
Xylene	Total Dissolved Salts

Chloride Total Petroleum Hydrocarbon (TPH) Total Calcium Total Magnesium Total Sodium	Temperature Level Dissolved Barium Acid Soluble barium
Soil Analytes	
Calcium Chloride Conductivity Potassium Moisture factor Sodium Absorption Ratio (SAR) Arsenic Cadmium Chromium Copper Lead	Mercury Nickel Zinc Magnesium Sodium Ammoniacal Nitrogen Nitrite-Nitrate Nitrogen pH Total Petroleum Hydrocarbons (TPH) Poly-cyclic aromatic hydrocarbons (PAH) BTEX

Soil analysis

Representative soil sampling was undertaken on the site specific irrigation areas to identify any emerging issues that might arise as a direct result of irrigation to these areas.. Originally 5.2 ha were available for irrigation, this was expanded to 7.0 ha in the 2018-2019 monitoring period. Further land has been developed in the monitoring period covered by this report with the Company now able to irrigate to 13.18 ha.

Soil sampling was undertaken with a soil corer which was inserted to a depth of 350 mm+/- below ground level (BGL), whereby ten soil cores are collected across an irrigated area. The ten cores are then composted to gain one representative sample. The analysis undertaken by the Council in respect of the soil is provided in Table 2.

1.3.5 Biomonitoring survey

A biological survey was performed on one occasion in the Haehanga Stream and associated unnamed tributary, at seven locations this monitoring period. This was undertaken in order to determine whether or not the discharge of treated effluent to land and water, as a process of the exercise of consent, had a detrimental effect on macroinvertebrate and fish communities in the stream. A summary of this survey is provided later in this report in Section 2.2.7.

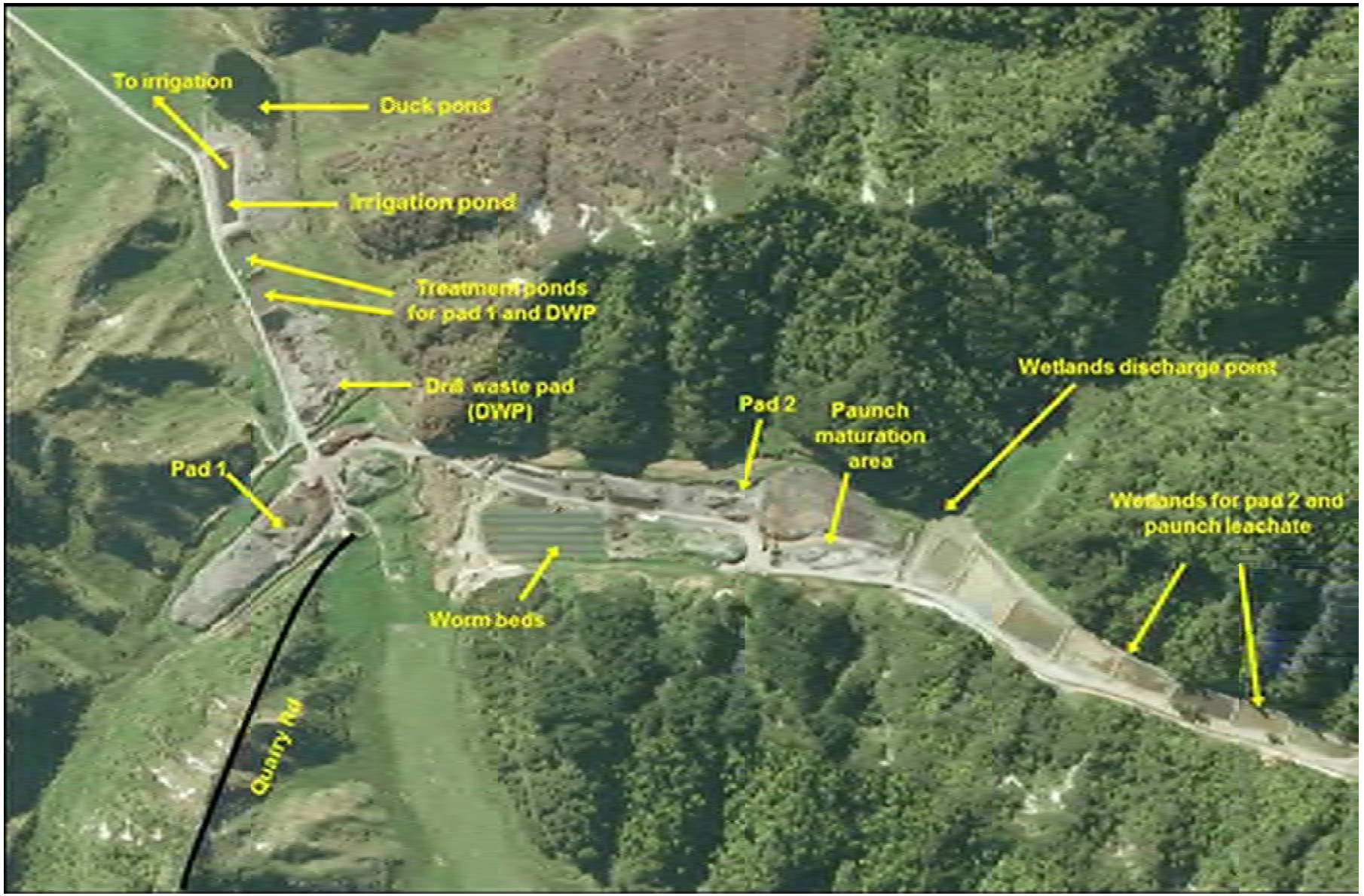

Figure 2 RNZ Uruti site map

Figure 3 RNZ Uruti groundwater monitoring well locations

Figure 4 RNZ Uruti surface water monitoring locations

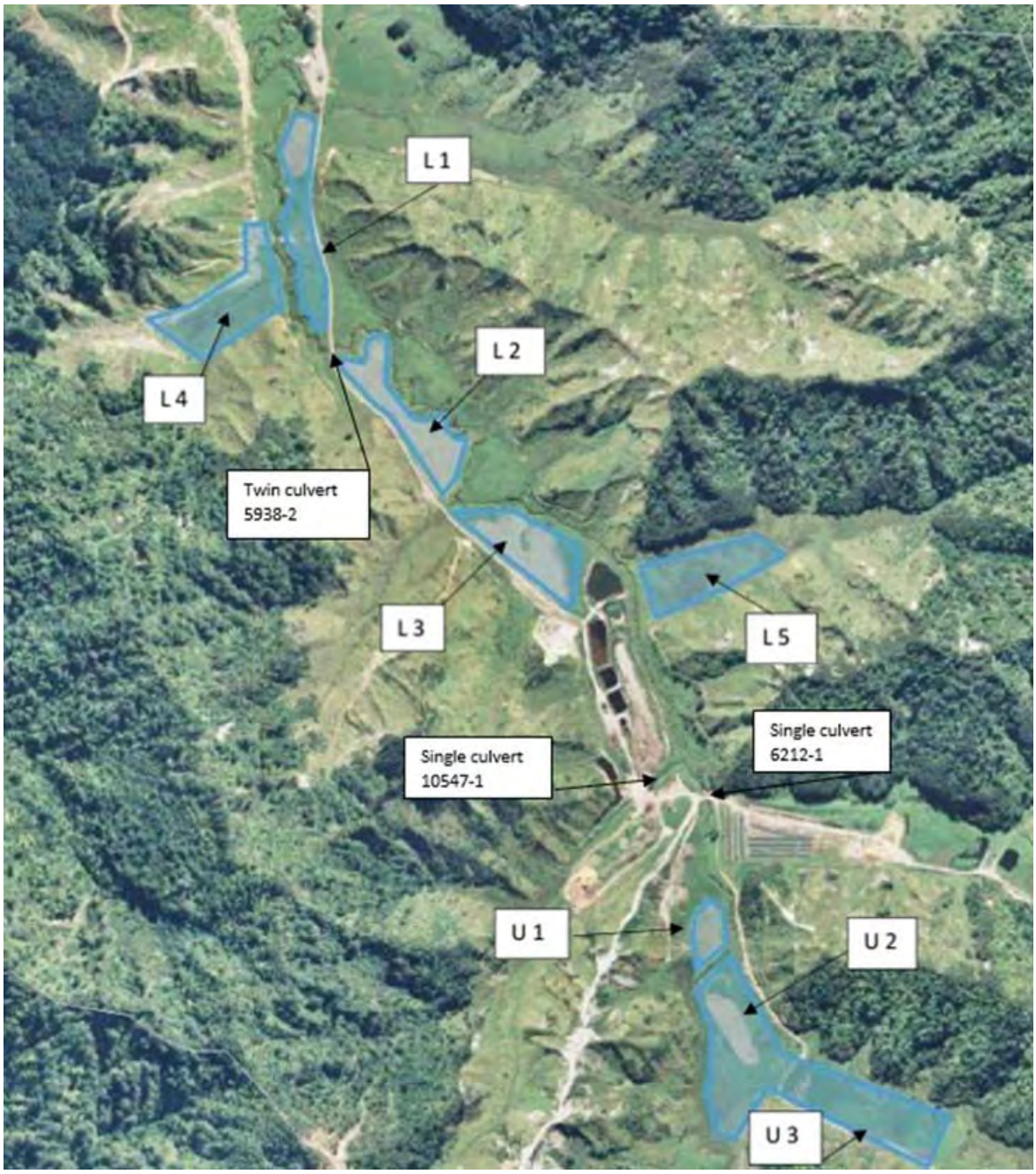

Figure 5 RNZ Uruti irrigation areas and consented culvert locations

2 Results

2.1 Inspections

30 July 2019

An inspection was undertaken under consent 5838-2.2 (this is the discharge to land consent) as part of routine compliance monitoring. The inspection was carried out in fine weather conditions following rain within the previous 24 hours. The surface water bodies across the site were elevated, swift and turbid.

An inspection of the site found that the irrigation areas were wet with standing water observed on the uppermost irrigation area. Irrigation activities were being carried out on the site at the time of inspection, to ensure that freeboard was maintained within the irrigation pond, so it can contain any further stormwater during rainfall events over the following days.

At the time irrigation was being carried out by way of slurry wagon application, on to the two lowermost irrigation areas. These were observed to be the driest of the irrigation areas and so utilising these areas to apply leachate/stormwater was a good management decision. An inspection of these irrigation areas was undertaken following the application of liquid waste and no signs of overland flow were observed.

The upper irrigation area had the travelling irrigator set up, however this was not being used at the time of the inspection. An inspection of the upper irrigation area noted that a small slip had come down at the rear of the irrigation area and as a result had blocked the drainage channel between the irrigation area and the adjacent hill. A conversation was held with the site manager and it was decided that as the stormwater was still managing to get around the slip and discharge via the channel, leaving the material in place and monitoring was the most practical decision. Monitoring would make sure that it does not get worse and result in stormwater discharging over the irrigation area.

If this were to occur then immediate remedial action would be required. If not, then the matter will be addressed during fine weather conditions when the soil has dried out and access to the site with a digger can be undertaken safely with minimal damage to the irrigation field.

Pad one was inspected and found to be well-bunded with all stormwater directed to the treatment ponds and irrigation pond. The drilling mud pad was inspected and the drain around the rear of the solid composting pile (adjacent to the stream) was open and flowing freely.

The drop-off pit at the top end of the drilling mud pad was approximately half full. (An inspection of the pit found no evidence of unauthorised materials, with the majority of the solid waste appearing to be chicken carcasses and sawdust.) It was communicated that the composting pile at the top end of the drilling mud pad must remain well contained and does not encroach on the bund or lay down pad. The material will need to be pulled back from the upper edges to make sure that any leachate is captured within the treatment system.

An inspection of the lower drilling mud pad area found that approximately 300 mm freeboard was present within the irrigation pond. The treatment ponds above the irrigation pond appeared to have solids within them and may require further de-silting. A pipe had been placed between the leachate collection area below the solid waste pile on the drilling mud pad and the irrigation pond. This allows leachate/stormwater, which collects within the bund, about the solids pile, to drain freely back into the irrigation pond, to prevent accidental overflows. It was noted however that this pipe was set rather high, meaning that there was no contingency storage should the pipe block.

It was communicated to the site manager that they could consider lowering the height of the pipe or building up the bund slightly. This could create a spillway adjacent to the pipe, should a blockage within the pipe occur, and then any leachate will be stored and if required, discharged into the irrigation pond via a designated overland flow path.

An inspection of the worm beds found that they were all covered with no issues identified. An inspection of the paunch pond found that there was approximately 400 mm freeboard remaining within the pond. Although no pumping was occurring at the time of the inspection the wetlands were observed to be discharging into the receiving environment. A large flow volume was observed discharging from the final pond, approximately half the pipe diameter. This was found to be reasonably clear with no foaming or discolouration noted within the receiving environment.

No issues were noted about the paunch pond / wetland treatment area at the time of the inspection.

The inspection of the single culvert consent (6212-1) found that the streams on the property were flowing at moderate to high levels and turbid. Due to the flow conditions of the stream at the time of the inspection, fish passage was difficult to assess. An inspection of the culvert however found that it was free flowing with no signs of obstructions or blockages. The headwalls were stable with no signs of erosion of the headwall or stream bank, within the vicinity of the culvert.

In relation to the air discharge consent (5839-2) the inspection was undertaken during overcast conditions, with light showers upon arrival which quickly cleared. The weather was best described as still conditions with no detectable breeze upon arrival at the site and approximately five eighth cloud cover.

An odour survey at the site entrance found that no odour was detectable. A very slight odour was noted at the site office. This odour was a result of irrigation activities taking place in the lower most irrigation paddock adjacent to the site office. The odour was noted within approximately 50 m of the irrigation activities but no further.

A slight odour was noted about the drilling mud pad, however at the time of the odour assessment in this area a slight breeze had developed carrying any odour up the valley and away from the receptors at the state highway.

No odours were detected about the paunch pond or the worm beds. No issues were identified on site with regards to discharges to air as a result of the inspection.

An inspection of the quarrying operations (10063-1) at the site found that no material had been extracted from the quarry during the winter months. Some material remained stockpiled adjacent to the top end of the worm beds to be exported off site in due course.

An inspection of the access track to the quarry site found that the bunds across the track remained in place and were working well diverting stormwater off the track and through the adjacent vegetated paddocks. Rilling of the access track was minimised and as the stormwater was filtered by the adjacent vegetated paddocks. There were no signs of stormwater to have discharged off the bottom of the access track, however the continued monitoring of the associated bunds which prevent this from occurring is required.

In relation to the twin culvert consent (5938-2), due to the flow conditions of the stream at the time of the inspection, fish passage was difficult to assess. An inspection of the culverts however found that they were free flowing, with no signs of obstructions or blockages.

The headwalls were stable with no signs of erosion of the headwall or stream banks within the vicinity of the culvert. The rock riffles in place upon the stream bed at two separate locations downstream of the twin culverts remained stable with no signs of mobilisation as a result of the high flows.

23-August 2019

In terms of discharges of waste to land under consent 5838-2.2, the RNZ Uruti composting facility was inspected as part of routine compliance monitoring. The inspection was undertaken during wet weather conditions. At the time of the inspection it was found that normal site operations were being conducted.

An inspection of the drilling mud pad found that product (chicken carcasses and carbon) was being accepted onto site. An inspection of the drilling mud pad found that the ring drain was in place collecting and directing stormwater and leachate to the irrigation pond.

A pipe that had previously been placed between the ring drain and the irrigation pond was to be replaced with a 300 mm pipe and set at a lower level to minimise the volume of leachate sitting in the lower end of the ring drain. An inspection of the irrigation pond found that there was approximately 300-400 mm of freeboard remaining, which is appropriate considering the period of wet weather experienced at the facility in the days prior to the inspection.

The 'duck pond' was full but not overflowing. A measure of the water in the pond found that the conductivity was still elevated and a conversation was held that the pond level needs to be managed to prevent overflows. This required the water contents to be irrigated to land via the irrigation paddocks when required.

Pad 1 was found to be well-bunded with the ring drains working well to ensure that all contaminated stormwater and leachate was being captured and directed through to the treatment and irrigation ponds. Work had been undertaken to desilt the treatment ponds, however the work was ongoing at the time of inspection. Access issues meant that a long reach digger was required to complete the rest of the works.

A long reach digger arm had been acquired and was planned to be fitted to a digger on site in the coming weeks. This would allow further work to be undertaken to desilt the treatment ponds to ensure compliance with the site management plan. The same digger is intended to be used to address fish passage at the site.

No irrigation was taking place at the time of the inspection due to the wet weather. A shed was currently being constructed adjacent to the irrigation pond. This will house the irrigation pipes and a series of taps which manage the contents and irrigation location of the irrigation pond.

Steel pipe had been placed from the twin culverts adjacent to the lower irrigation fields. This pipe will carry effluent pumped down from the irrigation pond. A series of nine irrigation pods (uni-sprinklers) have been ordered and will be set out across the lower irrigation area. Due to the shape of this area, the pods are considered a better method of application than the travelling irrigator.

Following the installation of the irrigation pods, the facility will be able to apply wastewater to pasture via pods, travelling irrigator or slurry wagon. Further, riparian planting had been undertaken on the lower reaches to the stream leading up to the twin culverts. Some further planting had also taken place about the upper irrigation area.

The worm beds were all covered with no issues identified. The paunch pond was inspected and found to have approximately 300 mm of freeboard. The wetland system was discharging into the receiving environment at the time of the inspection. No foaming or discolouration was found within the mixing zone as a result of the discharge.

The lay-flat hose which transports leachate from the paunch pond to the top of the wetland had been replaced with a more appropriate / fit for purpose steel pipe. The Company are also planning to clean out and reset the upper pond within the wetland treatment system as part of their ongoing maintenance requirements.

Discussions were held with the site manager about the installation of further downstream sampling points (post the final irrigation pond) to assess compliance with resource consent conditions. A discussion was held

regarding the plans to potentially open up further irrigation areas at the facility. This would involve some earthworks in the valley floor adjacent to the 'duck pond'.

Further advice will be provided on this with regards to earthwork limits and Council requirements prior to the area becoming operational.

An inspection of the twin culverts (5938-2) on site found them to be free of obstructions and/or blockages with the stream flowing rather evenly through both culverts. The stream was in a moderate to low flow at the time of the inspection and the culverts were found to be sitting below the static water level with no obstructions to fish passage observed.

The riffles placed on the stream bed below the culverts appeared to be stable and functioning well to increase the static water level. This is to prevent the culverts from being perched and preventing fish passage. The headwall at the upper side of the culvert had been repaired, large concrete blocks had been placed in the headwall to prevent erosion during high flows. Some large rock had also been placed on the downstream batter to minimise erosion during high flow incidents. These result in the stream overtopping the culverts. Further work is planned about the culverts to widen the access track and provide a more stabilised pathway for stream flow during overtopping events. No issues identified at the time of inspection.

In terms of the realignment consent (6211-1). The inspection found that the diverted section of the Haehanga Stream was stable with well vegetated banks. No signs of accelerated erosion of the banks or the bed of the stream were observed at the time of the inspection.

The stream was of a moderate to low flow at the time of the inspection and no obstructions to fish passage were noted throughout the length of the realignment.

The culverts (6212-1) about the access track to the worm beds (and adjacent culvert) were also inspected. The culvert that runs adjacent to the access track was found to be flowing freely with no blockages or obstructions. The rock work placed on the bed of the stream on the downstream side of the culvert appeared to be working well in lifting the static water level to allow for fish passage through the culvert. No issues were identified with this culvert.

The larger culvert (6212-1) which runs beneath the access track to the worm beds was also inspected with the site manager. While the culvert is large and free of blockages and/or obstructions, there is a fine, smooth shoot below the exit point of the culvert. This results in the stream quickly dropping in level before working through some boulders and then finding a new stabilised level downstream of the culvert.

The speed of the stream flow through the smooth culvert and the drop immediately below the culvert may result in a barrier to some fish species. This was discussed with site manager and possible fixes of building up the static water level below the culvert, in a stepped manner, to lift the water level through the culvert. This would make sure that there was a reasonable water depth throughout the culvert and as a process, reduced flow velocity, to allow fish to easily pass through.

This work was proposed to be carried out in the coming months once a long reach digger was operational on site, to allow access to the stream.

In relation to discharges to the air (5839-2), an odour survey was undertaken at the road side and also at the site office. No odours were detected at either locations. The odour about the drilling mud pad, although present, was less intense than noted on other inspections. This may be due to the wet weather that was experienced during the inspection. No unauthorised waste streams were noted on site at the time of the inspection. No odours were detected about the worm beds or paunch pond.

An inspection of the quarry (10063-1) and associated access track found that the cut-off drains were working as designed, ensuring that all stormwater collected on the access track was quickly directed off the track into the heavily grassed paddocks adjacent to the access track. No stormwater was exiting the base off the access track, with the final two cut-off drains ensuring that all stormwater was directed away from the

stream crossing at the base of the access track. No issues with the quarry were identified at the time of the inspection.

24 September 2019

During analysis of the inwards goods data submitted in accordance with Special Condition 5 of resource consent 5839-2, it was found that a number different products had been received onsite in contravention of special condition 3 of resource consent 5839-2 and special condition 2 of resource consent 5838-2.2.

These included material such as molasses, palm kernel, contaminated mud, contaminated soil, silicate washings from metal cutting tank clean and a dead cow. The analysis of the inwards goods register also found that the product descriptions were vague and of insufficient detail to determine the exact nature of the product being received. It has now been requested that more accurate descriptions be recorded against each of the inwards goods items contained within the register and that the register is submitted to TRC for review by the 5th day of each calendar month.

1 October 2019

An inspection of the discharge to land consent (5838-2.2) was undertaken in overcast conditions following recent heavy rain. The inspection found that the streams on the property were all in fresh as was the Mimitangiatua River. The twin culverts on the property were nearly at capacity with the flood flow. The inspection found that four new irrigation pods had been purchased and were in operation, briefly, in the lower most irrigation area.

The pods are more appropriate for the lower irrigation area than the travelling irrigator due to the narrowness of the field. The pods allow an even application of wastewater onto the pasture and can be adjusted to control the application rate. It is envisaged that further pods will be purchased in the near future.

An inspection of the irrigation pond found that there was approximately 300-400 mm of freeboard. Stormwater was flowing freely from the ring drain about the composting pile into the irrigation pond via the recently installed pipe.

An inspection about the irrigation pond found no signs of overflows as a result of the recent heavy rainfall event. The drop-off pit at the top of the ponds was full of product and work was beginning to remove the material and place it upon the composting pile.

It was communicated to move the dry composting material away from the upper most bund on the drilling mud pad to make sure that there was sufficient protection of the unnamed tributary above the pad.

All worm beds on site were covered with no issues identified. Material from pad one, which had previously been tested by Regional Council Officers[2] was being removed from the pad. Some material was being stockpiled adjacent to the upper worm bed area while other material was being placed on a fill area adjacent to the access track to the quarry.

Records are being kept about the volume of material being removed from pad one and the location of where that material is being stored and ultimately utilised on site. In the interim the Company was requested to make that the material is kept away from water bodies on site to prevent any risk of it discharging into surface water.

An inspection of the paunch pond found that there was sufficient freeboard within the pond. The wetland was discharging at a reasonably high rate, (although no pumping from the paunch pond was occurring)

---

[2] For further information in respect of tested material please refer to Technical Report 2019-50, referenced at the end of this report.

likely to be a result of the recent heavy rain. A visual inspection of the discharge from the wetland found that it was reasonably clear with a slight tannin colour. No adverse effects were observed upon a visual inspection of the receiving environment within or below the mixing zone.

An odour survey in relation to the discharge to air consent (5839-2) was undertaken along the property boundary adjacent with the State Highway. No odour was detectable about the property boundary. A further odour assessment was undertaken about the site offices, with the irrigation pods in operation in the lower-most irrigation area. No odour was detected at the site offices.

A slight 'sulphur' odour was noted about the irrigation pond, however the strength, although consistent was lesser than noted on other previous inspections. No odour was detected about the paunch pond or worm beds. No odour issues was noted onsite during the inspection.

The twin culverts (5983-2) on the property were nearly at capacity with the flood flow. An inspection of the other culverts (6212-1 and 10547-1) on the property found that all streams were in fresh and the streams were flowing swiftly through all culverts. No culverts were over topping and all appeared to be free of any obstructions that would negatively affect the ability of the culverts to cope with flood flows.

Due to the river conditions at the time of the inspection, it was not possible to assess fish passage. Some works were being planned by the site manager on site, with material being delivered to address fish passage through the large culvert beneath the access track leading to the worm beds. This planned work involves raising the level of the water on the downs stream side of the culvert in a controlled and incremental manner to achieve fish passage.

6 November 2019

In relation to the discharge to air consent (5839-2), an inspection was carried out in fine weather conditions following a period of dry, warm weather. At the time of inspection the weather was warm and still with no detectable breeze. Later on in the inspection a slight breeze heading up the valley developed. Approximately seven eighth high cloud cover was observed at the time of the odour inspection. An odour inspection was undertaken adjacent to State Highway 3 at the property boundary. No odours were detected at or beyond the boundary. A further odour survey was undertaken at the site office. A 'hay type odour' was detected associated with the harvesting of grass of all irrigation areas below the 'duck pond'.

A slight sulphur odour was detected about the irrigation pond, however this dissipated and could not be detected below the 'duck pond'. No odour was detected about the worm beds or paunch pond areas. The composting pit consisted largely of chicken carcasses and sawdust.

Worm beds were being fed at the time of the inspection with only one bed not covered. No irrigation was taking place during the inspection, however some aeration activities of the irrigation pond were taking place during the later portion of the inspection. Work was also being undertaken to ensure compliance with the Abatement Notice EAC-22632[3]. Final inspection to assess compliance with the Abatement Notice will occur in the coming two weeks.

An inspection of the stream re-alignment (6211-1) was undertaken during low flow conditions. The inspection found that the banks of the realignment were fully grassed and stable with no signs of bank or headward erosion.

No blockages or obstructions were noted and the stream was found to be flowing freely throughout the length of the realignment. No barriers to fish passage were observed and no issues identified.

---

[3] The consent holder was observed to not be adhering to site specific management plans which was a failure to abide by best practice.

An inspection of the culvert (6212-1) on the main stem of the Haehanga Stream (and adjacent culvert) found them both to be free of any obstructions and/or blockages. Water was flowing freely through both culverts. The work recently undertaken to ensure fish passage through the culvert adjacent to the access track to the worm beds was found to be stable and working well in lifting the static water level to create a deep gentle flow through the culvert.

Some work had been undertaken to place smaller gabion sized rocks between the larger rocks at the outlet of the larger culvert, beneath the access track to the worm beds. This is the first stage to lift the static water level through the culvert to ensure fish passage to the upper catchment.

Further work is required downstream to lift the static water level incrementally to ensure an appropriate depth of water can be maintained throughout the length of the culvert. The recently acquired long reach digger arm will be used to achieve this work. The site manager is aware of the requirements to complete this work and has added it to his work schedule.

An inspection of the quarry (10063-1) found that the ground was dry and beginning to become rather hardened from the dry spell. The quarry had not been in operation over the winter months and at this stage there was no plan to begin extraction of metal in the immediate future.

An inspection of the access track found that the bund created at the base of the track to divert stormwater away from the flats and adjacent stream was in place, however had decreased in height due to heavy traffic on site.

This bund is required to be monitored and re-established at the end of the product movement, or prior to a rainfall event. All other cut-off drains on the access track were open and working well. The area of excavation is stabilising naturally due to not being operational for an extended period of time. No issues identified at time of inspection.

An inspection of the twin culverts on site (5938-2) found that they were free flowing and clear of obstructions or other debris. Some work had been undertaken to the headwall and site access track, across the culvert, to stabilise the area during high flow events, when over-topping of the culverts can occur.

The rock work (riffles) created at two downstream locations were in place and appeared to have settled into the stream bed. These remain effective and stable following the wet winter months. This indicates that the riffles are able to withstand high flow events.

It was noted that during low flow conditions there is a slight change in water height in the centre of the culverts. This is due to the join of the concrete pipes. Although this is only minor in nature it was pointed out to the site manager and a discussion was had to rectify this issue.

Some further rock will be placed upon the uppermost riffle to lift the static water level slightly to ensure fish passage. This work will be undertaken in the coming weeks. No other issues were identified at the time of inspection.

31 January 2020

An inspection of the discharge to land consent (5838-2.2) was carried out during dry weather conditions while the streams within the catchment were in low flow conditions. The inspection found that two new irrigation areas had been established on site. These irrigation areas had been completed and grass seed spread on the areas. The seed was beginning to take and was being watered at the time to ensure a good strike was achieved. Sediment controls were in place, however these will need to be managed during the first wet weather event to ensure that all sediment laden run-off was treated to the required standard.

The inspection found that the drilling mud pad and associated leachate treatment ponds were in good order. Some work was planned on the bund about the stream side of the drilling mud pad as part of routine maintenance. This involved building up some areas of the bund.

The upper leachate ponds require to be cleaned out of solids on a regular basis to ensure compliance with the site management plan. The irrigation pond was low with approximately 1 m freeboard within the pond. The drop-off pit was being cleaned out at the time of inspection.

Plans are in place for a concrete pad to be installed at the top of the drilling mud pad for the chicken carcasses to be dropped off onto, rather than into the pit with the liquid waste, as is the current practice[4].

Pad 1 is well defined with a good ring drain to collect and direct any contaminated stormwater to the leachate ponds. With the extended dry period, limited irrigation activities were taking place on the site. The worm beds had been recently fed and given a general clean up.

The paunch pond had good freeboard with all reasonable stormwater removed and disposed of via pumping into the wetland treatment system. The upper pond within the wetland treatment system had been cleaned out and had now revegetated. Although leachate was being pumped from time to time into the wetland treatment system, it did not appear that the system has discharged for an extended period of time, with any liquid being taken up by the wetland or subject to evaporation.

A general inspection throughout the site found no visual effects within the receiving environment as a result of the site activities. The quarry on site is not in operation and there are no plans to begin extraction of metal any time soon. No issues identified at the time of inspection.

The inspection found that the stream realignment (6211-1) was stable with well vegetated banks throughout the realigned section of the stream. An inspection of the area found no signs of bank or headward erosion. No adverse effects were noted within the realigned section or within the wider environment.

In terms of the single culvert (6212-1) on the Haehanga Stream, the inspection found that the stream was in low flow through the culvert. The culvert was free of any obstructions or blockages. No erosion was observed about the culvert, with the headwall being solid and secure.

Some works had been undertaken to lift the static water level through the culvert to ensure fish passage. Further works were discussed with site manager on site and these will be carried out in the coming weeks.

In terms of the air discharge consent (5839-2) an inspection and odour assessment was undertaken in dry weather conditions, four eighths cloud cover, approximately 20°C, with a slight north-west wind. An odour survey was undertaken at both the site boundary and at the site offices. No odour was detected at either survey site.

An inspection of the drilling mud pad and associated leachate pond found that only minimal odour was being emitted from the area which quickly dissipated.

An inspection of the twin culvert (5938-2) found that the riffle below the culvert had been lifted slightly to ensure that the static water level was sufficient throughout the culvert. No issues were identified at the time of inspection.

27 Feb 2020

An inspection was undertaken as part of routine compliance monitoring and also to assess for any odour (5839-2) generated from a trial of sheep skins composting[5]. The inspection was undertaken in hot/dry weather conditions with zero cloud cover. It was approximately 24°C with a very light northerly wind.

[4] The Council has since been notified by the Company this will not occur.

[5] Please note additional compliance inspections were undertaken in relation to the consent holder request to accept a new compositing waste stream, sheep skins.

The inspection found that no odour was detectable at the state highway (noted that the wind was northerly). The irrigation pond and paunch ponds were both well down with the paunch pond free of any liquid that would be reasonable to be removed by the pump.

Approximately one meter freeboard was observed within the irrigation pond. A very slight odour was detected about the irrigation pond, however regular aeration of this pond may be beginning to reduce the sulphur type odour that is often emitted.

A slight odour was also detectable about the top of the drilling mud pad, however this quickly dissipated and was not detectable downwind at the rear of pad 1. At approximately 1350 hrs 30 ton of sheep skins arrived on site. The skins had been kept in a chiller at the plant in Whanganui and were still reasonably cool upon arrival at site.

An inspection of the skins found that they were clean and free of any obvious contaminants such as bones or meat residue. The skins were deposited onto a bed of sawdust to capture any liquid waste before being transported to their composting location further down pad 1. Upon depositing the skins onto the sawdust approximately 10 – 20 L of liquid was observed per truck load. The skins were layered on a bed of greenwaste and built up with corresponding layers of skins and greenwaste and finally covered with greenwaste to ensure that no skins were exposed to the open. No odour was detectable from the skins being deposited or layered with greenwaste at the site.

An inspection was undertaken very close (within 30 cm of the product) and no odour was detected. A slight odour immediately downwind could be detected when the digger was moving the greenwaste to cover the skins. This was a light odour which is generally associated with greenwaste composting activities. The trial of composting sheep skins at the facility did not result in any offensive or objectionable odours either within the immediate vicinity of the activity nor further afield. No issues identified at the time of the inspection.

In terms of the single culvert (6212-1) on the main stem of the Haehanga Stream, the inspection found that work were still being undertaken on site to lift the static water level through the culvert which runs under the access track to the worm beds. Rock to be used for this process were on site, however this needs to be lifted into place with a long reach digger. This is aimed at increasing the static water level of the stream, downstream of the culvert, to ensure that fish passage is maintained.

It was communicated to continue with this work so that it is completed in a timely fashion. All other culverts (5938-2 and 10547-1) within the Haehanga Stream were inspected and found to be free of blockages or obstructions with water flowing freely through them.

The inspection found that the quarry (10063-1) was not operational. The cut-off drains on the access track remained in place, however the lowermost cut-off bund was required to be reshaped to make sure that it intercepts all the stormwater during a rainfall event.

An inspection of the discharge to land consent (5838-2.2) found that the two new irrigation areas were more stabilised with good grass growth across both areas than in the previous inspection. The surface water cut-off drains and bunds however, were not yet stabilised and will require careful management to ensure that sediment is not mobilised from these areas.

It is expected, however, that these areas will stabilise quickly as grass growing conditions improve over the coming weeks. At the time, the irrigation pond was well down with approximately one meter freeboard throughout the pond. The pond is also being aerated in an attempt to reduce nitrogen loading within the irrigation liquid. Irrigation was taking place on the upper most irrigation field.

Some works were planned to lift the bund on the stream side of the drilling mud pad. Works were also undertaken to lift areas of the irrigation paddock immediately below the irrigation pond in order to minimise ponding and make it a more appropriate surface to irrigate on. Further riparian plants have been ordered for upcoming winter planting season.

The worm beds had recently been fed and a general clean-up had occurred about the beds to allow further operational space about the beds. The paunch pond had been pumped down and the wetlands were well below the point of discharge. The water from the final wetland pond was being recycled back through the wetland treatment system to keep the wetlands damp. It was planned to get a digger into the paunch pond and re-organise the area allowing for better drainage of stormwater through the pond to the pump location.

A commercial goat culler had been on site to reduce the number of feral goats on the property. A bird scarer had also been purchased and was in operation about the drilling mud pad in an attempt to reduce the seagull population at the facility.

An inspection of the twin culverts (5938-2) found that the twin culverts on site were free of blockages and or obstructions. With such a low flow, the majority of the water was flowing through only one of the culverts due to them being at slightly different levels. The rock riffles downstream of the works appear to be keeping the static water levels at an appropriate level in preventing the bottom end of the culverts from being perched. The upper most riffle would likely benefit from some further rocks being placed on it, to lift the static water level of approximately 200 ml throughout the length of the culverts. This current situation is compliant with the resource consent requirements, however the suggestion is to improve fish passage during low flow conditions.

2 March 2020

An inspection in respect to the air discharge consent (5839-2) was undertaken at the Company's Uruti composting facility as part of the trial regarding the composting of sheep skins at the facility (this was the second inspection with regards to this trial).

The inspection was undertaken in dry, warm conditions with a slight west/north-west wind. Temperature checks of the composting sheep skins and associated greenwaste had been undertaken on 28 February, 1 March and 3 March 2020.

Prior to turning the piles the temperatures within the composting heap were taken, as well as oxygen levels. The temperatures recorded by the consent holder on the day of inspection were found to be sitting between 50-60 degrees.

An odour survey was undertaken in a 360 degree manner about the composting heap. No odour was detectable at this time. Further greenwaste had been added to the pile to cover any exposed areas of product to enhance the composting process. The product was not turned during this inspection and it was agreed that the first turn would occur on 6 March 2020. No issues identified as a result of this inspection.

6 March 2020

An inspection was undertaken at the Company's facility with regards to a trial being undertaken at the site for the composting of clean, uncontaminated sheep skins. The inspection was undertaken during fine weather conditions with a very light north/north-west breeze. There was no cloud cover and approximately 12°C air temperature.

No odour (5839-2) was being emitted from the composting pile during a 360 degree odour survey around the perimeter of pad 1, prior to the pile being turned. It was observed during the turning/aeration process that the sheep skins (which were originally whole) had broken down considerably. The majority of the skins were broken down into portions no bigger than a standard dinner plate.

Some of the skins which were in the centre of the layers of skins, within the pile, appeared to of had little contact with the greenwaste. These were observed to be whole and in similar condition to when they were originally placed into the pile. These un-composted skins were a limited number and were well mixed with the greenwaste during the turning process. The degraded skins had broken up to a degree that the

operator of the digger found it a lot easier to manipulate the product than when dealing with the whole skins in the initial layering process.

A downwind odour survey during the turning process found that a strong sulphur type odour was detected immediately downwind of the heap, however this quickly dissipated and no odour was noted within the paddock downwind of pad 1.

The odour quickly reduced in intensity at the completion of the turning process. No odour was detected in any form beyond the boundary of the property. No issues identified at the time of the inspection.

12 March 2020

An inspection was undertaken to assess the odour (5839-2) generated from the sheep skin composing trial. 30 ton of sheep skins were delivered on 27 February 2020. The compost was being turned after two weeks. The wind at the time was very light to nil. Odorous steam was emitted when the compost was turned and an earthy sulphur type odour was noted.

The odour was largely rising straight up. The odour was only detected in the immediate vicinity of the compost and was not detected anywhere else on the property or at the road side boundary. The skins had decomposed considerably since arriving on site and were to be covered with greenwaste to reduce any odour. No issues to note during the inspection.

20 March 2020

An inspection with regards to odour (5839-2) was undertaken as part of the trial for composting clean and uncontaminated sheep skins at the Company's Uruti facility. This is the forth inspection undertaken during the trial process. The COVID-19 lock down commencing on 26 March 2020 means that it is likely that this is the last inspection with specific regards to the sheep skin composting trail. Normal site inspections will commence when able.

The inspection was undertaken in initially still conditions with a very slight north-east breeze developing during the turning process. Zero cloud cover and approximately 13°C air temperature. No odour was detected about the composting pile prior to the commencement of the turning/aeration process.

During the turning process it was found that the sheep skins had nearly completely broken down with only small pieces remaining visible. These small pieces appeared to be small clumps of wool with no hide visible within the clumps. During the turning process heat and moisture was observed being discharged into the air. A sulphur/cooking type odour was emitted during the turning process. This was detectable on the outer edge of the metal track that surrounds pad 1, however it quickly dissipated beyond that point and was not detectable 50-100 m from the pile.

No odour was noted at or beyond the property boundary. No further greenwaste was added to the pile with the large majority of greenwaste included at the time of initial delivery on 27 February and a slight top up off greenwaste to cover exposed product on 2 March. The inspections found that no odour was being emitted from the product at initial delivery or while it was allowed to sit undisturbed.

Odour was emitted for a short time during the turning process, however this was not to an extent that it approached the site boundary. The odour was largely confined to the immediate vicinity of pad 1, where the product was stored.

Consideration should be given to weather conditions while undertaking turning operations to reduce the risk of odour discharges toward sensitive receptors.

8 May 2020

An inspection in relation to the discharge to land (5838-2.2) consent was undertaken at the Company's Uruti facility. The inspection was carried out in fine weather conditions following a period of heavy rain and high

stream flows. At the time of inspection the stream was in a moderate to low flow condition for the current time of year. A surface water sampling run was also undertaken during the inspection.

The inspection found that the irrigation pond was full, as expected, following recent heavy rain. The irrigation pond was being aerated at the time of inspection in preparation for irrigating onto pasture in the coming days. There was an extended period of dry weather in the forecast, so the pond should be pumped well down to put it in good position for the winter period.

The irrigation areas were looking good with no signs of ponding/ pooling or overland flow. The irrigation paddock below the duck pond has re-grassed well after further earth was added over the summer period to lift portions of the paddock.

The two new irrigation areas were well grassed and were in a suitable state for irrigation fluid to be applied. It was advised that the irrigation fluid be applied lightly and monitored frequently to ensure that there are no overland flows. This was suggested to understand the behaviour of those new areas with regards to the application of irrigation waste.

The large solids compost pile on pad 3 (drilling mud pad) had been turned and seeded. At the time of inspection, the bund between pad 3 and the stream was being worked on in order to increase the bund height in places. The ring drain along this bund will also be cleaned out and redefined at the same time to ensure that all stormwater and leachate from pad 3 is collected and directed for storage into the irrigation pond. The area around the drop-off pit was tidy with the litter largely cleaned out of solid material. Ponds 2 and 3 within the leachate treatment system will need to have the solids removed again soon as part of ongoing maintenance.

Pad 1 was inspected and found to contain well defined windrows. Sheep skins and whole chicken carcasses are being dropped off at the bottom end of pad 1 where they are mixed with greenwaste, placed into windrows and covered with a layer of greenwaste. As the windrows begin to compost, they are turned and slowly migrate up pad 1 until they are completely composted and can be removed from the pad.

The worm beds were well covered with no odour. New worm beds have been placed on a pad area adjacent to the final pond in the wetland treatment system. The paunch pond was found to have plenty of freeboard with no pumping taking place at the time of inspection. The wetland was full and discharging into the receiving environment. The discharge had a very slight tannin colour. There was no odour, foaming or other adverse effects within the receiving environment as it was likely that the discharge was largely stormwater from the recent heavy rains.

Overall it was found that the site was in a tidy condition with ongoing maintenance being carried out at various locations about the site. A discussion was held with regards to testing further product on both pads 1 and 3 in due course to assess its suitability for being removed from the pads and applied to land as a soil conditioner.

An inspection of the twin culverts (5938-2) found that the stream was flowing evenly through both culverts. The culverts were free of any blockages or obstructions. No signs of erosion were noted about the head walls or banks within the immediate vicinity of the culvert.

At the time of inspection the stream was in moderate to lower flow conditions for this time of year. It was noted that the join in the pipes mid-way through the culverts are creating a slight drop in water levels. This should be addressed in due course by slightly building up the two downstream riffles. This in not urgent work but should be planned to address in due course.

In terms of odour (5839-2), at the time of the inspection the weather was warm and calm with no detectable wind. Zero cloud cover was observed. An odour inspection was undertaken along the property boundary with Mokau Road and a further survey was undertaken at the site office and weigh station area. No odours were detected at either location. No odour was noted at the twin culverts.

A sulphur type odour was detected about the irrigation pond which was full (from recent heavy rain) and was being aerated at the time of the inspection. The slight increase in odour in this location was likely to be a result of aeration of the irrigation pond. A slight odour was also detected about the drop-off pad, however the pit at this location was largely empty.

No significant odours were detected around pad 1 where chicken carcasses and sheep skins were composted. No composting piles were being turned at the time of inspection. The sheep skin product is now being delivered to site on a regular basis and mixed with chicken carcasses before being mixed and covered with greenwaste on pad 1 for composting.

The most recent wind row of sheep skins had some exposed skins on the right hand side (when looking up the valley towards the pile) and it was advised that this area should be covered with greenwaste.

No odours were detected about the worm beds, with a very slight odour noted about the drop-off point at the top end of the paunch pond. Further worm beds had been placed on the flat area adjacent to the lower most wetland pond and the paunch pond. No odours were noted about this area. No issues were noted at the time of inspection.

An inspection of the quarry facilities (10063-1) were undertaken as part of routine compliance monitoring. The inspection was undertaken in fine weather following some heavy rain and high stream levels in the recent seven days. The inspection of the quarry access track found that the bunds across the track to direct stormwater off the track were still in place. However, the larger bund at the base of the access track will need to be rebuilt and redefined. It had been flattened due to heavy traffic driving over the bund to access the lower adjacent track to the soil disposal area.

No excavation of material had occurred at the quarry itself for an extended period and therefore no inspection was undertaken upon the quarry ridgeline. The stockpiling area adjacent to the worm beds had also not been operational for a similar extended period. A small pile of material remained in this area, however there are no signs of sediment discharge/runoff to surface area about the pile.

An inspection of the single culvert (6212-1) on the Haehanga Stream found the culvert free of any blockages and/or obstructions. No signs of accelerated erosion were noted within the vicinity of the culvert. The riffles placed in the tributary immediately adjacent to the larger culvert appeared to have settled well, providing a good level of water throughout the culvert within the side tributary which leads up to the paunch pond.

Some works have been undertaken to improve the fish passage through the larger culvert by lifting the static water level, however further works are required to achieve the desired result, and this work should be planned for in the coming months.

An inspection of the re-aligned section (6211-1) of stream found that it continues to be well vegetated and stable with no significant signs of bank or head ward erosion. No obstructions to fish passage were noted nor were any blockages within the re-aligned section observed. The water flowing through this section was found to be clear and free of any significant sediment loads. No issues were identified as a result of the inspection.

3 June 2020

In relation to the discharge to land consent (5838-2.2), an inspection was undertaken as part of routine compliance monitoring. The inspection was undertaken during fine weather conditions following periods of heavy rain. A surface water sampling run was undertaken at the facility during the inspection.

At the time of sampling the pasture was saturated and the streams on the property were in fresh. No activities were being undertaken at the site during the sampling run. No irrigation had occurred at the site immediately prior to the sampling run.

The inspection found that the irrigation pond was reasonably full at the site, however this was expected due to the recent rainfall. There was sufficient free-board within the irrigation pond to retain further stormwater. The treatment ponds above the irrigation pond were due to be cleaned out again and have the solid material removed to increase the storage and treatment capacity of the ponds. The drilling mud drop-off pit was approx. one third to one half full.

The majority of the whole chicken carcasses are deposited on pad 1 and composted into windrows with the sheep skin material. This removes the need to hold the birds in the drilling mud drop-off pit. The bunds about pads 1 and 3 were in place and working well with no issues identified.

The area about the drop-off point was clean and tidy with the solid pile of pad 3 pulled away from the upper bund at the drop-off area. No further sheep skins are being taken to site until the commencement of the next killing season, which is in spring. The volume of paunch being taken to site has also reduced for the same reasons.

An inspection of the worm beds found them all to be covered. It was not anticipated that they will be worked over during the colder winter months.

An inspection of the irrigation areas found that no irrigation was taking place at the time of inspection. All irrigation areas were now able to be used as irrigation fields with good grass cover on the two newly developed areas. Over the winter periods it is important that effluent is applied thinly and evenly across all areas available, to reduce the risk of run-off to surface water during the winter months, when the ability of the areas to up-take the liquid is greatly reduced.

An inspection of the wetland treatment system, found that there was a reasonable quantity of discharge entering the receiving environment from the final pond. No foaming or discolouration was noted within the receiving environment (within the allowable mixing zone) and it is likely that a majority of the discharge from the wetland treatment system is stormwater (samples were taken). A full surface water sampling run was carried out with samples collected at all designated locations. No issues were identified at the time of inspection.

Inspection undertaken as part of routine compliance monitoring. An Inspection of the stream found that it had a good base flow with water flowing reasonably evenly through both culverts (5938-2 and 6212-1). The solid base-flow meant that the change of height within the culvert was not an obstruction for fish passage. No blockages were noted about the culverts. The headwall was in good condition with no signs of accelerated erosion within the vicinity of the culverts. The two riffles installed downstream of the culverts are in place and stable.

In respect to the odour (5839-2) consent, an inspection was undertaken at the facility in accordance with routine compliance monitoring. This was in fine weather conditions with four eighths cloud cover, 16°C in temperature, dry with a light northerly breeze. An odour survey was undertaken at the property boundary with Mokau Road. Due to the wind direction no odour from the facility was noted and in general terms with wind was blowing up the valley. An inspection about the lower irrigation area while liquid waste from the leachate pond was being applied to pasture via spray irrigation found that no odours were detected.

A slight sulphur type odour was detected around the leachate pond which was being aerated at the time of inspection. No odours were detected about the lower portion of the solids composting pile upon the drilling mud pad. Some odour was detected about the upper ends of the drilling mud pad, however the main odour detected about the upper drilling mud pad and pad 1 was that of the greenwaste compost which had recently been brought to site to mix with the sheep skins for the composting process.

Only a very light odour was detected around the sheep skin composting wind rows. It is anticipated that further loads of sheep skins will be delivered to site over the following week or so. The deliveries will cease for a period over winter, as the sheep processing plant based in Whanganui stops killing until the new

season. All worm beds were found to be covered with no odours being emitted. No issues were identified at the site with regards to emissions of odours beyond the site boundary.

The inspection found that the quarry (10063-1) was not in operation at the site and had not been used this summer. The access track is not in use also. The cut-off drains on the access track are in place and the bund at the base of the track is also in place, however this will need to be built up again as it decreased in size due to vehicle movements over it to access an area below the quarry access track. No issues were identified at the time of inspection.

An inspection of the culvert (6212-1) within the stream adjacent to the worm beds which leads up towards the paunch pond found that the culvert was full of slow moving water and provided good fish passage. The culvert was free of any blockages and obstructions and the rock work put into the stream bed below the culvert to lift the static water level within the stream was working well creating good fish passage. The large culvert below the access track to the worm beds was flowing freely and free of any blockages or obstructions. No signs of erosion about the culverts were observed. Further work is still required to be undertaken to ensure fish passage is provided for especially during the summer months when the stream is in low flow conditions.

Inspection of the stream realignment (6211-1) found that the stream had a reasonable base flow through the realignment. Banks of the realignment were well grassed with no signs of bank and/or headward erosion. No issues identified at the time of inspection.

30 June 2020

In terms of the discharge of waste to land (5838-2.2) an inspection was undertaken in fine weather conditions, with a light Northerly wind. The inspection found that the irrigation pond was full with reduced free-board than that observed in recent inspections (approximately 30 cm freeboard).

At the time of the inspection with pond was being aerated and the leachate was being applied to the lowermost irrigation area via stationary irrigators. The upper most irrigation area had been in operation, with leachate applied to land via the travelling irrigator on the morning of the inspection.

An inspection of the lowermost irrigation area found that it had good grass cover and although it was noted to be damp underfoot, the leachate was being applied lightly and there were no signs of pooling and/or runoff.

The newly constructed irrigation areas, adjacent to the duck pond and adjacent to the lowermost irrigation area, both had good grass cover but were not yet in operation. These areas are being lightly grazed by cattle in an effort to chew the grass shorter and assist it to thicken up. Stationary irrigators had been purchased for both areas and are on site. It was planned to have these areas operational for the winter months.

An inspection of the drilling mud drop-off pit and the solids composting pile at the upper end of the drilling mud pad found that the pond was reasonably empty and the solid material was pulled back from the edges, allowing stormwater to be collected in a ring drain and directed to the leachate pond. A lay down area was being developed adjacent to pad 1 to allow the storage of equipment and to provide a turnaround for heavy vehicles at the site.

At the time of inspection some greenwaste had recently been delivered to site and was piled adjacent to pad 1. The greenwaste was to be blended with sheep skins for the composting process. It was advised that best practice is to store this material within the confines of pad 1 to ensure that any run-off is directed to the leachate pond rather than the stream. This will reduce to risk of nitrogen and other contaminants being carried into the stream during rainfall events.

The site manager was receptive to this feedback and the greenwaste was largely moved prior to the conclusion of the inspection. Pad 1 was tidy with well-defined windrows across the pad. The lower windrows

were greenwaste and sheep skins and the upper two windrows were material from the drilling mud pad that had been further processed since it was previously sampled by TRC staff. The wetland treatment system appeared to be working well with a clear discharge exiting the final pond into the receiving environment. On visual inspection, no adverse effects were noted within the receiving environment. Although the level of stormwater within the paunch pond was low, with decent freeboard.

It was noted that a further defined ring drain was needed to be dug around the paunch drop-off point onto the paunch pond. This was due to the fact that the paunch is a rather saturated product that settles flat around the drop-off point, it can prevent stormwater from flowing freely into the pond and towards the wetland pump. The site manager was advised of this and undertook appropriate action.

An inspection of the upper most irrigation area found that it was wet underfoot with a small amount of ponding around the area that had been recently irrigated. Riparian plants had been ordered and will be planted about the stream over the winter period to continue the good efforts made over the previous couple of winters. Going into the wetter winter months a conscious effort needs to be made to manage with leachate pond and irrigation areas to ensure that the leachate is applied evenly across all the areas at a rate that the areas can be manage. This may require a frequent but low rate of application of leachate at short bursts across all fields when conditions allow. Bringing the two new areas into operation should assist with managing this aspect of the operation.

An inspection of the re-alignment (6211-1) found no issues of erosion or fish barriers. No issues identified at the time of inspection.

An inspection of the culvert (6212-1) found that it was free of blockages and or obstructions and was allowing water to flow through it freely. The elevated water level provided good fish passage, however it is acknowledged that further works are scheduled for the culvert to ensure fish passage is maintained during low flow conditions. This works will be undertaken during those aforementioned conditions.

In terms of odour discharges from the facility (5839-2), at the time of inspection, no work was being undertaken at the site and therefore the likelihood of odours to discharge from the facility was greatly reduced. The inspection was undertaken in calm conditions.

Wet surfaces and no traffic movements meant no dust was being generated on the property. No odours were detected at the site boundary (Mokau Road) or and the site office. A slight odour was detected around the irrigation pond, however this was to a lesser extent than previous inspections have noted. No odours were detected about the worm beds or pad 1.

Odour complaints had been received for the facility over recent days. These complaints were received in the evening during cold air drainage conditions. The odours are often effected by not only wind conditions at the site but also site activities that are being undertaken, to manage product at the facility such as irrigating, processing of worm beds or turning compost windrows. For this reason it is important to consider weather conditions when undertaken certain activities at the site, a practice that the site operators are aware of.

In terms of quarrying operations (10063-1), the cut-off drains and bunds appeared to be working well on the site access track. No issues were identified at the time of inspection.

An inspection of the twin culverts (5938-2) found that the stream was in fresh. Water was flowing evenly through both culverts with no blockages or obstructions observed. The head walls were in place with no signs of erosion or slumping in the immediate vicinity.

The riffles installed downstream of the culverts, to ensure a water level is maintained during low flow conditions to enable fish passage, appeared in be in place and withstanding the high flow event. No issues were identified at the time of inspection.

Inspections of Waitara Road worm farm facility, Brixton

17 July 2019

An inspection was undertaken as part of routine compliance monitoring. The inspection was undertaken following periods of intermittent rain over the previous days. At the time of the inspection a strong to moderate westerly wind was blowing across the site. Although odour was detected about the site, the strength of the wind caused it to quickly dissipate.

The stormwater system was inspected and was found to be discharging. The subsurface drainage pipe has been dug up and removed. An open drain had been installed in its place. This allowed the stormwater to discharge through the open drain to the rear of the property, where it enters a small sediment pond before discharging into the receiving environment.

It was communicated that vegetation needs to be encouraged to grow within the open drain to assist in treating the stormwater by filtering out sediment and uptake of nutrients. The installation of check dams within the open drain would also assist with stormwater retention and treatment.

Samples of stormwater discharge were collected to assess compliance with resource consent conditions. It was communicated that a small area at the back of the main storage shed needs to be cleaned up. This area is used for drum storage and some hydrocarbon staining was observed as a result of accidental discharges from the storage drums. The site manager agreed to arrange a general clean-up of this area.

12 March 2020

An inspection was undertaken to assess compliance with resource consent held by the facility. At the time of inspection there was no odour on site. All worm beds were covered. No discharge was occurring from the stormwater system. The site was relatively clean and tidy. No issues to note. The site was found to be compliant with its consent at the time of inspection.

2.2 Results of discharge monitoring

2.2.1 Surface water monitoring – Wetland treatment system discharge

The Company holds consent 5838-2.2; to discharge 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.

In this section of the report, the direct discharge monitoring to the unnamed tributary of the Haehanga Stream is reported (Table 3).

The Wetland Treatment System (WTS) (Figure 2) functions by pumping primarily ammonia-enriched fluid from the paunch mixing pond, to the top of a multi-tiered wetland treatment system which has been planted with the bulrush raupō. This effectively treats the ammonia-enriched water though assimilation, while the dense planting of the raupō enables it to act as a filter. Downstream of the tiered raupō wetland is sample location IND003008.

Table 3 IND003008 wetland treatment system discharge monitoring 2019-2020

Site: IND003008 Wetland treatment system discharge to un-named tributary of Haehanga Stream		**Consent limit 5838-2.2 condition 24**	**IND003008**	**IND003008**	**IND003008**	**IND003008**	**IND003008**
	Collected		**30 Aug 2019**	**06 Nov 2019**	**06 Mar 2020**	**08 May 2020**	**30 Jun 2020**
Parameter	**Time**		**10:43**	**No DS**	**No DS**	**11:46**	**09:59**
Chloride	**g/m³**		19.8	-	-	27	28
Electrical Conductivity (EC)	**µS/cm**		539	-	-	394	580
	mS/m		53.9	-	-	39.4	58
Free Ammonia as N	**g/m³**		0.23	-	-	0.0183	0.083
Nitrate-N + Nitrite-N	**g/m³**		4.7	-	-	1.75	2.5
pH	**pH Units**	**6-9 pH**	7.7	-	-	7.3	7.4
Sample Temperature	**°C**		11.6	-	-	15	10.5
Total Ammoniacal-N	**g/m³**		21	-	-	3.3	15.6
Total Suspended Solids	**g/m³**	**≤ 100 g/m³**	9	-	-	16	10

- The monitoring results were complaint with consent 5838-2.2, condition 24, on three of five sampling rounds undertaken on the WTS.
- On two occasions the WTS was not discharging.

2.2.2 Surface water monitoring – HHG000103 post mixing zone

The WTS (IND003008) discharges into the unnamed tributary of the Haehanga Stream. It is then monitored by consent 58383-2.2, condition 25, at surface water monitoring location HHG000103 (Figure 4), which is 40 metres downstream from the discharge.

Condition 25 states:

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 m, at established monitoring site HHG000103.

a. *A rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 g/m³*
b. *A level of un-ionised ammonia greater than 0.025 g/m³*

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.*

Table 4 Surface water monitoring post WTS HHG000103

	Site	5838-2.2 condition 25	HHG000103	HHG000103	HHG000103	HHG000103	HHG000103
	Collected		30 Aug 2019	06 Nov 2019	06 Mar 2020	08 May 2020	30 Jun 2020
Parameter	**Time**		**10:56**	**13:18**	**08:52**	**11:38**	**10:08**
Electrical Conductivity (EC)	**µS/cm**		237	224	257	227	209
	mS/m		23.7	22.4	25.7	22.7	20.9
Sample Temperature	**°C**		9.8	15.5	15.3	11.3	10.4
pH	**pH Units**		7.4	7.3	7.1	7	7.2
Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	**g O_2/m^3**	≤ 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloride	**g/m^3**		13.7	11.1	13.1	17.3	15.5
Total Suspended Solids	**g/m^3**		7	5	8	7	30
Free Ammonia as N	**g/m^3**	≤ 0.025	0.0156	0.00035	0.0003	0.00109	0.0028
Total Ammoniacal-N	**g/m^3**		3.3	0.057	0.088	0.51	0.84

- All five rounds were compliant with condition 25 of consent 5838-2.2.
- This is the third year the WTS has been compliant during sampling rounds.

2.2.3 Surface water monitoring of the Haehanga Stream and associated unnamed tributaries

The Haehanga Stream and associated unnamed tributaries were monitored on five occasions (SW1- SW5) this monitoring period. Two reduced surveys of four sites (reduced SW 1 and SW 2) on the Haehanga Stream and the duck pond (URUTIDP) (Figure 2) were also conducted during the peak summer months. The surface water monitoring locations are provided in Figure 4.

Please note that total petroleum hydrocarbons (C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36} and C_7-C_{36}), as well as benzene, toluene, ethylbenzene and xylenes (m, p and o), (BTEX), were tested for on five sampling rounds at nine monitoring sites. No results were recorded above the laboratory defined limit of detection (LOD) across these five rounds. These results have not been tabulated in this report.

Table 5 Surface water monitoring round 1 30/08/2019

SW 1 30/08/2020	Parameter	Electrical Conductivity (EC)	Temperature	pH	Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	Chloride
Site	Time	µS/cm	°C	pH Units	g O_2/m^3	g/m^3
Consent 5838-2.2 condition 11					>2.0	>150
HHG000090	10:05	154	9.4	7.3	< 1.0	10.3
HHG000093	10:18	165	10.3	7.3	< 1.0	11.6
HHG000097	11:03	186	8.7	7.4	< 1.0	12
HHG000098	10:54	181	9.2	7.3	< 1.0	12.3
HHG000099	10:27	260	9.7	7.6	< 1.0	13.2
HHG000100	10:32	204	10.1	7.3	< 1.0	13.7
HHG000103	10:56	237	9.8	7.4	< 1.0	13.7
HHG000106	11:10	263	12.4	7.3	< 1.0	18.6
HHG000109	11:22	222	10.5	7.4	< 1.0	15.4
HHG000115	11:28	225	10.6	7.5	< 1.0	16.3
HHG000150	11:46	251	9.8	7.2	< 1.0	25
HHG000160	12:16	246	10.9	7.3	< 1.0	24
HHG000165	11:58	200	11	7.2	< 1.0	19.9
HHG000168	12:04	242	10.5	7.3	< 1.0	24
HHG000190	12:25	239	10.8	7.3	< 1.0*	23
30/08/2020	Parameter	Total Sodium	Total Suspended Solids	Free Ammonia as N	Total Ammoniacal-N	Nitrate-N + Nitrite-N
Site	Time	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
Consent 5838-2.2 condition 11				>0.025		
HHG000090	10:05	9.6	6	0.00004	0.011	0.095
HHG000093	10:18	10	6	0.00028	0.08	0.104
HHG000097	11:03	NR	21	0.00031	0.075	0.083
HHG000098	10:54	NR	6	0.00053	0.149	NR
HHG000099	10:27	NR	67	0.00096	0.139	NR
HHG000100	10:32	10.5	27	0.00055	0.142	0.098
HHG000103	10:56	NR	7	0.0156	3.3	NR
HHG000106	11:10	NR	NR	0.0023	0.55	NR
HHG000109	11:22	NR	NR	0.0034	0.63	NR
HHG000115	11:28	12.2	NR	0.0035	0.62	0.34
HHG000150	11:46	14.1	15	0.0024	0.8	0.42
HHG000160	12:16	14	17	0.0031	0.75	0.44
HHG000165	11:58	12.7	9	0.00062	0.195	0.198
HHG000168	12:04	13.9	18	0.0026	0.7	0.43
HHG000190	12:25	NR	NR	0.0025	0.6	NR
NR= now results *= non filtered carbonaceous oxygen demand						

On consent 5838-2.2, condition 11, exceedance was recorded in surface water monitoring round 1 (Table 5). The monitoring indicated an increase in minerality from top to bottom of catchment, demonstrated by increasing conductivity and chloride concentrations. Notable ammonia was recorded post the WTS at monitoring location HHG000103. Note this is a consented discharge which was discussed in the previous section.

Table 6 Surface water monitoring round 2 06/11/2019

SW2 06/11/2020	Parameter	Electrical Conductivity (EC)	Sample Temperature	pH	Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	Chloride
Site	Time	µS/cm	°C	pH Units	g O_2/m^3	g/m^3
Consent 5838-2.2 condition 11					>2.0	>150
HHG000090	12:54	179	17.7	7.3	< 1.0	9.5
HHG000093	12:46	195	19.6	7.3	< 1.0	13
HHG000097	13:26	203	12.9	7.2	< 1.0	10.7
HHG000098	13:07	223	16.3	7.3	< 1.0	11.1
HHG000099	12:37	289	17.5	7.5	< 1.0	16.2
HHG000100	12:32	294	18.2	7.4	< 1.0	26
HHG000103	13:18	224	15.5	7.3	< 1.0	11.1
HHG000106	12:26	399	18.8	7.2	< 1.0	48
HHG000109	12:02	256	17.9	7.3	< 1.0	25
HHG000115	09:05	323	14.9	7.3	< 1.0	33
HHG000150	08:53	408	18.3	7	< 1.0	62
HHG000160	8:43	388	17.7	7	< 1.0	58
HHG000165	8:30	234	14.6	6.9	< 1.0	22
HHG000168	8:37	365	17.3	7	< 1.0	52
HHG000190	08:15	338	16.5	7.2	1.38*	47
06/11/2020	Parameter	Total Sodium	Total Suspended Solids	Free Ammonia as N	Total Ammoniacal-N	Nitrate-N + Nitrite-N
Site	Time	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
Consent 5838-2.2 condition 11				>0.025		
HHG000090	12:54	12.6	11	< 0.00007	< 0.010	< 0.002
HHG000093	12:46	13.3	5	0.0026	0.35	0.137
HHG000097	13:26	NR	4	0.00044	0.125	0.182
HHG000098	13:07	NR	6	0.00036	0.067	NR
HHG000099	12:37	NR	7	0.0024	0.24	NR
HHG000100	12:32	16.3	8	0.0119	1.49	0.3
HHG000103	13:18	NR	5	0.00035	0.057	NR
HHG000106	12:26	NR	NR	0.0094	1.75	NR
HHG000109	12:02	NR	NR	0.0037	0.55	NR
HHG000115	09:05	20	NR	0.0057	0.98	0.77
HHG000150	08:53	28	14	0.0035	0.99	0.93
HHG000160	8:43	26	8	0.00197	0.59	1.01
HHG000165	8:30	17.5	4	0.00028	0.125	0.41
HHG000168	8:37	25	79	0.00184	0.51	1.08
HHG000190	08:15	NR	NR	0.00144	0.31	NR
NR= no result *= non filtered carbonaceous oxygen demand						

The results of surface water monitoring round 2 (Table 6) did not record a non-compliance with consent 5838-2.2, condition 11. Of note is the increasing conductivity recorded down the catchment which doubles from the top to bottom site. Chloride values increased four-fold across the same area however, it remained below the consent maximum of 150 g/m^3. Un-ionised ammonia values remained below the consent value of 0.025 g/m^3 across all sites.

Two reduced surface water monitoring rounds (Tables 7 and 8) were undertaken in December 2019 and January 2020. These were aimed at the low flow conditions and due to the operator accepting a considerable volume of chicken carcasses. This product was the result in a mass mortality incident from a chicken shed in Auckland.

Table 7 Reduced surface water sampling round 1 05/12/2019

05/12/2020 Reduced SW 1	Site	Consent 5838-2.2 condition 11	HHG000090	HHG000106	URUTIDP	HHG000150	HHG000190
	Collected		05 Dec 2019	05 Dec 2019	05 Dec 2019	05 Dec 2019	05 Dec 2019
Parameter	Time		10:47	11:15	11:40	10:05	12:30
Electrical Conductivity (EC)	µS/cm		168	340	927	332	270
Sample Temperature	°C		19.5	18.9	20	18.3	19.2
pH	pH Units		7.3	7.1	7.7	7.1	7.2
Carbonaceous Biochemical Oxygen Demand ($CBOD^5$)	g O_2/m^3	>2.0	< 1.0	< 1.0	7.1	1.4	1.2
Chloride	g/m^3	>150	9.8	33	220	46	27
Total Sodium	g/m^3		11.2	17.1	71	19.4	17.8
Escherichia coli	cfu / 100mL		220	3000	900	2200	4000
Free Ammonia as N	g/m^3	>0.025	< 0.00008	0.0052	0.0015	0.0058	0.00125
Total Ammoniacal-N	g/m^3		< 0.010	1.03	0.073	1.3	0.2

The December 2019 monitoring round did not record an exceedance with condition 11 of consent 5838-2.2. It was noted that the duck pond did record a significant value for oxygen demand, chloride and to a lesser extent sodium. *E. coli* was measurable, however ducks frequent this pond, as such marked *E. coli* concentrations would be expected. The specific consent condition is related to effects within the Haehanga Stream.

The stream monitoring did record *E. coli* at the three lower sites which were significantly elevated when compared to the top monitoring site (HHG000090). It is further noted that *E. coli* concentrations are specifically related to human health effects, and recreational water quality. Elevated *E. coli* levels adversely affect human health and limit recreational use of the stream.

Table 8 Reduced surface water sampling round 2 21/01/2020

21/01/2020 Reduced SW 2	Site	Consent 5838-2.2 condition 11	HHG000090	HHG000106	URUTIDP	HHG000150	HHG000190
	Collected		21 Jan 2020	21 Jan 2020	21 Jan 2020	21 Jan 2020	21 Jan 2020
Parameter	Time		11:20	10:30	10:00	09:35	08:30
Electrical Conductivity (EC)	µS/cm		182	327	941	457	331
Sample Temperature	°C		19.5	18.6	19.8	22.4	18.9
pH	pH Units		7.3	7.4	7.9	7.4	7.1
Carbonaceous Biochemical Oxygen Demand ($cBOD^5$)	g O_2/m^3	>2.0	< 1.0	< 1.0	3.6	2.1	1.3
Chloride	g/m^3	>150	9.4	26	210	72	37
Total Sodium	g/m^3		11.9	18.8	67	29	20
Escherichia coli	cfu / 100mL		22	1600	500	1200	2500
Free Ammonia as N	g/m^3	>0.025	< 0.00008	0.0025	0.0115	< 0.00012	0.00031
Total Ammoniacal-N	g/m^3		< 0.010	0.26	0.39	< 0.010	0.073

The follow up monitoring round conducted in January 2020 did record a slight exceedance in carbonaceous oxygen demand, with a value of 2.1 g O_2/m^3. This elevation was site specific and did not extend to the lower monitoring site, HHG000190. The remaining consent defined contaminants of concern were not exceeded within the Haehanga Stream. *E. coli* remained elevated at the lower sites. This analyte will be added to the upcoming monitoring period to further assess the annual variation over time, with a view to assessing how this analyte will fit within the National Policy Statement for Freshwater Management 2020 category for human contact.

Table 9 Surface water monitoring round 3 06/03/2020

SW3 06/03/2020	Parameter	Electrical Conductivity (EC)	Sample Temperature	pH	Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	Chloride
Site	Time	µS/cm	°C	pH Units	g O_2/m^3	g/m^3
Consent 5838-2.2 condition 11					>2.0	>150
HHG000090	08:34	273	18.9	7	< 1.0	15.7
HHG000093	08:24	268	17.1	6.8	< 1.0	22
HHG000097	08:58	262	14.4	7	< 1.0	11.9
HHG000098	08:43	NR	NR	NR	NR	NR
HHG000099	08:19	277	16.7	7.2	< 1.0	16.2
HHG000100	08:12	289	16.9	7.3	< 1.0	24
HHG000103	08:52	257	15.3	7.1	< 1.0	13.1
HHG000106	08:04	415	15.5	7	< 1.0	44
HHG000109	07:37	324	16.5	7	< 1.0	29
HHG000115	07:46	327	16.5	7	< 1.0	32
HHG000150	07:20	344	18.9	6.9	< 1.0	37
HHG000160	07:04	325	18.3	6.9	< 1.0	34
HHG000165	07:13	218	16.6	7	< 1.0	17.1
HHG000168	07:18	314	18.3	7.2	< 1.0	32
HHG000190	06:54	322	18.5	7.1	< 1.0*	30
06/03/2020	Parameter	Total Sodium	Total Suspended Solids	Free Ammonia as N	Total Ammoniacal-N	Nitrate-N + Nitrite-N
Site	Time	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
Consent 5838-2.2 condition 11				>0.025		
HHG000090	08:34	13.3	8	0.0001	0.027	0.011
HHG000093	08:24	13.8	3	0.000132	0.07	0.195
HHG000097	08:58	NR	< 3	0.00019	0.074	0.178
HHG000098	08:43	NR	NR	NR	NR	NR
HHG000099	08:19	NR	14	0.0003	0.067	NR
HHG000100	08:12	14.5	6	0.0007	0.102	0.22
HHG000103	08:52	NR	8	0.0003	0.088	NR
HHG000106	08:04	NR	NR	0.005	1.74	NR
HHG000109	07:37	NR	NR	0.00077	0.23	NR
HHG000115	07:46	18.4	NR	0.00099	0.33	0.34
HHG000150	07:20	18.8	12	0.00055	0.189	0.36
HHG000160	07:04	18	18	0.00044	0.169	0.35
HHG000165	07:13	15.4	< 3	0.00027	0.084	0.2
HHG000168	07:18	17.7	13	0.00066	0.133	0.35
HHG000190	06:54	NR	NR	0.00044	0.107	NR
NR= now result *= non filtered carbonaceous oxygen demand						

Condition 11 of consent 5838-2.2 was not exceeded during the third surface water monitoring round (Table 9). Though noted was the slight elevation of ammonia (NH_4) at site HHG000106. Conductivity, chloride and ammonia concentrations increased down the length of the Haehanga Stream.

Table 10 Surface water monitoring round 4 08/05/2020

SW4 08/05/2020	Parameter	Electrical Conductivity (EC)	Sample Temperature	pH	Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	Chloride
Site	Time	µS/cm	°C	pH Units	g O_2/m^3	g/m^3
Consent 5838-2.2 condition 11					>2.0	>150
HHG000090	11:35	186	11.3	7	< 1.0	13.5
HHG000093	11:27	192	11.6	6.9	< 1.0	14.8
HHG000097	12:05	209	11.2	7	< 1.0	14.3
HHG000098	11:51	177	11.6	7.4	< 1.0	15.5
HHG000099	11:21	297	11.7	7.2	< 1.0	17.6
HHG000100	11:17	229	11.7	7	< 1.0	17.5
HHG000103	11:38	227	11.3	7	< 1.0	17.3
HHG000106	11:13	286	14	7.2	< 1.0	20
HHG000109	10:53	264	11.3	7.1	< 1.0	23
HHG000115	11:05	271	11.6	6.9	< 1.0	23
HHG000150	10:40	285	11.6	6.9	< 1.0	32
HHG000160	10:27	288	11.6	7.1	< 1.0	33
HHG000165	10:10	214	12	6.9	< 1.0	23
HHG000168	10:15	282	11.3	6.9	< 1.0	32
HHG000190	09:28	289	11.6	6.9	< 1.0*	33
08/05/2020	Parameter	Total Sodium	Total Suspended Solids	Free Ammonia as N	Total Ammoniacal-N	Nitrate-N + Nitrite-N
Site	Time	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
Consent 5838-2.2 condition 11				>0.025		
HHG000090	11:35	11.1	4	0.0001	0.046	0.171
HHG000093	11:27	11.7	4	0.000148	0.083	0.199
HHG000097	12:05	NR	5	0.00009	0.047	0.09
HHG000098	11:51	NR	15	0.00026	0.054	NR
HHG000099	11:21	NR	5	0.00043	0.141	NR
HHG000100	11:17	11.8	7	0.00043	0.21	0.21
HHG000103	11:38	NR	7	0.00109	0.51	NR
HHG000106	11:13	NR	NR	0.00195	0.47	NR
HHG000109	10:53	NR	NR	0.00175	0.75	NR
HHG000115	11:05	15	NR	0.00116	0.7	0.37
HHG000150	10:40	16.6	6	0.00125	0.71	0.48
HHG000160	10:27	16.4	9	0.00171	0.72	0.54
HHG000165	10:10	13.7	4	0.00024	0.135	0.198
HHG000168	10:15	16.8	8	0.00113	0.7	0.52
HHG000190	09:28	NR	NR	0.002	1.08	NR
NR= now result *= non filtered carbonaceous oxygen demand						

Surface water monitoring round four (Table 10) did not record any significantly elevated contaminants or consent exceedance when compared to condition 11 of consent 58383-2.2. In similarity to the previous monitoring rounds, an increasing trend in conductivity, chloride and ammonia concentrations was recorded down the length of the Haehanga Stream.

Table 11 Surface water monitoring round 5 30/06/2020

SW5 30/06/2020	Parameter	Electrical Conductivity (EC)	Sample Temperature	pH	Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	Chloride
Site	Time	µS/cm	°C	pH Units	g O_2/m^3	g/m^3
Consent 5838-2.2 condition 11					>2.0	>150
HHG000090	09:53	188	10.3	7.2	< 1.0	10.8
HHG000093	09:41	194	10.3	7.3	< 1.0	13
HHG000097	10:18	227	10.4	7.7	< 1.0	13.5
HHG000098	10:03	174	10.4	7.3	< 1.0	13.9
HHG000099	09:36	205	10.2	7.2	< 1.0	12.8
HHG000100	09:30	201	10.2	7.2	< 1.0	13.6
HHG000103	10:08	209	10.4	7.2	< 1.0	15.5
HHG000106	09:23	221	10.4	7.2	< 1.0	13.3
HHG000109	09:06	215	10.2	7.2	< 1.0	15.6
HHG000115	09:01	213	10.2	7	< 1.0	15.9
HHG000150	08:52	230	10.3	7.1	< 1.0	18.9
HHG000160	08:45	252	10.3	7.3	< 1.0	21
HHG000165	08:40	202	10.8	7.1	< 1.0	16.9
HHG000168	08:35	250	10.3	7.1	< 1.0	21
HHG000190	08:26	252	10.3	7.2	1.1*	21
30/06/2020	Parameter	Total Sodium	Total Suspended Solids	Free Ammonia as N	Total Ammoniacal-N	Nitrate-N + Nitrite-N
Site	Time	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
Consent 5838-2.2 condition 11				>0.025		
HHG000090	09:53	10	28	0.00009	0.033	0.129
HHG000093	09:41	10.7	33	0.00124	0.33	0.147
HHG000097	10:18	NR	51	0.00021	0.02	0.041
HHG000098	10:03	NR	32	0.00017	0.043	NR
HHG000099	09:36	NR	126	0.00019	0.064	NR
HHG000100	09:30	10.5	78	0.00077	0.29	0.151
HHG000103	10:08	NR	30	0.0028	0.84	NR
HHG000106	09:23	NR	NR	0.00045	0.144	NR
HHG000109	09:06	NR	NR	0.00193	0.61	NR
HHG000115	09:01	11.2	NR	0.00109	0.59	0.22
HHG000150	08:52	12.2	181	0.0021	0.95	0.3
HHG000160	08:45	13	220	0.0048	1.21	0.35
HHG000165	08:40	11.9	17	0.00014	0.054	0.13
HHG000168	08:35	13.2	200	0.0028	1.14	0.34
HHG000190	08:26	NR	NR	0.0029	1.07	NR
NR= now result *= non filtered carbonaceous oxygen demand						

No consent exceedances were recorded during the final surface water monitoring round (surface water five) (Table 11). Observed in the results is an increase in ammonia concentration in the final monitoring sites, noting that HHG000165 is a tributary joining the Haehanga Stream while HHG000160, 168 and 190 are on the mainstream.

Surface water monitoring discussion

No petroleum related results (total petroleum hydrocarbons (C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36}, C_7-C_{36}), or benzene, toluene, ethylbenzene, xylenes (BTEX)) were recorded above the laboratory defined limit of detection (LOD), across all five surface water monitoring rounds this monitoring period.

One slight exceedance in oxygen demand was identified during the current monitoring of the Haehanga Stream and associated unnamed tributaries. The remaining parameters of concern were found to be below the consent defined concentrations. The exceedance was found during the reduced monitoring round 2, undertaken in January 2020. The concentration reported 2.1 g O_2/m^3 was recorded at HHG000150, the limit is 2.0 g O_2/m^3.

During the previous monitoring period (2018-2019) elevated contaminants (ammonia, sodium, chloride and oxygen demand) were recorded in the surface waters of the Haehanga Stream, this was the result of a breech in the side of the bund of the drilling mud pad. Post the subsequent repair works, late March 2019, there have been no significant exceedances in consent conditions or elevated contaminates of concern within the surface waters of the Haehanga Stream.

Of note, *E. coli* concentrations were elevated during the reduced summer monitoring rounds of the Haehanga Stream. *E.coli* concentrations within the Mimitangiatua River are not currently quantified. As such further quantifying the base loading within both the Mimitangiatua River and the Haehanga Stream for *E.coli* is an area to expand monitoring to in the 2020-2021 monitoring period and beyond. This will seek to assess the influence of the Haehanga Stream, if any, on the Mimitangiatua River from an *E.coli* perspective. Noting that *E. coli* is a human health and recreational water quality related issue, as well as stock watering.

In terms of the Haehanga Stream and the 2019-2020 monitoring, there were incremental increases in chloride and ammonia down through the length of the Haehanga Stream. It is further noted that these increases were within consent conditions. Figure 6 demonstrates the increase in conductivity within the surface water as a result of the consent holders operations. Similar increases in chloride were also recorded (Figure 7).

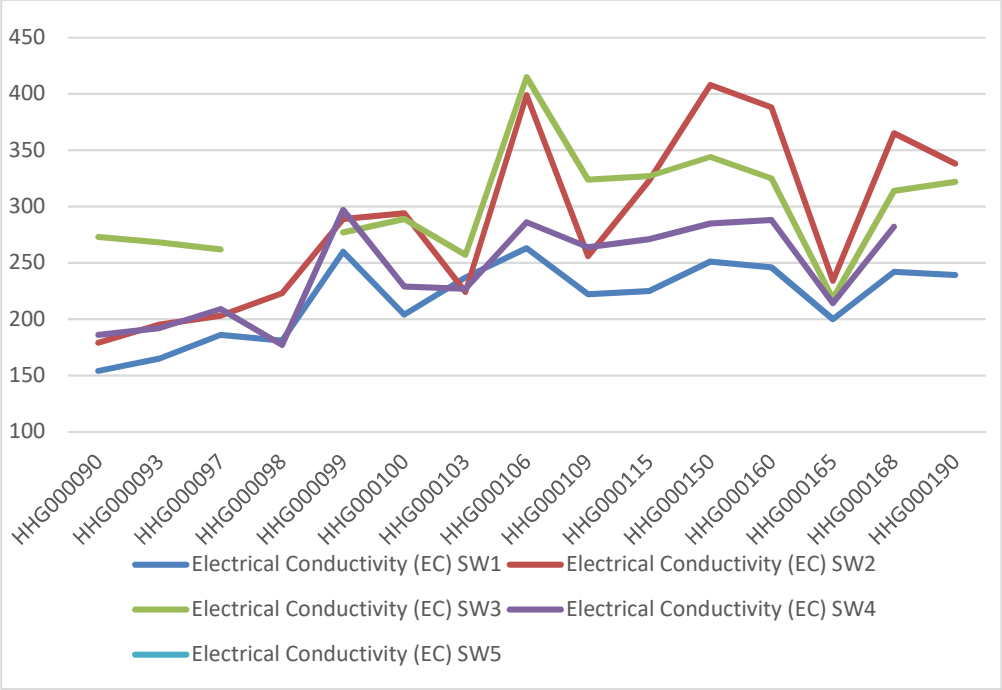

Figure 6 Conductivity uS/cm by site Haehanga Stream 2019-2020

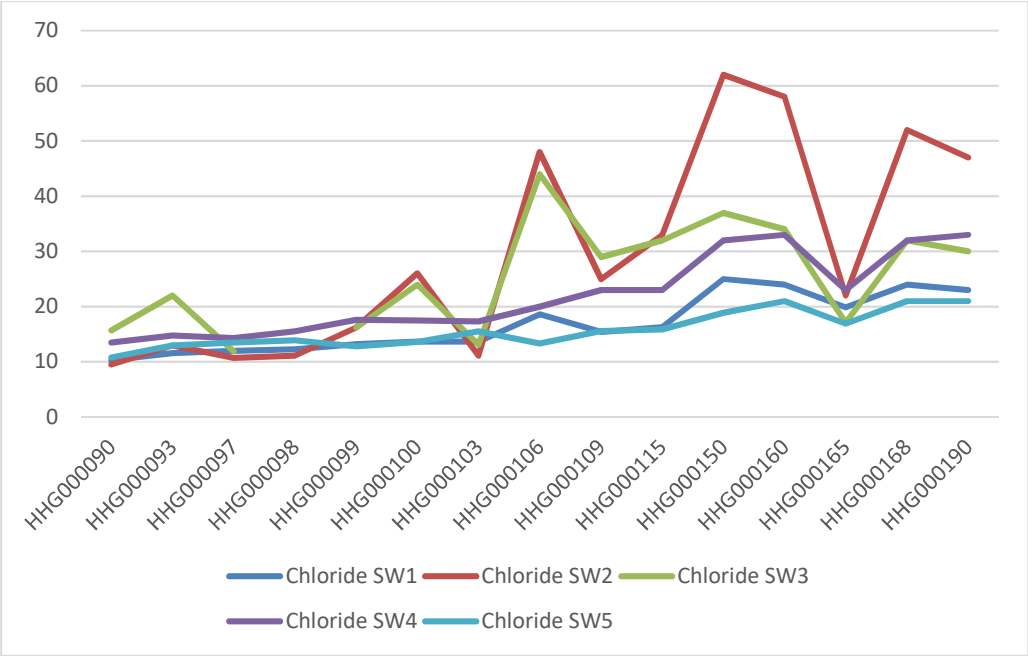

Figure 7 Chloride g/m^3 by site Haehanga Stream 2019-2020

In terms of ammonia throughout the catchment, Figure 8 demonstrates the ammonia concentrations at sites throughout the catchment, please note these results have been adjusted to a pH 8 as required by the NPS-FM 2020 guidelines for comparison with the guidelines. Note that the elevated result at HHG000103, relates to monitoring below the WTS. This peak was compliant with the consent condition in regard to un-ionised ammonia (Section 2.2.2).

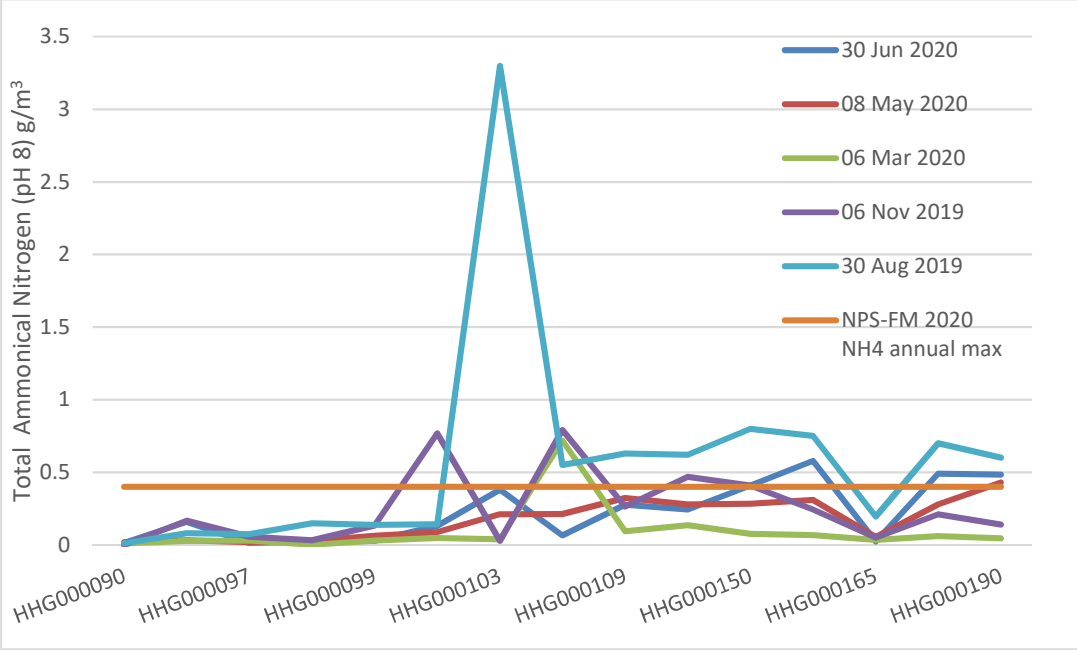

Figure 8 Total ammoniacal nitrogen (adjusted pH 8) g/m^3 by site Haehanga Stream 2019-2020

However, what is apparent is the increase in ammonia concentration down through the catchment. The increase is particularly apparent when the influence of HHG000165 is taken into account. Please note that HHG00165 is a monitoring location on an unnamed tributary of the Haehanga Stream which flows from an undeveloped area of site, located to the east of the main gate. The corresponding low ammonia

concentrations recorded are likely due to no operations occurring in the catchment above HHG000165 and would therefore represent an un-impacted catchment.

The results for ammonia at HHG000165 remained of low concentration throughout the monitoring period. In contrast, on the main stem of the Haehanga Stream, the ammonia concentration at the lower sites of HHG000160, HHG000168 and HHG000190 demonstrated increasing concentration down through the catchment.

The NPS-FM 2020 determines the attribute state for rivers and lakes for water quality in terms of ammonia toxicity (Figure 9). The Council has assessed ammonia at HHG000150 since 2010. The requirement for comparison to the NPS-FM attribute state for ammonia is a minimum of 30 sample results over a three year period. These sample results must also be adjusted to a pH of 8. The attribute state has two guidelines, an annual median and an annual maximum, which are classified into four bands, A, B, C and D (Figure 9).

Analysis of ammonia at HHG000150 over the past three years recorded a median concentration of 0.30 g/m^3. In the current monitoring period, including the mini surveys, the median concentration was recorded at 0.36 g/m^3. This would place HHG000150 and specifically the Haehanga Stream firmly above the national bottom line for ammoniacal nitrogen (>0.24 g/m^3) annual median (pH 8 adjusted). Noting in the data set this year the annual maximum of 0.40 g/m^3 at HHG000150 was exceeded on three of seven occasions.

Owing to this, further work is required by the Company to improve the quality of the water within the Haehanga Stream and the monitoring programme will be adjusted to accommodate this. It is further noted that the NPS-FM 2020 came into force in September 2020, which is outside of the date of this monitoring report (1 July 2019 – 30 June 2020). However, considering this is current legislation it serves as goal setting for the consent holder, as this will serve as an assessment tool moving forward.

Value (and component)	Ecosystem health (Water qualit	
Freshwater body type	Rivers and lakes	
Attribute unit	mg NH_4-N/L (milligrams ammoniacal-nitrogen per litre)	
Attribute band and description	**Numeric attribute state**	
	Annual med	Annual maximum
A 99% species protection level: No observed effect on any species tested.	≤0.03	≤0.05
B 95% species protection level: Starts impacting occasionally on the 5% most sensitive species.	>0.03 and ≤0.24	>0.05 and ≤0.40
National bottom line	**0.24**	**0.40**
C 80% species protection level: Starts impacting regularly on the 20% most sensitive species (reduced survival of most sensitive species).	>0.24 and ≤1.30	>0.40 and ≤2.20
D Starts approaching acute impact level (of death) for sensitive species.	>1.30	>2.20
Numeric attribute state is based on pH 8 and temperature of 20°C. Compliance with the numeric attribute states should be undertaken after pH adjustment.		

Figure 9 Ammonia toxicity ecosystem health (rivers and lakes) NPSFM 2020

*Note 1 mg/l = 1 g/m^3

2.2.4 Drilling mud pad (pad 3) irrigation pond monitoring

Leachate 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 final pond (Figure 2), termed the irrigation pond. From here, the leachate collected in the final pond is irrigated across the irrigation paddocks (Figure 5) which is now a total of 13.18 ha. This increased from 7.0 Ha in the last monitoring (2019-2020) period. The analysis of the five rounds of monitoring from the irrigation is presented in Table 12.

Table 12 IND002044 irrigation pond monitoring 2019-2020

RNZ Uruti irrigation pond IND002044	Collected	30 Aug 2019	06 Nov 2019	06 Mar 2020	08 May 2020	30 Jun 2020
	Time	11:37	12:12	07:58	10:50	09:15
Sample Temperature	°C	12.7	22.5	19.5	13.8	11.4
Electrical Conductivity (EC)	µS/cm	5,520	8,260	11,830	6,900	7,920
pH	pH Units	7.6	7.9	8	7.8	7.8
Total Sodium	g/m^3	210	300	540	350	290
Total Calcium	g/m^3	177	300	280	220	200
Total Magnesium	g/m^3	29	45	56	50	45
Sodium Absorption Ratio (Total)		3.9	4.2	7.7	5.6	4.9
Total Potassium	g/m^3	360	790	1,210	560	520
Chloride	g/m^3	920	1,450	2,700	1,430	990
Acid Soluble Barium	g/m^3	0.6	0.67	0.48	0.29	0.38
Dissolved Barium	g/m^3	0.41	0.23	0.37	0.3	0.33
Total Barium	g/m^3	0.75	0.76	0.77	0.44	0.42
Acid Soluble Lead	g/m^3	0.004	0.011	0.007	0.008	0.005
Dissolved Arsenic	g/m^3	0.059	0.075	0.075	0.115	0.16
Dissolved Cadmium	g/m^3	< 0.00010	< 0.0003	< 0.0003	< 0.0003	< 0.00053
Dissolved Chromium	g/m^3	0.052	0.019	0.03	0.024	0.042
Dissolved Copper	g/m^3	0.0049	< 0.003	0.005	0.008	0.0092
Dissolved Lead	g/m^3	0.0009	< 0.0005	0.0017	0.0017	0.002
Dissolved Mercury	g/m^3	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Dissolved Nickel	g/m^3	0.041	0.061	0.093	0.05	0.048
Dissolved Zinc	g/m^3	0.005	< 0.005	0.008	0.019	0.016
Carbonaceous Biochemical Oxygen Demand ($CBOD^5$)	$g\ O_2/m^3$	570	550	300	660	1340
Total Ammoniacal-N	g/m^3	320	400	550	360	570
Free Ammonia as N	g/m^3	3.1	15.1	22	6.2	6.6
Total Kjeldahl Nitrogen (TKN)	g/m^3	300	410	580	360	570
Total Nitrogen	g/m^3	300	410	580	360	570
Nitrate-N + Nitrite-N	g/m^3	0.015	0.006	0.009	0.025	0.12
C_7 - C_9	g/m^3	0.28	0.56	0.6	0.34	0.27
C_{10} - C_{14}	g/m^3	0.5	0.7	< 1.0	< 0.4	< 0.4
C_{15} - C_{36}	g/m^3	1.7	3	10	1	1.3
Total hydrocarbons (C_7 - C_{36})	g/m^3	2.5	4.2	11	1.7	1.9
Benzene	g/m^3	0.032	0.0142	0.071	0.042	0.139
Toluene	g/m^3	0.132	0.57	0.69	0.25	0.29
Ethylbenzene	g/m^3	0.01	0.0062	0.0077	0.0122	0.0153
m&p-Xylene	g/m^3	0.063	0.041	0.052	0.075	0.096
o-Xylene	g/m^3	0.025	0.0139	0.0195	0.029	0.035

Condition 10 of consent 5838-2.2 requires the irrigation wastewater to not exceed 5% (50,000 mg/l) total petroleum hydrocarbons (TPH) and a sodium absorption ratio (SAR) not exceeding 18 SAR.

The results indicated compliance with condition 20 on the five occasions monitored. The maximum TPH content was 11 g/m^3 and the maximum SAR content was 7.7.

Across the five monitoring rounds the constituents concentrations within the irrigation pond were reported as follows:

- The temperature across the five rounds ranged 11.4 – 22.5°C
- Electrical conductivity ranged 6,900 – 55,520 µS/cm.
- pH results ranged 7.6 – 8.0 pH.
- Total sodium ranged 210 - 540 g/m^3.
- Total calcium ranged 177 - 300 g/m^3.
- Total magnesium ranged 29 – 56 g/m^3.
- Total potassium ranged 360- 1,210 g/m^3.
- Chloride ranged 920 – 2,700 g/m^3.
- Acid soluble barium ranged 0.29 – 0.67 g/m^3.
- Dissolved barium ranged 0.23 – 0.41 g/m^3.
- Total barium ranged 0.42 – 0.77 g/m^3.
- Acid soluble lead ranged 0.004 – 0.011 g/m^3.
- Dissolved arsenic ranged 0.059 – 0.16 g/m^3.
- Dissolved cadmium results were below the laboratory defined limit of detection (LOD) on all five occasions.
- Dissolved chromium results ranged 0.019 – 0.052 g/m^3.
- Dissolved copper results ranged from below the LOD through to 0.0092 g/m^3.
- Dissolved lead ranged from below the LOD through to 0.0017 g/m^3.
- Dissolved mercury was below the LOD on all five occasions.
- Dissolved nickel ranged from 0.041 – 0.093 g/m^3.
- Dissolved zinc ranged from below the LOD through to 0.019 g/m^3.
- Carbonaceous biochemical oxygen demand remained significantly elevated within the irrigation pond, ranging from 300 – 1,340 g O_2/m^3.
- Total ammoniacal nitrogen ranged from 320 – 570 g/m^3.
- Free ammonia ranged from 3.1 – 22 g/m^3.
- Total kjeldahl nitrogen (TKN) and total nitrogen (TN) ranged 300 – 580 g/m^3.
- In terms of petroleum hydrocarbons:
    - C_7-C_9 ranged 0.27 – 0.6 g/m^3.
    - C_{10}-C_{14} ranged from below the LOD through to 0.7 g/m^3.
    - C_{15}-C_{36} ranged 1 – 10g/m^3.
    - C_7-C_{36} ranged from 1.7- 11 g/m^3.
- In terms of benzene, the recorded range was 0.0142 – 0.139 g/m^3.
- Toluene ranged 0.25 – 0.69 g/m^3.
- Ethylbenzene ranged 0.0062 – 0.01 g/m^3.
- M & p xylene ranged from 0.041 – 0.096 g/m^3.
- O- xylene ranged from 0.025 – 0.035 g/m^3.

2.2.4.1 Applications of irrigation fluid

The analysis of the irrigation fluid (Table 12) allows an estimate of the likely quantity of the contaminants discharged to land within the Uruti site. The irrigation areas are defined in Figure 5. The total irrigation area is 13.18 ha. Prior to this development occurring there was 7.0 ha available. Please note that the increased irrigation areas were not fully utilised by the consent holder this monitoring period.

The total volume of fluid discharged to land, by area, is tabulated in the following Figure 10. In the 2019-2020 monitoring period the Company discharged a total 19,410 m^3 of fluid to land. This would average out across the total irrigation area as 1,472 m^3 per ha.

However, as the Company did not have the total area size available for irrigation, some irrigation areas received more fluid than others.

In this monitoring period area U3 received the highest application of fluid, with an annual discharge volume of 5,715 m^3, this was followed by area U2 with 4,575 m^3.

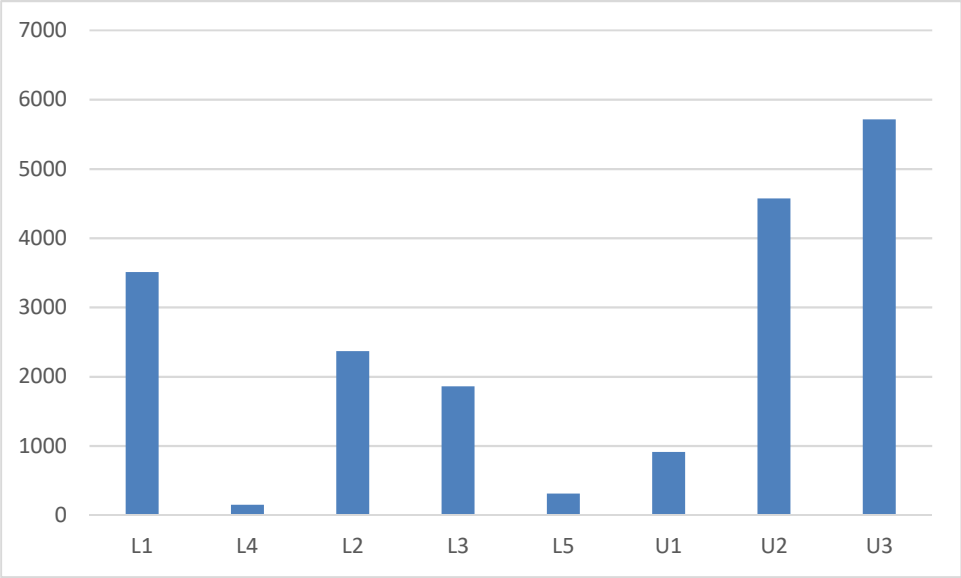

Figure 10 2019-2020 irrigation fluid discharge quantity (m^3) by area

The following Figure 11 provides an estimate of the total nitrogen (in kg) per ha by irrigation area.

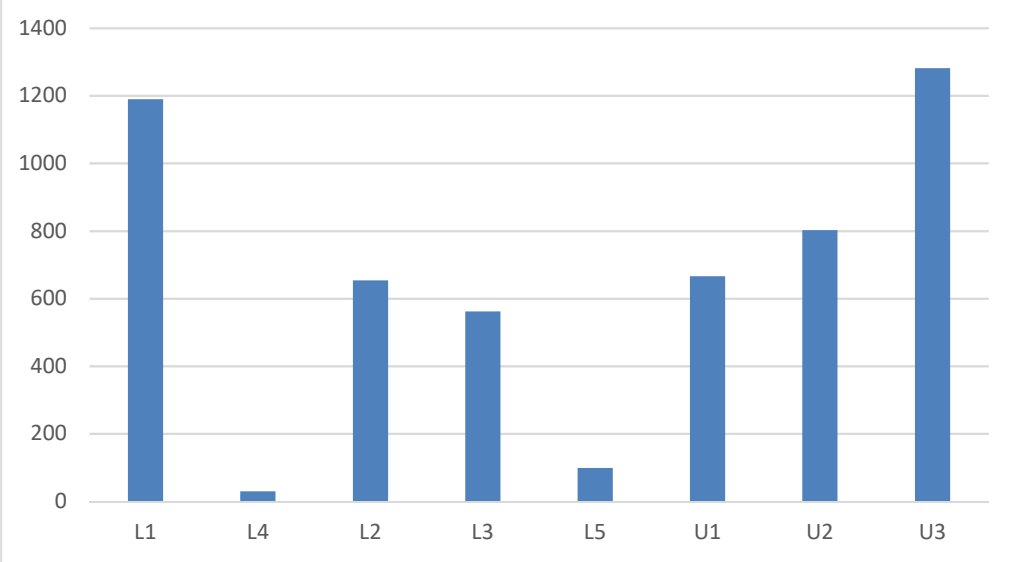

Figure 11 Estimated total nitrogen in kg per ha by irrigation area 2019-2020

The estimated results demonstrate that an exceedingly high concentration of nitrogen has been put to land across the irrigation areas in the 2019-2020 monitoring period. Three irrigation areas received equal to or in excess of 800 kg/ N/ ha, these were L1, U1, U2 and U3. In the case of L1 and U3, the estimated loading was close to (in the case of L1) 1,200 kg N/ha. In the case of U3, in excess of 1,200 kg/N/ha.

The consent holder proposes to mitigate the elevated nitrogen applications by utilising a baleage cut and carry policy. This is proposed to remove between 287-407 kg N/ha[6].

In terms of chloride loading applications (Figure 12), six irrigation areas (L1 – L3 and U1 – U3) received in excess of 1,500 kg of chloride per Ha. In the case of L1 (3,700 kg Cl/ha) and U3 (4,000 kg Cl/ha), the applications were high.

Considering the total irrigation area is now 13.18 ha. The estimated average chloride concentrations throughout the monitoring year was estimated at 1,498 g/m^3. When divided by the total area, the applicant could discharge a total of 2,206 kg/ha, which is still high if each area had an equal quantity discharged.

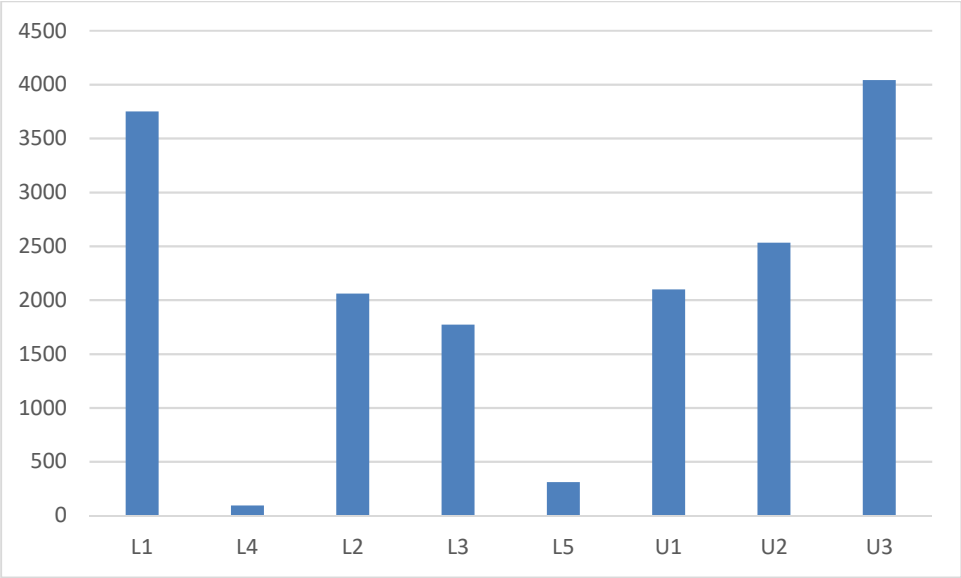

Figure 12 Estimated chloride applications in kg per ha by area 2019-2020

Drilling mud and produced water is the main source of the elevated chloride within the irrigation fluid. The consent holder will cease the acceptance of any drilling waste related material on the 31 December 2020. This is proposed to reduce the chloride loading in the long term.

It should be noted drilling mud remains in significant volumes on the drilling mud pad and this will continue to be a source of chloride on the site. Chloride will continue to be monitored within the programme despite the site no longer receiving drilling mud.

[6] Table – 24 Land Pro Ltd 2020- Application to Taranaki Regional Council for Renewal of Resource Consents Revision 17 –Final 26 June 2020

2.2.5 Groundwater monitoring

Groundwater monitoring was undertaken across the seven monitoring wells on four occasions this monitoring period. This was increased from biannual in the 2018-2019 monitoring period. The location of the groundwater monitoring wells is provided in Figure 3. The analysis of the four rounds is provided in the following Tables 13-19.

Table 13 Monitoring well GND2188 (2019-2020)

Site: GND 2188	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	Time	10:30	09:40	08:20	09:05
Sample Temperature	°C	14.2	15.3	16	14.7
LEVEL	m	1.31	1.58	2.635	0.595
pH	pH Units	6.7	6.8	6.9	5.9
Electrical Conductivity (EC)	µS/cm	744	1,785	1,445	711
Acid Soluble Barium	g/m^3	< 0.11	0.34	0.26	< 0.11
Dissolved Barium	g/m^3	0.102	0.3	0.151	0.112
Chloride	g/m^3	111	330	230	116
Total Sodium	g/m^3	32	74	62	36
Total Magnesium	g/m^3	17.8	41	34	16.1
Total Calcium	g/m^3	67	153	148	51
Total Dissolved Solids (TDS)	g/m^3	470	1,230	1,000	420
Total Ammoniacal-N	g/m^3	2.1	17.4	5.2	0.4
Free Ammonia	g/m^3	0.0031	0.037	0.0149	0.000105
Nitrate-N + Nitrite-N	g/m^3	0.009	0.025	0.01	18.8
Benzene	g/m^3	< 0.0010	0.0093	0.0048	< 0.0010
Toluene	g/m^3	0.0024	0.98	0.131	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	0.003	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	0.0013	< 0.0010	< 0.0010
C_7 - C_9	g/m^3	< 0.06	0.71	< 0.10	< 0.10
C_{10} - C_{14}	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C_{15} - C_{36}	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C_7 - C_{36})	g/m^3	< 0.7	0.7	< 0.7	< 0.7

GND2188, the old control bore prior to the company extending the upper irrigation area (U3). The analysis indicated an increase in analyte concentrations in the summer months, when the groundwater level has decreased due to the summer low flows. This monitoring well recorded a significant degree of variation throughout the year. Of note:

- pH analysis indicated the groundwater was marginally below neutral in three of four monitoring rounds (6.7-6.9 pH), prior to decreasing (5.9 pH) in the final monitoring round.
- Chloride analysis increased three fold during the monitoring year, peaking in October 2019 prior to reducing, with a range of 111- 330 g/m^3. The high value, 330 g/m^3, is the second most elevated result in this data set over time.
- Total dissolved solids ranged 420 -1,230 g/m^3. The high value, 1,230 g/m^3 is the most elevated result recorded at this location, this was recorded during the February 2020 monitoring round.
- Total ammoniacal nitrogen results followed a similar pattern to TDS, though the elevated result was recorded in October 2019, with a value of 17.4 g/m^3. Noting this is the most elevated result for ammoniacal nitrogen in the data set. The lowest result (0.4 g/m^3) was observed in the final monitoring round, June 2020.

- Nitrate/nitrate nitrogen (NNN) concentrations remained <1.0 g/m^3 in three of four monitoring rounds. The final monitoring round (June 2020) recorded a value of 18.8 g/m^3, which is the most elevated result for this analyte at this location.
- In terms of benzene, trace concentrations were recorded on two occasions (October 2019 and February 2020).
- Trace toluene was recorded on three consecutive occasions August 2019 – through to February 2020, prior to reducing to below the laboratory limit of detection (LOD).
- M, P and Oxylene were recorded on one occasion (October 2019) at trace concentrations.
- In terms of petroleum hydrocarbons, C_7-C_9 was recorded on one occasion, October 2019.

Table 14 Monitoring well GND2189 (2019-2020)

Site: GND2189	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	Time	11:00	10:30	09:00	09:45
Sample Temperature	°C	12.7	14	15.9	13.7
LEVEL	m	0.35	0.79	1.69	0.26
pH	pH Units	6.2	5.8	6.3	5.8
Electrical Conductivity (EC)	µS/cm	631	942	894	579
Acid Soluble Barium	g/m^3	0.42	0.55	0.48	0.25
Dissolved Barium	g/m^3	0.44	0.52	0.46	0.26
Chloride	g/m^3	139	240	154	143
Total Sodium	g/m^3	39	64	62	41
Total Magnesium	g/m^3	7	16.4	16.8	9.1
Total Calcium	g/m^3	33	58	65	33
Total Dissolved Solids (TDS)	g/m^3	430	710	550	330
Total Ammoniacal-N	g/m^3	2.4	1.18	1.29	0.35
Free Ammonia	g/m^3	0.001	0.00022	0.00097	0.000065
Nitrate-N + Nitrite-N	g/m^3	0.36	0.003	0.006	0.055
Benzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010	0.0022	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C_7 - C_9	g/m^3	< 0.06	< 0.10	< 0.10	< 0.10
C_{10} - C_{14}	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C_{15} - C_{36}	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C_7 - C_{36})	g/m^3	< 0.7	< 0.7	< 0.7	< 0.7

GND2189, located on the north side of area U1. The water level of this monitoring well is the closest to the surface (0.26 m, June 2020), of all of the seven monitoring wells in this data set. It also contains the least range of water depth (1.69 m). Of note:

- pH analysis indicated the groundwater remained acidic in the four monitoring rounds (6.3- 5.8 pH).
- Barium concentrations (both acid soluble and dissolved) ranged from 0.25 to 0.52 g/m^3
- Chloride values recorded a peak concentration of 240 g/m^3 in October 2019. This value is the most elevated in this data set since January 2015, prior to reducing by the final monitoring round.
- Total dissolved solids followed similar trend to the chloride, with a value of 710 g/m^3, in October 2019.
- Ammoniacal nitrogen was recorded at low concentrations, (<2.5 g/m^3).
- One trace value for toluene was recorded 0.0022 g/m^3, February 2020.

Table 15 Monitoring well GND2190 (2019-2020)

Site: GND2190	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	Time	12:15	12:10	10:30	11:05
Sample Temperature	°C	13.2	15	17	14.2
LEVEL	m	0.37	0.985	2.122	0.27
pH	pH Units	5.7	5.7	6	5.4
Electrical Conductivity (EC)	µS/cm	3,150	2,990	3,260	2,990
Acid Soluble Barium	g/m^3	2.1	1.77	1.74	1.46
Dissolved Barium	g/m^3	2.1	1.74	1.75	1.73
Chloride	g/m^3	900	870	920	880
Total Sodium	g/m^3	250	250	260	250
Total Magnesium	g/m^3	22	22	23	19
Total Calcium	g/m^3	177	166	179	149
Total Dissolved Solids (TDS)	g/m^3	2,100	2,100	2,300	1,720
Total Ammoniacal-N	g/m^3	1.06	0.83	1.13	0.38
Free Ammonia	g/m^3	0.000149	0.000138	0.00045	0.000032
Nitrate-N + Nitrite-N	g/m^3	17.9	3.2	0.105	1.59
Benzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C_7 - C_9	g/m^3	< 0.06	< 0.10	< 0.10	< 0.10
C_{10} - C_{14}	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C_{15} - C_{36}	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C_7 - C_{36})	g/m^3	< 0.7	< 0.7	< 0.7	< 0.7

GND2190, located on the north eastern edge of irrigation area L2. Historically this has been the most impacted well from irrigation applications over time.

- pH analysis indicated the groundwater remained acidic for the duration of the monitoring period (6.0-5.4 pH) the most acidic was recorded in the final monitoring round (5.4 pH).
- The monitoring recorded the most elevated concentrations of barium (acid soluble and dissolved) in the data set (2.1 g/m^3, July 2019), prior to reducing slightly by the end of the monitoring period, 1.46 g/m^3, acid soluble and 1.73 g/m^3, dissolved.
- Chloride analysis remained elevated for groundwater, ranging at a stable range of 870-920 g/m^3 across the four rounds.
- Sodium was also elevated when compared to the other monitoring locations, ranging 250-260 g/m^3.
- Total dissolved solids ranged 1,720-2,300 g/m^3. The second highest result for this analyte across the monitoring wells on site.
- Nitrate/nitrite nitrogen (NNN) ranged 0.105-17.9 g/m^3 during the four monitoring rounds.
- No petroleum hydrocarbon or benzene toluene, ethylbenzene or xylenes (BTEX) were recorded across the four monitoring rounds.

Table 16 Monitoring well GND3007 (2019-2020)

Site: GND3007	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	Time	13:25	13:30	11:55	12:35
Sample Temperature	°C	13	14.4	Dry well	14
LEVEL	m	1.86	2.115		1.53
pH	pH Units	5.9	5.6		6.7
Electrical Conductivity (EC)	µS/cm	141	177		197
Acid Soluble Barium	g/m^3	< 0.11	< 0.11		< 0.11
Dissolved Barium	g/m^3	0.026	0.035		0.039
Chloride	g/m^3	19.4	27		8.6
Total Sodium	g/m^3	8.6	10.2		18.6
Total Magnesium	g/m^3	3	4.1		2.5
Total Calcium	g/m^3	9.5	12.6		18.5
Total Dissolved Solids (TDS)	g/m^3	90	112		124
Total Ammoniacal-N	g/m^3	0.135	0.023		0.022
Free Ammonia	g/m^3	0.000032	< 0.000010		0.000032
Nitrate-N + Nitrite-N	g/m^3	< 0.002	< 0.002		0.085
Benzene	g/m^3	< 0.0010	< 0.0010		< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010		< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010		< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002		< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010		< 0.0010
C_7 - C_9	g/m^3	< 0.06	< 0.10		< 0.10
C_{10} - C_{14}	g/m^3	< 0.2	< 0.2		< 0.2
C_{15} - C_{36}	g/m^3	< 0.4	< 0.4		< 0.4
Total hydrocarbons (C_7 - C_{36})	g/m^3	< 0.7	< 0.7		< 0.7

GND3007 is located at the base of the Haehanga catchment, close to the state highway. On one occasion (February 2020) this monitoring well was not sampled due to insufficient water within the well. Three monitoring rounds were undertaken.

- pH analysis indicated the groundwater remained on the acidic side of neutral across the initial two monitoring rounds (5.9-5.6 pH), though the final monitoring recorded an increase in pH (6.7 pH).
- Acid soluble barium remained below the LOD on the three occasions monitored, this is the fourth occasion this analyte has been below the LOD.
- Dissolved barium observed a slight increase across the three monitoring rounds.
- Chloride, sodium, ammoniacal, NNN nitrogen and TDS remained of low concentrations across the three monitoring rounds.
- No petroleum hydrocarbons or BTEX were recorded above the LOD across the three rounds.

Table 17 Monitoring well GND3008 (2019-2020)

Site: GND3008	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	Time	12:50	12:50	11:10	10:45
Sample Temperature	°C	14.5	15.3	16.9	14.7
LEVEL	m	2.48	2.635	3.44	1.33
pH	pH Units	5.8	6.5	6.2	6.2
Electrical Conductivity (EC)	µS/cm	772	674	482	1,658
Acid Soluble Barium	g/m^3	0.27	0.14	< 0.11	0.54
Dissolved Barium	g/m^3	0.27	0.035	0.045	0.59
Chloride	g/m^3	174	105	96	340
Total Sodium	g/m^3	39	32	30	95
Total Magnesium	g/m^3	21	13.9	12.2	29
Total Calcium	g/m^3	51	34	31	138
Total Dissolved Solids (TDS)	g/m^3	580	410	360	1,050
Total Ammoniacal-N	g/m^3	0.66	3.4	3.2	0.85
Free Ammonia	g/m^3	0.000127	0.0041	0.00182	0.00042
Nitrate-N + Nitrite-N	g/m^3	2.6	0.007	< 0.002	34
Benzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C_7 - C_9	g/m^3	< 0.06	< 0.10	< 0.10	< 0.10
C_{10} - C_{14}	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C_{15} - C_{36}	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C_7 - C_{36})	g/m^3	< 0.7	< 0.7	< 0.7	< 0.7

GND3008 is located at the northern end of the lower irrigation area (L1). In this monitoring period L1, by the consent holder's records, received the second highest chloride and nitrogen applications (Tables 14 & 15). The following has been noted from the four monitoring rounds.

- Electrical conductivity (EC) demonstrated a reducing then increasing concentration, with the elevated result observed in the final monitoring round, noting this is the most elevated result in this data set for this location.
- Acid soluble barium and dissolved barium followed a similar curve, reducing to below the LOD in the February 2020 monitoring round in the case of the acid soluble, prior to increasing in the final monitoring round, with a data set high result for this location in both analytes.
- Chloride and total dissolved solid concentrations recorded a notable increase in the final monitoring round.
- Nitrate/nitrite nitrogen (NNN) concentrations remained low in three of four monitoring rounds prior to a significant increase in the June 2020 monitoring round.
- No petroleum hydrocarbon or BTEX results were recorded above the LOD across the four monitoring rounds.

Table 18 Monitoring well GND3009 (2019-2020)

Site: GND3009	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	**Time**	**11:30**	**11:25**	**09:40**	**10:25**
Sample Temperature	**°C**	14.1	16.1	17.1	14.9
LEVEL	**m**	1.95	1.85	2.625	1.95
pH	**pH Units**	6.4	6.5	6.4	6.6
Electrical Conductivity (EC)	**µS/cm**	3,870	3,580	3,280	1,612
Acid Soluble Barium	**g/m^3**	1.1	0.89	0.85	< 0.11
Dissolved Barium	**g/m^3**	0.8	0.59	0.55	0.08
Chloride	**g/m^3**	980	910	900	114
Total Sodium	**g/m^3**	380	340	310	59
Total Magnesium	**g/m^3**	36	35	29	44
Total Calcium	**g/m^3**	157	150	132	240
Total Dissolved Solids (TDS)	**g/m^3**	2,700	2,400	2,200	1,320
Total Ammoniacal-N	**g/m^3**	26	24	21	0.87
Free Ammonia	**g/m^3**	0.0179	0.028	0.022	0.00119
Nitrate-N + Nitrite-N	**g/m^3**	0.004	< 0.002	0.004	0.031
Benzene	**g/m^3**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	**g/m^3**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	**g/m^3**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	**g/m^3**	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	**g/m^3**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C_7 - C_9	**g/m^3**	< 0.06	< 0.10	< 0.10	< 0.10
C_{10} - C_{14}	**g/m^3**	< 0.2	< 0.2	< 0.2	< 0.2
C_{15} - C_{36}	**g/m^3**	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C_7 - C_{36})	**g/m^3**	< 0.7	< 0.7	< 0.7	< 0.7

GND3009 is located to the north of the duckpond. The result indicated the following:

- pH remained slightly acidic, with all results below 7 pH, ranging 6.4-6.6 pH.
- Electrical conductivity recorded reducing concentrations across the four rounds, reducing considerably in the final monitoring round.
- Acid soluble barium and dissolved barium also recorded a reduction in concentrations throughout the monitoring period.
- Chloride, total dissolved solids and ammoniacal nitrogen concentrations recorded a significant reduction, specifically in the final monitoring round.
- No petroleum hydrocarbons or BTEX were recorded above the LOD.

Table 19 Monitoring well GND3010 (2019-2020)

Site: GND3010	Collected	30 Jul 2019	31 Oct 2019	20 Feb 2020	05 Jun 2020
Parameter	Time	10:00	08:55	07:35	08:25
Sample Temperature	°C	13.6	14.3	15.4	14.3
LEVEL	m	2.12	1.989	2.88	1.645
pH	pH Units	6	5.8	6.3	5.7
Electrical Conductivity (EC)	µS/cm	223	200	387	204
Acid Soluble Barium	g/m^3	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m^3	0.04	0.042	0.006	0.05
Chloride	g/m^3	21	24	10.2	24
Total Sodium	g/m^3	12	13.2	20	14
Total Magnesium	g/m^3	5	5.7	9.1	5.4
Total Calcium	g/m^3	11.3	12.4	20	14.8
Total Dissolved Solids (TDS)	g/m^3	123	117	250	134
Total Ammoniacal-N	g/m^3	2.1	0.51	8.1	0.18
Free Ammonia	g/m^3	0.0007	0.000103	0.0052	0.00003
Nitrate-N + Nitrite-N	g/m^3	0.2	0.002	0.007	0.118
Benzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C_7 - C_9	g/m^3	< 0.06	< 0.10	< 0.10	< 0.10
C_{10} - C_{14}	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C_{15} - C_{36}	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C_7 - C_{36})	g/m^3	< 0.7	< 0.7	< 0.7	< 0.7

GND3010 is located above the upper irrigation area, U3. This monitoring well is proposed to be the new control bore, as the extension of the upper irrigation area have now impacted the previous control bore, GND2188.

However, the results from the previous monitoring period (2018-2019) indicated that this well location may well be monitoring the upper monitoring area rather than background concentrations, as ammonia was recorded (9.1 g/m^3, June 2019).

The analysis recorded this monitoring period indicated the following;

- pH remained acidic throughout the monitoring period, it fluctuated either side of pH 6, prior to reducing to 5.7 pH, in the final monitoring round.
- Acid soluble barium remained below the LOD in the four monitoring rounds, while dissolved barium was recorded at trace concentrations.
- Chloride and total dissolved solids fluctuated slightly, though remained at low concentrations.
- Ammonia recorded a degree of variation across the four monitoring rounds, ranging 0.18 – 8.1 g/m^3, with the final monitoring round recording the lower value of the range.
- No petroleum hydrocarbon or BTEX was recorded above the LOD this monitoring period.

Groundwater discussion

For the majority of the monitoring wells, the impacts to groundwater in terms of chloride, ammonia, total dissolved solids and barium appeared to be short term, and follow an annual cycle, most likely attributed to the hydrological cycle. Where by elevated stream flows and rainfall in the autumn and winter months appear to reduce the relative concentration of these target contaminants, specifically chloride.

The reduction in ammonia concentrations may also be in part due to the Company under taking baleage operations on the irrigation areas, to remove excess nitrogen, in a cut and carry manner. This method of nitrogen removal had been submitted in the most recent assessment of effects associated with the Company's on-going consent renewal.

Loading applications, as detailed in the Company's irrigation records, have been significant in some areas, no major daylighting of nitrogen (acute elevations) has been recorded in the Haehanga Stream or associated unnamed tributaries during monitoring rounds, other than the consented WTS discharge. Though noted is the low concentration, chronic, ammonia concentrations at the lower surface water monitoring sites.

Petroleum hydrocarbons and BTEX results were found also to be sporadic and of low (trace concentrations) with no recorded long term impacts from these parameters recorded in the groundwater.

In the previous monitoring period GND2190 and GND3009, recorded elevated TDS, chloride and ammonia. In this monitoring period the ammonia impacts observed in GND3009 rapidly reduced to near trace (0.84 g/m^3, Table 21, June 2020) concentration in final monitoring round. Chloride impacts in GND2190 remain elevated at, or close to the 900 g/m^3, with TDS also in excess of 1,500 g/m^3.

2.2.6 Irrigation area soil monitoring

The Company irrigates fluid leachate from the irrigation pond (Section 2.2.4) to eight irrigation areas. The irrigation areas now total 13.18 ha (Figure 5). The Company extended an existing area (U3) and created two new areas (L4 and L5). The volume of fluid irrigated to these areas have been discussed in Section 2.2.4.

In this monitoring period nine soil samples were collected, this included two baseline samples (Transects A and B) collected from new irrigation area L4. The baseline samples were collected prior to the irrigation area construction and should serve as baseline soil conditions for the majority of the site irrigation areas. The baseline samples had not been influenced by construction of the irrigation area, compost application, or long term irrigation. Area L5, transect F was collected from a newly constructed irrigation area which had yet to be irrigated upon, though did contain some compost application.

Table 20 RNZ Uruti irrigation area soil sample results 2019-2020

	Location	Location L4	Location L4	Location L5	Location U3	Location U2	Location U1	Location L3	Location L2	Location L1
	Description	Baseline	Baseline	Disturbed but not irrigated	Light to medium irrigation	Medium irrigation	Significant long term irrigation	Significant long term irrigation	Significant long term irrigation	Medium irrigation
	Date	11 Nov 2019	11 Nov 2019	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020
Parameter	Unit/Time	10:38	10:56	11:30	09:50	10:20	10:50	12:00	12:30	13:00
Polycyclic aromatic hydrocarbons										
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.015	< 0.013	< 0.015	< 0.014	< 0.014	< 0.014	0.013	< 0.015	< 0.014
Perylene	mg/kg dry wt	< 0.015	< 0.013	< 0.015	0.084	< 0.014	< 0.014	< 0.013	0.048	< 0.014
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Mono aromatic hydrocarbons										
Benzene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.06	< 0.07	< 0.06	< 0.07	< 0.07
Toluene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.06	< 0.07	< 0.06	< 0.07	< 0.07
Ethylbenzene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.06	< 0.07	< 0.06	< 0.07	< 0.07
m&p-Xylene	mg/kg dry wt	< 0.14	< 0.11	< 0.13	< 0.12	< 0.12	< 0.13	< 0.12	< 0.13	< 0.13

	Location	Location L4	Location L4	Location L5	Location U3	Location U2	Location U1	Location L3	Location L2	Location L1
	Description	Baseline	Baseline	Disturbed but not irrigated	Light to medium irrigation	Medium irrigation	Significant long term irrigation	Significant long term irrigation	Significant long term irrigation	Medium irrigation
	Date	11 Nov 2019	11 Nov 2019	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020	26 Jun 2020
o-Xylene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.06	< 0.07	< 0.06	< 0.07	< 0.07
C7 - C9	mg/kg dry wt	< 9	< 8	< 9	< 9	< 9	< 9	< 8	< 9	< 9
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20	< 20	40	22	< 20
C15 - C36	mg/kg dry wt	< 40	< 40	< 40	42	< 40	< 40	260	167	47
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	< 70	< 70	< 70	< 70	300	189	< 70
Cation/Anion/pH										
Calcium (Sat Paste)	mg/L	< 8	< 8	26	380	139	48	319	126	183
Chloride	mg/kg dry wt	10	6	81	290	125	240	680	440	450
Conductivity from soluble salts	mS/cm	< 0.2	< 0.2	< 0.2	0.5	0.2	< 0.2	0.4	0.2	0.2
Dry Matter (Env)	g/100g as rcvd	68	77	68	74	71	69	74	68	71
Magnesium (Sat Paste)	mg/L	< 3	< 3	9	101	51	8	60	19	27
pH	pH Units	5.6	5.8	6.1	6.4	5.5	5.6	7.1	7.2	7.3
Sodium (Sat Paste)	mg/L	9	10	21	141	88	56	156	161	102
Total Recoverable Magnesium	mg/kg dry wt	5,100	5,100	6,400	6,800	5,700	6,000	6,000	5,200	5,500
Total Recoverable Calcium	mg/kg dry wt	2,800	3,000	4,400	6,200	3,700	3,700	9,800	8,500	7,100
Total Recoverable Potassium	mg/kg dry wt	880	910	1,320	1,660	1,280	1,300	1,800	2,300	1,500
Total Recoverable Sodium	mg/kg dry wt	80	90	137	230	143	199	400	370	320
Sodium Absorption Ratio (SAR)		0.8	0.9	0.9	1.7	1.6	2	2.1	3.5	1.9
Total Recoverable Barium	mg/kg dry wt	36	39	67	360	186	570	2,300	490	1,280
Soluble Salts	g/100g dry wt	< 0.05	< 0.05	< 0.05	0.17	0.09	< 0.05	0.13	0.08	0.08
Heavy metals										
Total Recoverable Arsenic	mg/kg dry wt	4	3	5	5	5	4	5	4	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.12	0.12	0.18	0.18
Total Recoverable Chromium	mg/kg dry wt	18	16	22	21	19	21	20	19	19
Total Recoverable Copper	mg/kg dry wt	9	9	11	15	11	11	18	13	21
Total Recoverable Lead	mg/kg dry wt	10.8	10.4	13.9	16.4	13.2	13	20	14.5	18.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	14	14	17	19	16	14	16	13	13
Total Recoverable Zinc	mg/kg dry wt	54	54	68	68	57	61	84	68	76

The analysis of the nine soil transect resulted in the following:

- Polycyclic aromatic hydrocarbons (PAHs) recorded three compounds, benzo{b}fluoranthene +benzo{j} fluoranthene on one transect (transect G, 0.013 mg/kg) and perylene on two transects (transect C, 0.084 mg/kg and transect H, 0.048 mg/kg) at low concentrations. The remaining PAHs were below the LOD and have not been tabulated.
- No benzene, toluene, ethylbenzene or xylenes (BTEX) results were recorded above the LOD across all nine soil samples.
- Total petroleum hydrocarbons (TPH) results were as follows:
    - C_7-C_9 did not record any results above the LOD.
    - C_{10}-C_{14} recorded two results at low concentrations, transect G (40 mg/kg) and transect H (22 mg/kg). Transect G is situated in area L3 and transect H in area L2. Both are long term irrigation areas.
    - C_{15}-C_{36} recoded four results, transect C/ area U3 (42 mg/kg), transect G/area L3 (260 mg/kg), transect H/area L2 (167 mg/kg) and transect I/area L1 (47 mg/kg).
    - In terms of C_7-C_{36}, two transects recorded results, transect G/area L3 (300 mg/kg) and transect H/area L2 (189 mg/kg).
- In terms of soil chloride concentrations (Figure 13), significant variation existed across the irrigation areas. Area L3 held the most elevated result with a high concentration of 680 mg/kg, followed by area L1 (450 mg/kg) and area L2 (440 mg/kg).
    - The remaining areas held concentrations below 300 mg/kg. Of note is the impact from the irrigation in this figure, as the baseline soil transects of area L4, which have yet to be utilised for irrigation, recorded trace values (very low concentrations) 6-10 mg/kg.

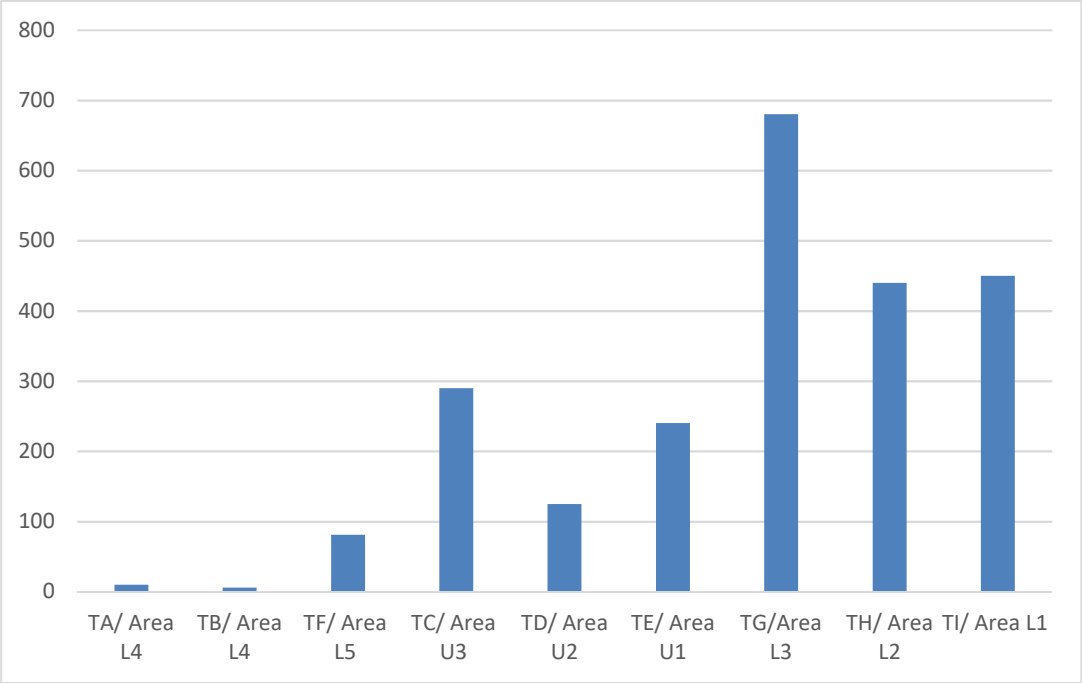

Figure 13 Irrigation area soil chloride results (mg/kg)

- Soil pH results ranged 5.5-7.3 pH. The majority of the soil pH results were slightly acidic however, the irrigation areas (L1-L3) to the north of the duckpond all held pH results above 7 pH, Figure 14.

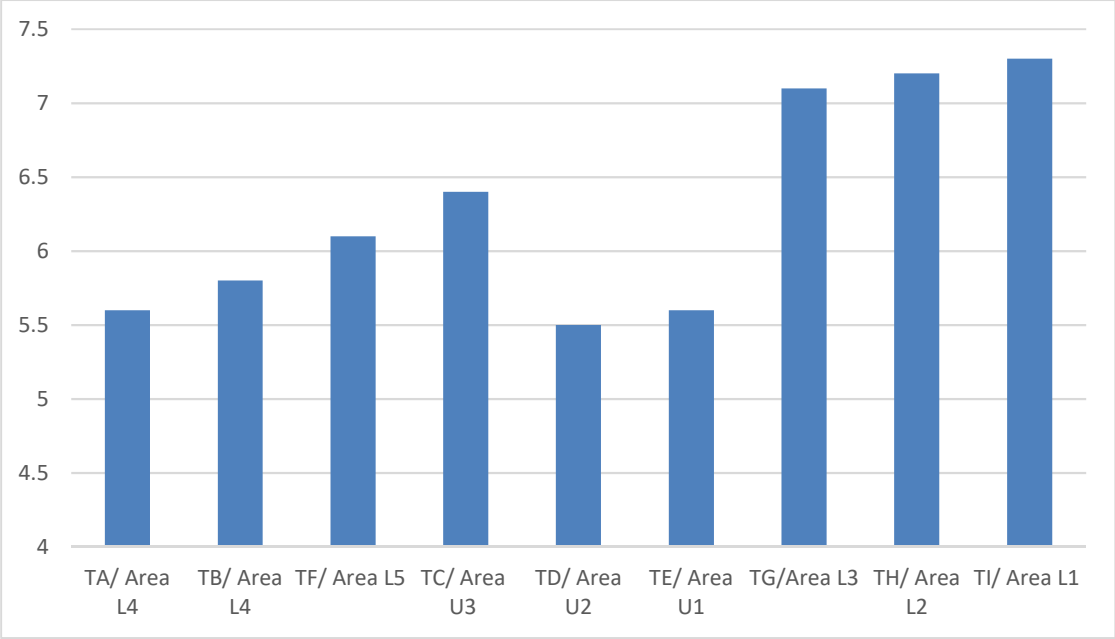

Figure 14 Soil pH results by irrigation area

- Soil sodium results were found to be elevated within the high application rate (U1-U3 inclusive) and long-term irrigation areas (L1-L3 inclusive), Figure 15.

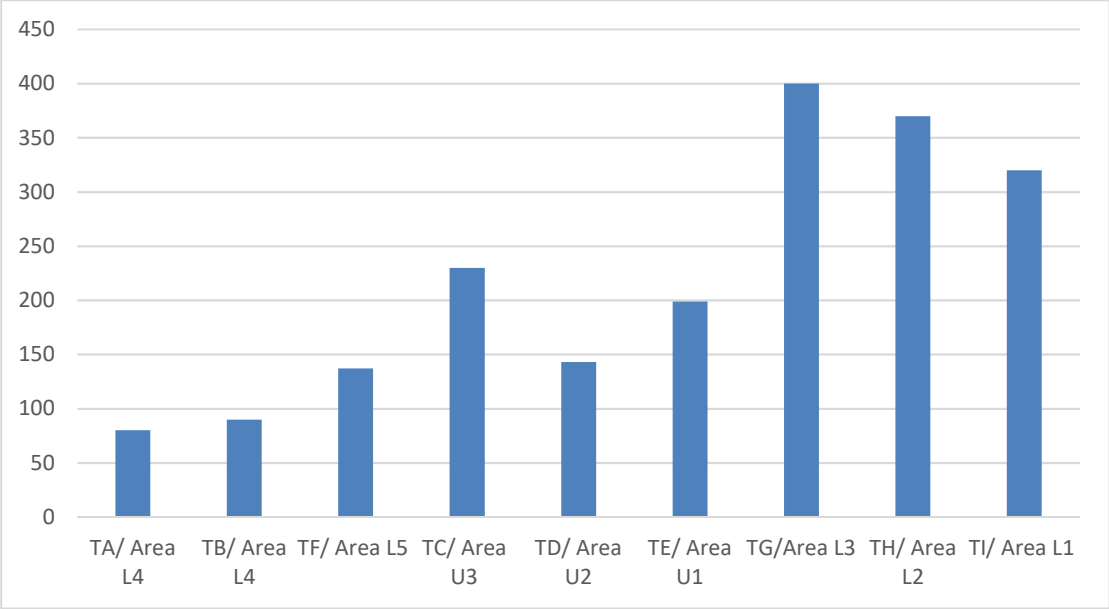

Figure 15 Soil sodium results by irrigation area

- Sodium absorption ratio (SAR) results were of low concentration, the most elevated result of the data set was at area U2 with a value of 3.5 SAR.
- Total recoverable barium results demonstrate the result of irrigating drilling mud constituents to land (Figure 16). In this monitoring period the elevated result was recorded at area L3, with a concentration of 2,300 mg/kg. Please note that area L3 is one of the long term irrigation areas.

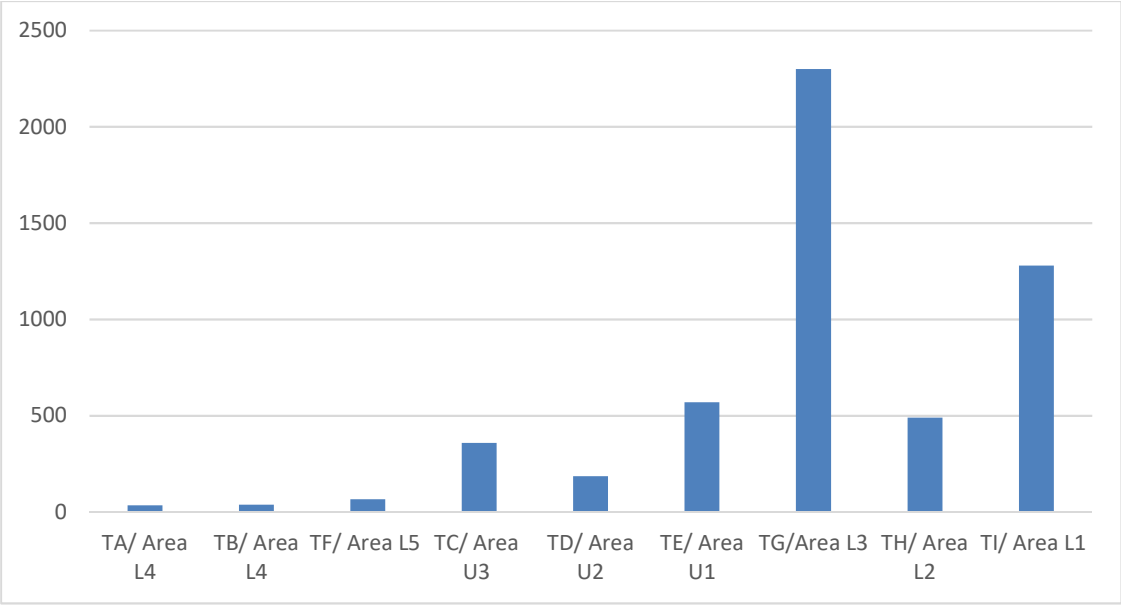

Figure 16 Soil barium results by irrigation area

- Soluble salt concentrations ranged from below the LOD in the cases of areas L4, L5 and U1. These three locations received the least quantity of irrigation fluid when compared to the other irrigation areas of L1, L2, L3, U2, and U3. Area U3 held the highest value for this analyte, 1,700 mg/kg. This corresponds with Figure 12, which is the estimated chloride loading by ha per area, whereby area U3 received the highest concentration of chloride in the monitoring period, as well the highest quantity of fluid, Figure 10.
- In term of heavy metal analysis:
    - Total recoverable (TR) arsenic results remained stable across the nine soil samples, ranging from 3-5 mg/kg.
    - TR cadmium results ranged from below the LOD in four samples of nine, (areas L4, U3 and U2). The range of the recordable results was 0.11 mg/kg in L5 through to 0.18 mg/kg, both L1 and L2. Notably, the long term use areas on site held the highest results for this analyte.
    - TR chromium results remained quite stable across the nine transects, ranging 16-22 mg/kg.
    - TR copper also remained quite stable, ranging 9-21 mg/kg.
    - TR lead remained relatively stable, ranging 10.4-20 mg/kg.
    - TR mercury results were all below the LOD.
    - TR nickel remained stable across the nine transects, ranging 13-19 mg/kg.
    - TR zinc did contain some variation, the range 54-84 mg/kg, with the higher result, 84 mg/kg, associated with long term irrigation area L3.

All heavy metal results comply with current grade A biosolids guidelines[7].

Specifically the results recorded in area L4 represent true soil baseline conditions, these parameters are important to assess the degree of impact observed in other irrigation areas, both the long term areas of L2-3 and U1, as well as the more recent area of L1, over time. These results will also serve to compare any site rehabilitation that may be undertaken in the future, for soil conditions.

[7] NZWWA Guidelines for the safe application of biosolids to land in New Zealand, 2003

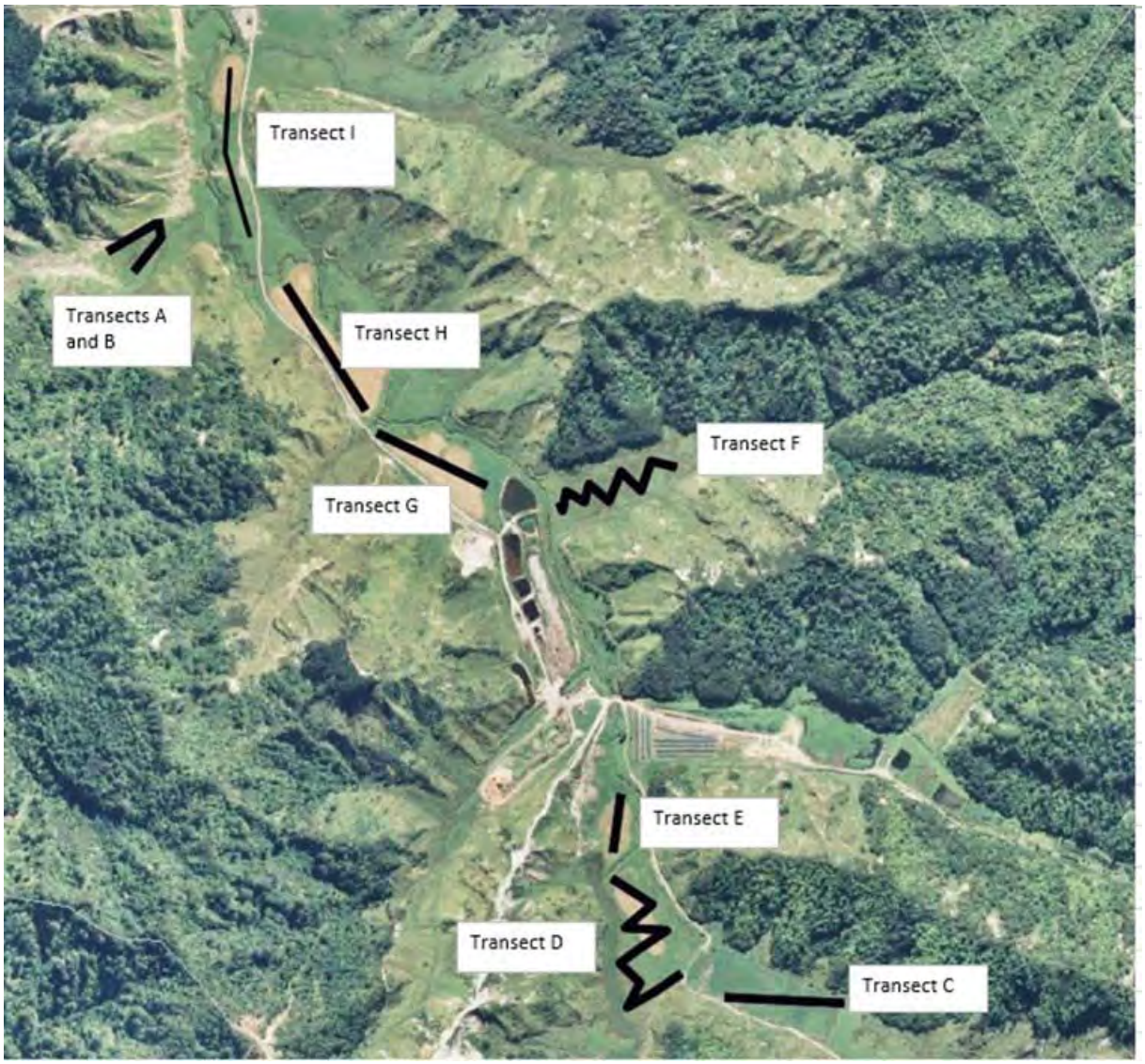

Figure 17 RNZ Uruti soil sample transect locations

2.2.7 Biological monitoring of the Haehanga Stream and associated unnamed tributaries

2.2.7.1 Annual macroinvertebrate survey

The Council's standard 'streambed kick' and 'vegetation sweep' techniques were used at six established sites (Table 21) to collect streambed macroinvertebrates from the Haehanga Stream catchment in order to assess whether the Company's composting areas had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI, and SQMCI scores for each site.

Low flows at the time of the survey resulted in limited sampling habitat at some sites, and consequently, sampling methodology changed from that typically performed at these sites. It should be noted that where community health is discussed below, it is done so with reference to what would be expected in such low flow, habitat restricted conditions.

Table 21 Biomonitoring sites in the Haehanga catchment

Site	Site Code	GPS coordinates (Easting-Northing)	Location
1	HHG000090	1732685-5684577	Upstream of extended irrigation area
2	HHG000100	1732272-5684972	Downstream of extended irrigation area
T2	HHG000098	1732747-5685043	Upstream of wetland discharge point
T3	HHG000103	1732692-5685042	Downstream of wetland discharge point
5	HHG000115	1732124-5685478	25 m downstream of last pond and swale collection area
6	HHG000150	1731673-5685796	30 m downstream of lower irrigation area
7	HHG000190	1731611-5686514	50 m upstream of State Highway 3 bridge

The macroinvertebrate survey conducted on January 2020 observed flows in the Haehanga catchment to be very low, with no discernible flow at some sites. The water had a yellow tannin colouration at the head of the catchment, deteriorating to brown and cloudy at the most downstream site. The habitat limitation caused by the low flows resulted in reduced community richness at all sites.

Overall, this survey found that macroinvertebrate communities of the main stem sites were slightly below average health. Undesirable heterotrophic growths were not recorded at any of the seven sites in this survey.

Figure 18 Map of lower biomonitoring sites on the Haehanga Stream

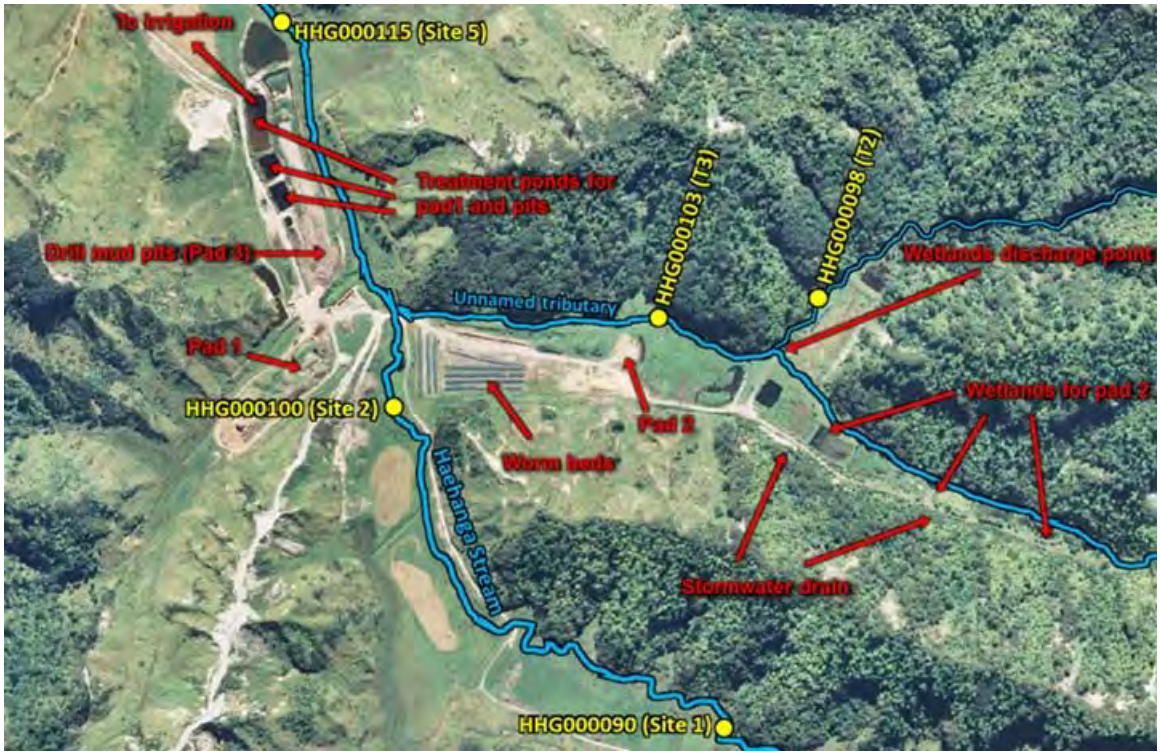

Figure 19 Map of upper biomonitoring sites on the Haehanga Stream and associated unnamed tributaries

Site 1 (Figure 19) had exhibited consistently low macroinvertebrate health scores, as predicted, due to the poor habitat quality in the upper reach of the stream. This section of the stream is not fenced off from livestock and has been poorly managed. It is worth noting that the control site has been compromised multiple times in the past by major earthworks, new consented activities, and livestock damage. Because of this, the control site had been moved upstream to a highly variable site with poor macroinvertebrate habitat quality.

The habitat at site 1 supports more 'tolerant' taxa, which is expected given this area is marshland habitat with pools and no discernible flow. It has a soft bottom, often grass with no cobble or boulder, very little wood debris, and no bed shading, which is largely unrepresentative of downstream sites in many regards.

Therefore, there is little value in comparing site 1, which is expected to have low community health scores, to the downstream sites, which have higher quality habitat (more gravel, cobble, wood debris, riffles, and bed shading) and would be expected to have higher macroinvertebrate health scores.

Therefore, it is recommended that another site is established in a similar catchment arising from the hill county that would be representative of the downstream sites for comparison. In the meantime, site T2 or T3 are more representative of the downstream sites despite being potentially affected by land irrigation. It is recommended that site T2 or T3 should be used to assess the health of downstream macroinvertebrate communities when possible until another site can be established in a similar, unaffected stream. In the current survey, the flow conditions present at site T2 prevented accurate sampling and therefore was not sampled. In such a case, site T3 should be used to compare all other downstream sites.

In general, the communities in the Haehanga Stream sites had relatively low proportions of sensitive taxa, which is expected in small, soft-bottomed streams such as the Haehanga Stream; however, the numbers of taxa recorded were lower than other lowland, hill country streams surveyed at similar altitude. MCI values recorded in the Haehanga Stream were fairly consistent in a downstream direction indicating some improvement when compared to the previous survey. The lowest MCI score in the current survey was recorded at site 6 (66 units) and the highest at site T3 (82 units). With the exception of site 1, all sites recorded MCI scores below their respective medians.

The site sampled in the unnamed tributary (T3) had the highest MCI and SQMCI scores of all the sites. While the amount of habitat available covered a small area, the quality of the habitat was better than any of the other sites that were sampled. Site T3 in the unnamed tributary comprised large and small cobble with some gravel as well as wood debris with riffle habitat throughout. Additionally, the tributary was mostly shaded due to channelisation as well as overhanging vegetation on the northeast side, which deters the growth of periphyton and 'undesirable' heterotrophic growths as well as maintains a lower water temperature. The quality of water in this tributary is likely higher than the other sites sampled, given that the tributary is fed by water runoff from mostly unaltered hill country bush.

All sites in the main stem Haehanga lack bed shading during most of the day. This causes water temperature to rise up to 28°C in the summer, which is outside the thermal preference and, in some cases, tolerance of many stream dwelling species. Unshaded streambeds also promote algal and periphyton growths which were reported as abundant in the previous survey. Site T2 in the unnamed tributary historically has the highest macroinvertebrate health scores and has a mostly shaded bed with much lower temperatures in the Spring, Summer, and Autumn months compared to site 1 (Figure 19). The increased temperature and increased algal growth reported in previous reports is likely contributing to the negative trend in the macroinvertebrate community over the past few surveys.

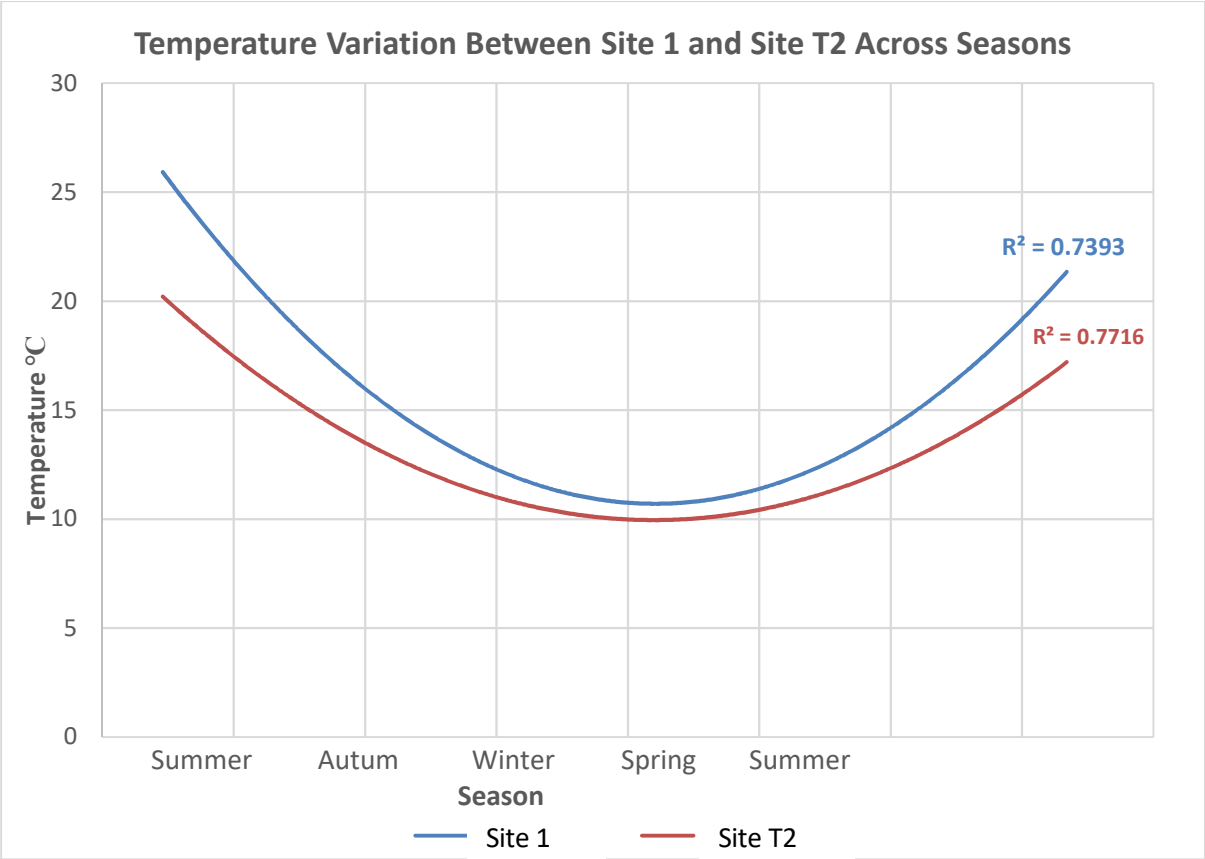

Figure 20 Seasonal temperature comparison between site 1 and site T2 (2010-2019)

During previous surveys, Chironomus bloodworms have been recorded as abundant at various sites. Abundance of this taxon is usually an indication of an organic discharge, although low dissolved oxygen in the stream can also allow this taxon to dominate the community, especially when this is associated with low flows.

It may be then that the sporadic appearance of Chironomus in abundance is at least in part related to the dissolved oxygen concentrations. Dissolved oxygen concentrations in the Haehanga have been found to be depressed at times, and during the warmer months, when there is more aquatic weed growth, dissolved oxygen may be significantly depleted at night.

This is a natural occurrence in some streams that are slow flowing and weedy. Any macroinvertebrate surveys undertaken when such conditions exist could potentially record a community with fewer sensitive species, and a more abundant population of Chironomus. During the current survey, Chironomus was absent at sites 1 and T3, recorded as very abundant at site 2, and common at sites 5, 6, and 7. This possibly suggests a slight, progressive increase in the organic enrichment of the stream. Any on-going works to the leachate and stormwater treatment system would need to regard this progressive enrichment and seek to mitigate it, which would also include improved management of the riparian margin. Any works that improve water quality are also likely to lead to an improvement in freshwater macroinvertebrate communities below the discharge, and should continue to be encouraged.

Overall, current results show that the macroinvertebrate community is consistent across sites within the main-stem stream, but are slightly lower than what is expected for lowland, hill country streams. There are many biotic and abiotic factors, including various consented activities of the Company that can affect macroinvertebrate community health in this stream.

It is recommended that the Company undertake actions to increase the habitat quality of the stream to match that of the upstream site T2 and T3 by better maintenance of the riparian margin and maintaining

stock exclusion from all parts of the Haehanga Stream within the property and riparian planting. These actions will reduce reduce the temperature of the stream to a reasonable level of seasonal variation to better support aquatic ecosystems. This may also help to reduce the amount of sedimentation that occurs at the lower sites and potentially reduce proliferation of periphyton.

Please note the above is extracted from the full biomonitoring report which can be requested in full from the Council. Document number 2481285, report number KB016. It is also referenced at the rear of this report.

2.2.7.2 Fish survey of the Haehanga and associated unnamed tributaries

No fish survey was undertaken this monitoring period. The rational for this was outlined in the previous monitoring period, Technical Report 2019-50, it is also outlined below.

The following as extracted from Technical report 2019-50

In summary, the results of the current survey are not sufficient to identify the potential effects of composting activities and wastewater irrigation undertaken by the Company. There are many activities that may adversely affect the fish community within the Haehanga Stream that take place in conjunction with wastewater discharge, making it difficult to determine if any detrimental effects on the fish community are directly associated with the wastewater discharge.

Most other activities on the site are not directly related to the processing of materials (and therefore production of wastewater), but are the result of historical and ongoing farming or other site activities. These include the placement of access culverts (impeding fish passage), drystock farming where stock have direct access to the tributaries and the upper stream (pugging, bank erosion, suppression of riparian vegetation growth), and the loss of riparian margins (this would include a multitude of effects such as temperature and sedimentation increases).

Owing to this, the fish survey has been suspended for a period of three years. In the three year hiatus from the fish survey the following has been proposed to the Company:

Mitigation activities which have been suggested are as follows:

- Intensive riparian planting and fencing in the catchments waterways;
- The cessation of any instream works;
- The continued implementation of stringent sediment controls,
- The cessation of any eeling;
- Ensuring that fish passage is strictly achieved under the majority of flows.

Any benefits from such works would take several years to eventuate, hence the three year delay between surveys.

2.3 Incidents, investigations, and interventions

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

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

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

Table 22 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the Company activities during the 2019-2020 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 22 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
04 December 2019	Acceptance of unauthorised material to site at Uruti	N	Yes	Infringement notice issued
22 June 2020	Complaint advised unpleasant odour coming from Worm farm, Mokau Rd, Uruti Valley.	N	Yes	Infringement notice issued on finding of objectionable odour beyond the site boundary
23 June 2020	A complaint was received concerning a 'horrible' odour discharging from the composting site at Mokau Road, Uruti.	N	Yes	Infringement notice issued on finding of objectionable odour beyond the site boundary

3 Discussion

3.1 Discussion of site performance

Site performance will be discussed by consent:

5838-2.2 discharge to land

No significant non-compliances were identified during inspections this monitoring period. However, a review of the incoming goods list from the previous monitoring period and in to the beginning of this monitoring period, identified a number of materials which had been accepted without prior authorisation. The Company were issued an infringement notice for this.

In order to make sure this did not occur again, a specific list of materials were agreed between the Company and the Council. This included updating existing definitions of received goods. This also comprised the term 'dirty water' which was not seen as in fitting with the consent. Greater detail was provided by the Company post this non-compliance.

The Company were also under an abatement notice due to the long term non-compliance with not supplying drilling mud analysis, as required by consent. The compliance date for this was the 30 June 2020. Post this date the Company have been compliant with this item.

Inspections noted that the irrigation pond held reasonable freeboard throughout the monitoring period, with no visual evidence of over flow. Ponds had been desilted as required by the management plan. Though additional work is required within the drilling mud pad 3, to remove excess leachate build up which occurs at the Northern end of the pad. It is also noted that this area has been prone to overflowing in previous monitoring periods and the facility remains under an abatement notice from the 2018-2019 monitoring period, specifically related to this pond overflowing into the duck pond.

Two new irrigation areas (areas L4 and L5) were constructed this monitoring period, an existing area was also extended (U2). All three areas were assessed by the Council's River's Engineer and Land Management Officer prior to breaking ground, to make sure that no wetland areas were being impacted by this activity. The new irrigation area opposite the duck pond, termed L5, likely contains a wetland up gradient from it. The Company have discussed the possibility of further enhancing this area and have proposed to engage the local Iwi (Ngāti Mutunga) to aid them in protecting and enhancing this area.

In terms of the irrigation areas overall, a significant extension of irrigation areas were undertaken by the consent holder this monitoring year. For reference, in the 2018-2019 monitoring period, the irrigation areas were extended from 5.3 ha to 7.0 ha. In this reporting period they were further extended to 13.18 ha. The rationale for extending these areas was due to total nitrogen and chloride loading requirements from the irrigation pond.

Both these analytes were put to land in excessive amounts in the previous monitoring period (Technical report 2019-50).

It should be noted that the new irrigation areas were only brought on line at the end of the monitoring period. This meant that the older established areas, plus the extended areas were subjected to higher applications (Section 2.2.4.1) then would be proposed had the full 13.18 ha been available.

Vectors in the form of seagulls, cats, goats and wild pigs have been numerous at times. The Company brought in a goat culler and a bird scarer. Though further work is required in this area, as they have been frequently observed during inspections.

5839-2.0 air discharge

Odour surveys were conducted frequently by the Council's Investigating Officer. These were administered at the State Highway, weighbridge, irrigation pond, drilling mud pad 3 drop-off, pad 1, pad 2, worm beds and upper irrigation areas. Further surveys were also conducted during complaints and these will be discussed in the effects section. During normal compliance inspections, which were conducted monthly, no significant objectionable odour was noted on the site or offsite, throughout the year.

The applicant applied for a new waste stream in the form of lamb pelts/ skins mid-way through the monitoring period. In order to add confidence to the new composting stream, a trial was discussed and agreed upon between the Council and the Company. This eventuated in the Company accepting 30 ton of material (one truck load) on a one off basis. This was monitored by the Company and the Council at regular intervals throughout the trial. This included significant monitoring of key compost parameters by the Company throughout the trial.

The trial was successful, with no significant odour noted on site and no odour noted off site throughout the three week period. Post the trial, sheep skin was added to the acceptable goods list.

A change, which was communicated at the end of the previous monitoring period and continued throughout the current, was the staged aeration of irrigation pond. This was proposed to reduce the nitrogen concentrations within the final pond. This process does lead to notable odour in close proximity to the irrigation pond when in operation.

5938-2.0, 6212-1.0, 10547-1.0 culverts

During inspections the ability for fish to move up and down the catchment has been given much consideration throughout the past few monitoring periods. Given the dynamics of the Haehanga catchment, a considerable range of weather conditions are observed throughout a calendar year. The Company has been able to satisfy fish passage throughout the monitoring period, specifically through the twin culverts (5938-2.0) which have in the past been considerably perched.

Maintenance of the downstream riffle has enabled the Stream to maintain flow through the twin culverts across all flows. This is a significant undertaking, as during the summer low flows the stream does become disjointed and pools in areas.

The single culvert (6212-1.0) on the Haehanga Stream has proved more of difficult task to satisfy fish passage across all flows. This had been discussed frequently during inspections and the site manager has been working on this aspect, with further works planned to be undertaken this summer. The plan is to maintain the riffle downstream of the single culvert, which will in turn, raise the static water level below the culvert and reduce any potential velocity barrier. The riffle can be frequently washed away during higher flows. The site manager is aware of this and is committed to continually monitoring this, as well as the twin culverts.

Both these culverts have been found to have stable headwalls which are routinely assessed for any signs of erosion.

The replaced existing culvert (10547-1.0), which is located in close proximity to the drilling mud pad has proved difficult to assess for fish passage. It is very long, 25 m, and leads from a rocky hill gully. Neither the inspector nor the biologist are encouraged to enter this area from a safety stand point as it constitutes a confined space. The head wall is routinely checked for any erosion, as is the downstream extent.

10063-1.0 quarrying operations

The quarry has been non-operational this monitoring period. The inspections focussed on the access track which in previous monitoring period had been prone to erosion. To mitigate this, the Company have been

regularly reminded to pay close attention to cut-off drains, which prevent significant rainfall from flowing from the base of the track and affecting site operations and stream clarity.

The inspections remarked that the cut-off drains were functioning as planned with no non-compliances noted.

5839-2.2 stormwater discharge Waitara Road

Inspections found the facility at Waitara Road to be well managed, with housekeeping prevalent throughout. The Company had removed the previous subsurface drainage pipe and replaced it with an open drain. This is a proposed improvement to the stormwater system, as it will allow stormwater to discharge from the property, into a sediment collection pond, prior to the unnamed tributary of the Waiongana Stream.

Further enhancements to the stormwater system had been discussed, and how well these develop over the coming monitoring period will be assessed during inspections.

It was noted that some older storage containers at the rear of the facility required some further housekeeping.

The facility was found to be compliant with its resource consent during inspections this monitoring period.

3.2 Environmental effects of exercise of consents

5838-2.2

The wetland treatment system (WTS) functionality has been widely discussed in previous monitoring reports. In this monitoring period the monitoring of the discharge and the associated instream monitoring location (Sections 2.2.1 and 2.2.2) were found to be compliant on all sampling occasions. This includes for un-ionised ammonia at HHG000103, which has been found to be compliant for the past three monitoring years.

Irrigation pond constituents and irrigation area soil

The irrigation areas have been extended as previously discussed in the performance section. The discharged quantities of nitrogen and chloride put land in this monitoring period remained significantly elevated.

Given the increased irrigation area, the Company now has the ability to balance the nitrogen load to land in the upcoming monitoring period. This coupled with the planned cut and carry baleage policy is proposed to mitigate the elevated nitrogen.

While this may well reduce the nitrogenous impacts, the chloride remains significantly elevated. This is a direct result of accepting drilling waste. To counter this, the Company will cease all acceptance of drilling waste related material on the 31 December 2020.

While this may negate an increasing source of chloride, the Company have a significant legacy issue to deal with, in the form of the drilling mud compost. Noting that this material has been in-situ for longer than eight years and will remain a consistent source of chloride until it is fully processed.

In the previous monitoring period a portion of the drilling mud pad compost was assessed and was found to be elevated in target contaminants. This results meant it could not be used around the site under the permitted activity rule 29. Reprocessing is continuing.

Five of eight irrigation areas received over 2,000 kg per ha of chloride in the 2019-2020 monitoring period. This is not a sustainable way of disposing of elevated saline fluid. The effect of the irrigation can be observed in the soil sampling undertaken this monitoring period.

The newly developed area of L4, which had not received any irrigation, held a baseline concentration ranging between 6 – 10 mg/kg chloride. Area L3 in comparison, which is long term irrigation area held a

concentration of 680 mg/kg. Similar ranges are also observed in barium concentrations across the irrigation areas. The baseline from area L4 for barium held a range of 36- 39 mg/kg, which when compared to area L3, 2,300 mg/kg is a significant more elevated. The elevated concentration in L3 is directly related to irrigating diluted drilling waste to land.

The baseline soil samples of the new irrigation area L4 are indicative of true baseline conditions pre irrigation, with no compost application. These results should serve as a marker against all other irrigation areas in future. They will also serve as the true baseline conditions for measured parameters, should site rehabilitation be undertaken in the future.

Surface water

Surface water monitoring rounds of the Haehanga Stream and associated unnamed tributaries were undertaken on five occasions during the monitoring period. In addition, two mini surveys were also completed during summer low flows. The mini surveys were orchestrated as a direct result of the Company accepting a substantial amount of perished chicken. The mini surveys also served to assess for any un-consented discharge to surface water, as have been recorded in previous monitoring periods.

The results of the five monitoring rounds and two mini surveys did not record any significant impact to surface waters when compared to consent conditions, as a process of operations.

Of note was the significant bacteriological impact noted during the mini surveys. While bacteriological impacts to surface water have no significant baring on in-stream biota, they do carry human health related impacts from a recreational bathing perspective. It is proposed for the upcoming monitoring period that additional monitoring sites be established on the Mimitangiatua River to assess for bacteriological impacts.

While there were no significant impacts to surface water, Figure 7 and 8 do provide a reference of the stresses affecting this water course, with surface water chloride concentrations increasing down the catchment. This is particular apparent in the summer months, when an increase of 50 g/m^3 chloride was recorded, from the top site (HHG000090) to the bottom site (HHG000190).

In terms of ammoniacal nitrogen within surface water, analysis of this analyte at HHG000150 over the past three years recorded a median concentration of 0.30 g/m^3. In the current monitoring period, including the mini surveys, the median concentration was recorded at 0.36 g/m^3. This would place HHG000150 and specifically the Haehanga Stream firmly above the national bottom line (NPS-FM 2020) for ammoniacal nitrogen annual median (>0.24 g/m^3) (pH 8 adjusted). Noting in the data set this year the annual maximum of 0.40 g/m^3 at HHG000150 was exceeded on three of seven occasions.

This increase in certain contaminants also matches up with the discussion offered by the biologist in reference to the macroinvertebrate survey, which stated in reference to the genus *Chironomus* (blood worms).

During the current survey, Chironomus was absent at sites 1 and T3, recorded as very abundant at site 2, and common at sites 5, 6, and 7. This possibly suggests a slight, progressive increase in the organic enrichment of the stream.

It is noted in the biological survey, in the previous technical report and communicated to the Company on multiple occasions that further work on the riparian margins is required within the Haehanga catchment. The fish survey has been put on hold for a period of three years for the Company to undertake these works.

To date minimal work has been undertaken up catchment, where the thermal impacts to the head waters of the Haehanga Stream occur and the area is frequented by stock, unfenced and exposed, with little to no shading.

Now that the Haehanga Stream has been recorded to be above the national bottom line for ammonia, as defined by the NPS-FM, there will be a requirement to improve the water quality of this stream.

Bacteriological assessment will be undertaken in the upcoming monitoring period across all surface water monitoring locations.

The requirement to improve the riparian habitat has been communicated and will continue to be reinforced.

Groundwater monitoring

This was increased from biannual to quarterly, which provided a better picture of the groundwater conditions throughout the monitoring period. Two of the seven wells (GND2190 and GND3009) recorded elevated chloride concentrations this monitoring period (>800 g/m^3), though the final round for GND3009 recorded a significant reduction in the groundwater chloride concentration. The remaining five wells remain below 350 g/m^3.

In terms of nitrogen, the results varied considerably throughout the monitoring period. GND3009 held an elevated concentration of ammonia across three rounds (>20 g/m^3) which was reduced in the final monitoring round (0.87 g/m^3). Nitrate/nitrite nitrogen (NNN) results have remained low in five of seven wells. GND3009, which is located in area L1 recorded a considerable increase in NNN concentration in the final monitoring round from below the LOD to 34 g/m^3. While conversely, GND2190, which is a chloride impacted well, recorded a decreasing concentration (NNN) across the monitoring period.

When the results are compared to the Company's tiered management plan, all wells remain in tier 1. However it should be noted that the tiered system is a methodology construed from landfarm surrender conditions. Landfarms are, for the majority, undertaken on a one off application basis, rather than long term application of fluid and material. It is recommended that the Company review the tiered system to establish whether it remains fit for purpose.

Compost application

The Company were intending to put to land under a permitted activity rule, with assessment, composted drilling mud. To date no assessed drilling mud has been found to be compliant with the assessment criteria and assessed material from the drilling mud pad has not been allowed to be put to land. A review of the Rule 29, from the Region Freshwater Plan identified that this material is not generated on site, as it comprises wastes which were brought to site. Further, the assessment found the material in its current state was likely to have a significant adverse effect on the environment if put to land within the site boundaries.

It should be noted that composted material contains nitrogen as well as other contaminants and this should be factored in by the Company when they reach an ultimate decision with how to deal with this legacy. In its current form it will continue to contribute to nitrogen and chloride loading across the site, while the Company continue to add to it. It is also further understood that best practice for this material is to have it sold/ removed legally and exported off site and in doing so, exporting the nitrogen and other contaminants with it.

Nitrogen loading rates remain elevated and it is not sustainable to overload areas with excessive concentrations, irrespective of the source. If nitrogen levels do not decrease the Council will likely consider alternative regulatory approaches such as setting a nitrogen cap on individual application areas.. Similar caps have been imposed on other land application industries.

Air consent 5839-2.0

Complaints related to odour confirmed two odour incidents this monitoring period. Objectionable odour was confirmed and the Company were issued an infringement notice on both occasions. Prior to these infringements, the previous complaints were received in March and September 2018, and prior to those, April 2015.

Further investigation as to the source of these odours and the likely formulation of the odours is under way at the time of writing and will reported in the 2020-2021 annual report.

The Company have been asked to engage expert opinion on their odour impacts and how to mitigate or prevent them.

Odour surveys are undertaken monthly by the Council's Investigation Officer. In this monitoring period, odour has been found localised to the drilling mud pad, both at the drop-off area and the irrigation pond. The composting material on pad 1 has been found, on occasion, to be odorous during turning events. The odour generated can migrate down the valley when cold air drainage occurs and this activity should be avoided at such a time.

Culvert monitoring

5938-2.0, 6212-1.0 and 10547-1.0

The main aspect of any culverts situated within the Haehanga Stream is that they must be able to stand up to significant erosion issues, associated with various flows throughout a monitoring year. It must also be constructed in a manner which does not prevent fish passage. All three culverts have been found to be good condition with minimal erosion present.

Fish passage is continually regarded through inspections and in the case of the twin culverts, this has been achieved across all flows.

The large single culvert however continues to be a work in progress. Work has been undertaken to lift the static water level downstream of the culvert. This work will not be fully complete until the Company has had the opportunity of assessing the works in the low flow summer months.

The large single replacement culvert, which leads from the Haehanga Stream to an unnamed tributary, situated in a rocky gully has not be able to be assessed for fish passage due to its length (>25 m), it is also a confined space.

6212-1.0 Stream realignment

No issues with the stream alignment have been found by the Council's Investigating Officer this monitoring period.

10063-1.0 Quarry operations

As the quarry has been non-operational during this monitoring period, inspections focused mainly on stormwater runoff on the access track. Regular maintenance of the stormwater cut-off drains continued during this monitoring period. No elevated suspended solids were recorded during the surface water monitoring rounds.

Biological monitoring

The biologist concluded that overall, the survey found that macroinvertebrate communities of the main-stem sites were slightly below average health. However, undesirable heterotrophic growths were not recorded at any of the seven sites in this survey.

The original reference site for this survey had been compromised in the previous monitoring period. The new reference site proposed, located at the top of the catchment is not comparable to lower sites. In order to mitigate this, the biologist has been tasked with identifying and monitoring a new reference site in a similar catchment. This work will be undertaken in the next monitoring period.

The fish survey has been postponed for a period of three years to enable the Company to undertake significant development of the riparian margins, including the up catchment head waters, via fencing, stock removal and planting. The next fish survey will be undertaken in the 2022-2023 monitoring period.

5839-2 stormwater discharge Waitara Road

No objectionable odour was recorded during the inspections this monitoring period. A sample was collected from the upgraded stormwater drain. The result indicated that the discharge was in compliance with consent for pH and suspended solid concentrations. This discharge occurs infrequently, thus the degree of revegetation proposed during inspections will be assessed in the upcoming monitoring period.

All worms beds were found to be covered when not being fed or harvested. No issues were noted.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 23-31.

Table 23 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	- No - A review of the incoming goods register identified a number of items which had been accepted on site that had no prior authorisation - Drilling mud pad compost continues to increase in size without any secondary vermicomposting undertaken, which is not as was proposed in the original application - Compost on drilling mud pad unable to be sold as it contains elevated contaminants as a result of insufficient site management
2. Only acceptable waste accepted onto site	Site inspections/review of supplied records	- No - The review indicated some wastes accepted without authorisation. - Infringement fine issued
3. Representative sample of each type of drilling waste analysed for: a. Total petroleum hydrocarbons b. Benzene, toluene, ethylbenzene and xylenes c. Polycyclic aromatic hydrocarbons d. Heavy metals e. Chloride, nitrogen, pH, potassium and sodium	Records to be provided	- Yes - Analysis provided by Company post 30 June 2019

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?**
4. DAF residue not to be accepted	Site inspections/review of supplied records not listed as accepted	- Yes - Records checked
5. Maintenance of stormwater systems	Inspections	- Maintenance ongoing - Specific requirement to manage leachate on Pad 3 drilling mud pad
6. Maintenance of treatment systems	Inspections	- Yes - Maintenance on going
7. Adequate pond construction to prevent any leak to surface water or groundwater from any leachate or stormwater holding pond	Inspections and monitoring	- Yes - No significant contaminants identified during the surface water monitoring rounds
8. Keep and supply irrigation records	Supply of records	- Yes - Supplied 24/09/2020
9. No direct discharges to water to occur as a result of irrigation to land	Site inspections /sampling	- Yes
10. Irrigated fluids not to exceed 5% hydrocarbon content or SAR of 18	Site inspections and sampling	- Yes - Sampling indicated the SAR was below the value of 18 on all monitored occasions - TPH in fluid has been below 5%
11. Discharges not to cause adverse effects at downstream of irrigation areas	Surface water sampling and inspections	- No - On one occasion (21/01/2020) at HHG000150, a minor exceedance in oxygen demand was reported (2.1 g O_2/m^3) - HHG00150 was the old downstream monitoring location applicable to this condition - HHG000150 above the national bottom line (>0.24 g/m^3) for ammonia toxicity as defined by NPS-FM - However, as the irrigation areas have been extended, the new monitoring location is HHG000168 - HHG000168 was recorded above the annual maximum (>0.4 g/m^3) for ammonia toxicity as defined by NPS-FM on two of five occasions -
12. Soil sampling to be undertaken for TPH and BTEX	Soil sampling undertaken by the Council	- Yes

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?**
13. Soil sampling to be undertaken for chloride, sodium, magnesium, calcium, potassium, soluble salts and conductivity	Soil sampling undertaken by the Council	- Yes
14. Adhere to composting facility management plan	Inspections	- Some portions of the management plan have been undertaken, while other facets have not - Bird scare deployed - Goat culling undertaken - Some goats observed and significant seagulls, thus continued adherence to removing these vectors from site is required - Irrigation areas extended significantly - Stormwater improved - Setbacks from Haehanga undertaken - Storage dam not completed - It is noted the dam was proposed in 2015, the NPS-FM 2020 requires adherence to regarding and maintaining fish passage. The proposed dam does not currently have provision for fish passage, this aspect will require careful consideration if it is to go ahead - Monitoring within the tiered system as defined by plan - More riparian planting required (deferred fish survey to allow time to plant additional and develop riparian margin across the whole site)
15. Establish groundwater monitoring bores	Site inspections	- Yes - Additional monitoring wells have been installed
16. Groundwater monitoring wells installed as per standard	Undertaken	- Yes
17. Consent holder monitoring and record groundwater in each monitoring well each day for level, temperature, and conductivity	Not undertaken by consent holder	- No - Not undertaken every three months or supplied as required by consent

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?**
18. Groundwater sampled per six month interval: a. Total petroleum hydrocarbons b. BTEX	Undertaken by Council	- Yes
19. Groundwater samples shall be collected from all wells for chloride, sodium, magnesium, calcium, TDS and conductivity	Undertaken by Council	- Yes
20. Prepare Pond Treatment System Management Plan	Plan provided	- Yes - Management plan now termed leachate and stormwater management plan currently included in consent renewal - Original Pond Treatment System management plan issue date July 2010 issue 1 currently utilised
21. Adhere to Pond Treatment System Management Plan	Inspections	- No - No breathable compost covers on compost - No straw used on the solids collection pond to mitigate odour - No fogging system is installed around the final irrigation pond to neutralise odour - Inspections indicate cleaning out of sediments ponds and traps is not cleaned out at a 20% basis, though some have been cleaned out, this is an on-going requirement - Community meetings are not held
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

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?**
26. Maintain riparian plantings	Inspection identified that riparian planting is developing. This will be on-going	- Additional riparian planting undertaken - A significant portion still requires planting. The Council biologist requires significantly more planting of the stream margin. - The annual fish survey has been postponed for three year to allow the Company to further develop the riparian margins to enhance the habitat for fish
27. Notify the Council of significant incidents on site	No notifications received	- N/A
28. Prepare a Site Exit Plan prior to site closure	Not supplied	- Not supplied as yet
29. Adhere to Site Exit Plan	N/A	- N/A
30. Optional Review	Consent renewal occurring	- 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		**Improvement required** **Poor**

N/A = not applicable

Table 24 Summary of performance for consent 5839-2.0

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	- No - Accepting items without authorisation - Objectionable odour on two occasions
2. Composting area not to exceed certain limits	Programme management and site inspections	- No - Identified significant increase in the size of both pads, which have effectively doubled in size - This to be dealt with via consent renewal

Purpose 5839-2.0: *To discharge emissions to air at Mokau Road, Uruti*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
3. Only acceptable waste brought onto site	Site inspections and a review of records	- No - Review of records indicated that some wastes have been accepted with no authorisation Infringement fine issued
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 - Data received and reviewed
6. Prepare a Site Practices Plan	Plan submitted with AEE	- Yes
7. Adhere to Site Practices Plan	Inspections	- No - Vectors were uncontrolled. Now a bird scarer is in operation and a hunter employed to remove feral goats - Ponds require more regular clean outs - The drop-off pit is still utilised for storage, something which was proposed to be discontinued in the AEE
8. Arrange professional assessment of Site Practices Plan	Supplied in 2010-2011 year.	- Yes
9. Submit Proposed Implementation Plan	Plan submitted in the 2011 as defined in Technical report 2015-68	- Yes
10. Adhere to Proposed Implementation Plan		- Not assessed - Proposal adopted and incorporated into other plans - Defined in Technical report 2015-68
11. Dust deposition not to exceed certain limits	Not monitored	- Not assessed-dust not an issue during inspections
12. PM10 and suspended particulate not to exceed certain limits	Not monitored	- Not assessed
13. No offensive or objectionable odour beyond the boundary	Inspections	- No - Two confirmed odour incidents, infringement fines issued
14. Install a weather station and provide data	Inspection and weather updates.	- Recently updated October 2020
15. Conduct odour surveys	Undertaken by the Council during inspections and during complaints	- Yes

Purpose 5839-2.0: *To discharge emissions to air at Mokau Road, Uruti*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
16. Hold community meeting	Meeting held in 2011	- No community meeting held in this monitoring period - The Company have decided to reinitiate annual community meetings in the upcoming monitoring period
17. Notify the Council of onsite incidents	No notification received	- N/A
18. Prepare a Site Exit Plan prior to site closure	Not provided, though included in current AEE documentation	- 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		**Poor**
Overall assessment of administrative performance in respect of this consent		**Poor**

N/A = not applicable

Table 25 Summary of performance for consent 5892-2

Purpose 5892-2.0: *To discharge stormwater from the worm farming operations onto and into land and into an unnamed tributary of the Waiongana Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Exercise of consent in accordance with information provided in application	Site inspections	- Yes
2. Best practicable option as described by S2 of RMA	Site inspections	- Yes - Site inspections indicated that housekeeping was good and limited odour noted - All worm beds were covered when not being fed
3. Stormwater management plan	Received 14 November 2016	- Yes
4. Records of source, nature and volume of wastes	Yes	- Yes - Provided with main Uruti information
5. No contamination of ground or surface water	Site inspections	- Yes - One sample of the drain did identify elevated BOD, but the drains only flows during intense rainfall

Purpose 5892-2.0: *To discharge stormwater from the worm farming operations onto and into land and into an unnamed tributary of the Waiongana Stream*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. Maintenance of stormwater treatment system and concentration limits	Site inspections	- Yes - Concentrations within range for pH and suspended solids
7. Post mixing zone stormwater effects	Sampling	- Not assessed - Samples were not collected during the period under review as there was no water in the tributary
8. Windrows covered except when discharging	Inspections	- Yes - Inspection indicated that windrows were covered, except during feeding or harvesting
9. Alterations to processes and operations	Inspections	- Sheep skin composting trial undertaken successfully - Allowable goods list developed and agreed
10. Reinstatement of site	Not required currently	- Not assessed
11. Optional review of consent	No review due this period	- Consent under renewal process
Overall assessment of consent compliance and environmental performance in respect of this consent Overall administrative compliance with this consent		**High** **High**

N/A = not applicable

Table 26 Summary of performance for consent 5938-2.0

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 - Bed is adequately constructed and does not prevent fish passage. - Regular check undertaken during inspections
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 - Site inspections indicated the Site Manager is continually working on improving this aspect and regularly checks the culvert

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?**
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**

N/A = not applicable

Table 27 Summary of performance for consent 6211-1

Purpose 6211-1.0: *To realign a stream at Mokau Road, Uruti*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notification prior to commencement of works	Works undertaken and assessed by investigating officer	Yes
2. Realignment in accordance with application	Site inspections	Yes
3. Best practicable option	Site inspections	Yes
4. Minimisation of discharge	Site inspections	Yes
5. Minimisation of riverbed disturbance	Site inspections	Yes
6. Optional review of consent	No review due this period	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**

N/A = not applicable

Table 28 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 - Works undertaken this period and inspectorate were informed, some additional rocks were added to the downstream side of the culvert

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?**
		which lifted the static water level within the stream - Additional work is planned for this summer - The works will be assessed over time to make sure that adequate fish passage is maintained
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 - Site inspections indicated that recent works are aiding with fish passage, additional works planned for this summer - Continual monitoring of this will be undertaken
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 Overall administrative performance with respect to this consent		**Good** **High**

N/A = not applicable

Table 29 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-Quarry was not operated this monitoring period, all stormwater directed to grassland off access track via cut-off drain	- Yes
2. Notification of quarry works	Consent exercised	- 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?**
3. Adopt best practicable option	Inspection identified the quarry was not operated this monitoring period	- Yes - Cut-off drains inspected and found to be working well. Continually checked by site manager
4. Shall operate and progressively reinstate the quarry site in a manner which ensures exposed areas are kept to a minimum at all times	Not assessed as quarry not operational	- NA
5. Ensure no area greater than 1 ha is exposed at any one time	Online assessment	- Yes - Inspection and online review indicated the current quarry area is 6,000 m^2 - The access track is 4,000 m^2
6. The stormwater discharged shall not exceed 4 ha	Not assessed this period	- NA
7. Stormwater treatment system shall be installed before any site works commence	Inspections	- Yes - Inspection indicated the stormwater cut-off drains and sediment traps are on the access track - Continual maintenance is required
8. Stormwater treatment system shall be maintained for the life of the quarry operation	Inspection indicated that this is on-going	- Yes
9. All stormwater to be directed to stormwater treatment system prior to discharge to Haehanga Stream tributary	Inspection	- Yes
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: <15 g/m^3	Sampling	- Surface water monitoring at HHG000100 indicated compliance with this condition.

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?**
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 25 m	Sampling	- NA
12. After mixing the discharge shall not give rise to any of the following effects: a. Production of scums, films or foams b. Any conspicuous change in the colour or visual clarity c. Any emission of objectionable odour d. Rendering of fresh water unsuitable for farm animal e. Any significant adverse effects on aquatic life	Inspection and sampling	- Yes - Inspections and sampling did not indicate any of the following effects as process of the quarry operations
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 5 NTU as a result of the discharge	No turbidity monitoring undertaken this period	- NA
14. Maintain and update Contingency plan	Notification and supply of records	- No - Not supplied

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?**
15. Site shall be operated in a management plan which will contain the following: a. The loading and unloading of materials b. Maintenance of conveyance systems c. General housekeeping d. Management of the interceptor system	Supply of management plan-Not received	- No - Not received
16. Notification pertaining to the change of nature of discharge	Notification	- No - None received
17. Consent lapse	Consent in effect	- NA
18. Review condition	No review required quarry non-operational this monitoring period	- NA
Overall assessment of consent compliance and environmental performance in respect of this consent Overall administrative performance with respect to this consent		**Good** **Improvement required**

N/A = not applicable

Table 30 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 shall be a smooth bore plastic pipe and have an internal diameter of no less than 1 metre and be no longer than 40 m	Inspections	- Yes
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	Inspections	- Yes
3. The fill over the top of the culvert pipe shall be 2.3 m	Inspections	- Yes

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?**
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 received via inspectorate	- 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		- NA
The consent holder shall take all practicable steps to minimise stream bed disturbance, sedimentation and increased turbidity during installation of the culvert, including by: e. completing all works in the minimum time practicable; f. avoiding placement of excavated material in the flowing channel; g. keeping machinery out of the actively flowing channel, as far as practicable; and h. reinstating any disturbed areas as far as practicable	Inspections	- Yes
6. A reinforced concrete headwall shall be installed at the inlet to the culvert	Inspections	- Yes
7. 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;	Inspections	- Yes

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?**
- 50% greater than 600 mm diameter; - 90% greater than 350 mm diameter		
8. The culvert shall not restrict fish passage	Not assessed	- Not assessed by the Council biologist - This culvert is very large and long. The biologist did not feel safe to enter as it is a confined space
9. 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	To be assessed	- NA
10. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site		- Yes - On observation this appears to be in line with the gradient
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. 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	Inspections	- Yes - Maintenance undertaken when required - Regularly inspected

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?**
13. 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		- None reported. - Note this was a replacement culvert
14. 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		- Exercised
15. Review condition	Not required currently.	- NA
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 31 RNZ resource consent compliance 2019-2020 monitoring period

Consent	Environmental Performance	Administrative performance
5838-2.2 (Discharge waste to land and water, Uruti)	Improvement required	Poor
5839-2 (Discharge emissions to air, Uruti)	Poor	Poor
5892-2 (Stormwater Waitara Road)	High	High
5938-2.0 (Twin culvert Uruti)	High	High
6211-1 (Haehanga realignment Uruti)	High	High
6212-1 (Culvert, Uruti)	Good	Good
10063-1.0 Quarry discharge	Good	Improvement required
10547-1.0 Culvert unnamed tributary	High	High

Table 32 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2013-2014	5838-2				1
	5839-2		1		
	5892-2	1			
	5893-2	1			
	5938-1	1			
	6211-1	1			
	6212-1		1		
2014-2015	5838-2			1	
	5839-2		1		
	5892-2	1			
	5893-2	1			
	5938-1	1			
	6211-1	1			
	6212-1			1	
2015-2016	5838-2.2			1	
	5839-2	1			
	5893-2	1			
	5892-2	1			
	5938-2.2			1	
	6211-1	1			
	6212-1			1	
	10063-1.0				
2016-2017	5838-2.2		1		
	5839-2	1			
	5893-2	1			
	5892-2	1			
	5938-2.2			1	
	6211-1	1			
	6212-1			1	
	10063-1.0				
2017-2018	5838-2.2			1	
	5839-2		1		
	5893-2	1			
	5892-2			1	
	5938-2.0	1			

Year	Consent no	High	Good	Improvement req	Poor
	6211-1	1			
	6212-1	1			
	10063-1.0	Not assessed as quarry operations suspended			
2018-2019	5838-2.2				1
	5839-2			1	
	5892-2	1			
	5938-2		1		
	6211-1	1			
	6212-1		1		
	10063-1.0		1		
	10547-1.0	1			
Totals		23	8	10	2

During the year, the Company demonstrated a poor environmental and administrative performance with the resource consents as defined in Section 1.1.4.

3.4 Recommendations from the 2018-2019 Annual Report

In the 2018-2019 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at Company facility of Uruti in the 2019-2020 year be amended from that undertaken in 2018-2019, by the following:
    a. THAT the groundwater analysis be expanded to quarterly to account for further seasonal variation.
    b. THAT the soil sampling be expanded to account for a sample from each of the irrigation areas in order to assess change across the irrigation areas annually.
2. The establishment of new surface water monitoring locations (three) below the new lower irrigation areas.
3. Surface water monitoring to target summer low flows specifically.
4. Inspections at the Waitara Road facility to be conducted at certain times in order to collect stormwater discharge samples.
5. The implementation of in-situ multi-parameter probe/sonde be considered for installation in the lower reaches of the Haehanga Stream, below the irrigation areas to assess water quality continuously.
6. The annual fish survey is proposed to be undertaken on a tri-annual basis. The rationale for this change in timing is to allow the Company to undertake enhanced riparian margin development across the whole catchment. This also includes the upper catchment of the Haehanga Stream which is particularly vulnerable to thermal impacts. In addition, the Company must complete all works and remedial items with regard to fish passage. These two areas are seen as key facets to aid the fish populations which are impacted by naturally occurring low flows in the summer months. Further, the Company must undertake operations which do not result in elevated contaminates entering the Haehanga Stream, as the last two monitoring periods have identified contaminant concentrations which could impact the biology of the Stream. These were identified during the low flow months,

where the biology of the stream is already stressed due to natural climatic forcing which is further exacerbated due to the above outlined facets.

7. The proposed tri-annual fish survey will have an updated methodology to further align it with New Zealand Freshwater Fish Sampling Protocols which reflect best practice undertaken throughout the country.
8. The annual macro-invertebrate survey will continue on an annual basis. In addition to this annual survey, specific regard will be given to assessing the degree of fish barrier and the degree of riparian development over the three year period.
9. THAT should there be issues with environmental or administrative performance in 2019-2020, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

All of the above recommendations, apart from points 5 and 7, were implemented this monitoring period. Point 5 remains under consideration and may be included as a condition in the on-going consent renewal.

3.5 Alterations to monitoring programmes for 2020-2021

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

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

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

It is proposed that for 2020-2021 monitoring period that the monitoring of the consented activities at the Uruti facility on the Mokau Road continue at the same level as that undertaken in the 2019-2020 monitoring period, with the inclusion of bacteriological samples at all sites of the Haehanga Stream.

That the implementation of an in-situ water quality probe remain a consideration and should a decline water quality results be recorded, then it should be installed, at the consent holder's expense.

It is proposed that for 2020-2021 monitoring period that the monitoring of the consented activities at the blending facility located on the Waitara Road, Brixton, continue at the same level as that undertaken in the 2019-2020 monitoring period.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2020-2021.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Uruti site in the 2020-2021 year continue at the same level as in 2019-2020, with the inclusion of the following:
2. THAT the implementation of a telemetered in-situ water quality probe be installed, at the consent holder's expense, as soon as practicable.
3. Increased focus on ammonia and dissolved reactive phosphorous monitoring within the surface waters.
4. Consideration of increasing the frequency of surface water monitoring round frequency to monthly.
5. Bacteriological monitoring (*E-coli*) of the Haehanga Stream and the above and below the confluence with the Mimtangitua River.
6. Consideration of targeted odour surveys in order to access for objectionable odour.
7. It is proposed that for 2020-2021 monitoring period that the monitoring of the consented activities at the blending facility located on the Waitara Road, Brixton, continue at the same level as that undertaken in the 2019-2020 monitoring period.
8. THAT should there be issues with environmental or administrative performance in 2020-2021, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

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.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in µS/cm.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m^3s^{-1}).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$g/m^2/day$	grams/$metre^2$/day.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.

Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m^2	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
MPN	Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample.
µS/cm	Microsiemens per centimetre.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM_{10}, $PM_{2.5}$, $PM_{1.0}$	Relatively fine airborne particles (less than 10 or 2.5 or 1.0 micrometre diameter, respectively).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
Zn*	Zinc.

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

solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

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

Bibliography and references

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

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

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

BTW Company Ltd-Uruti Compost Facility Management Plan-Remediation New Zealand 2015.

Taranaki Regional Council: Clements, K: 2019 Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, April 2019.

Taranaki Regional Council: Clements, K: 2020 Biomonitoring of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, January 2020. KB016.

Taranaki Regional Council: Clements, K: 2019 Fish survey of the Haehanga Stream in relation to discharges from the Remediation (NZ) Limited composting site at Uruti, April 2019.

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

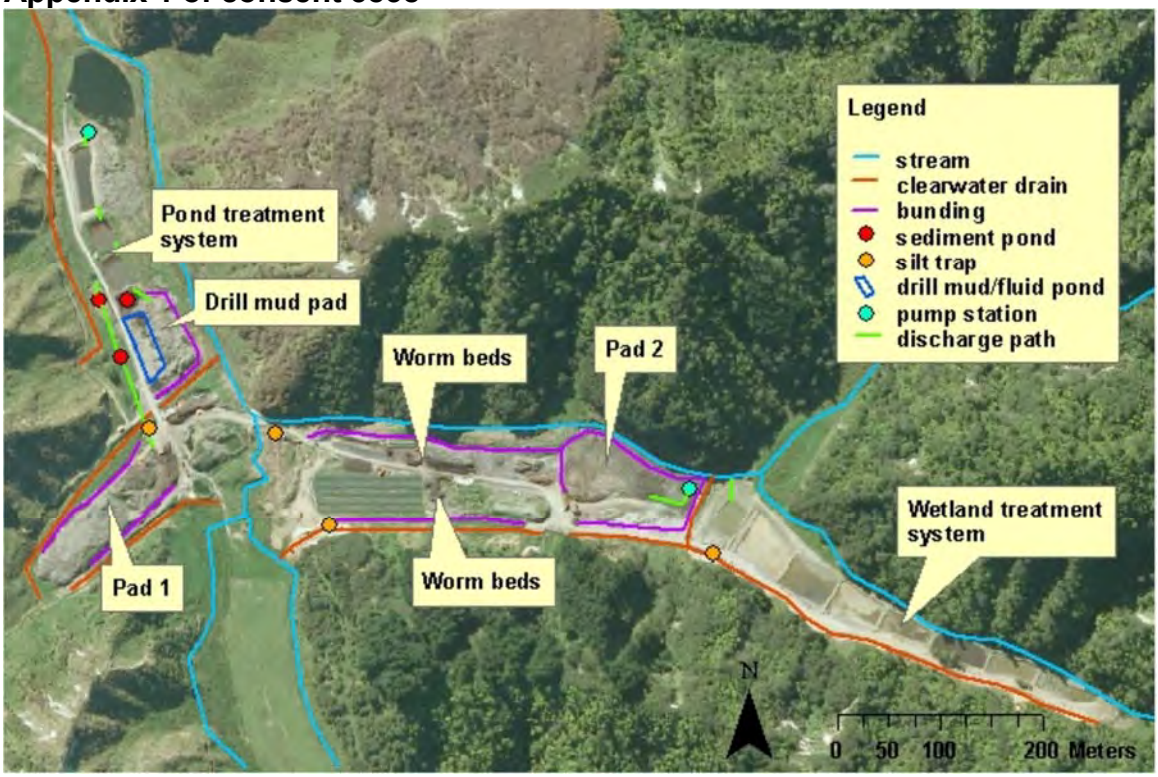

Figure 1 The location and extent of the Pond Treatment System, Wetland Treatment System, Pads 1 and 2, and the Drill Mud Pad.

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

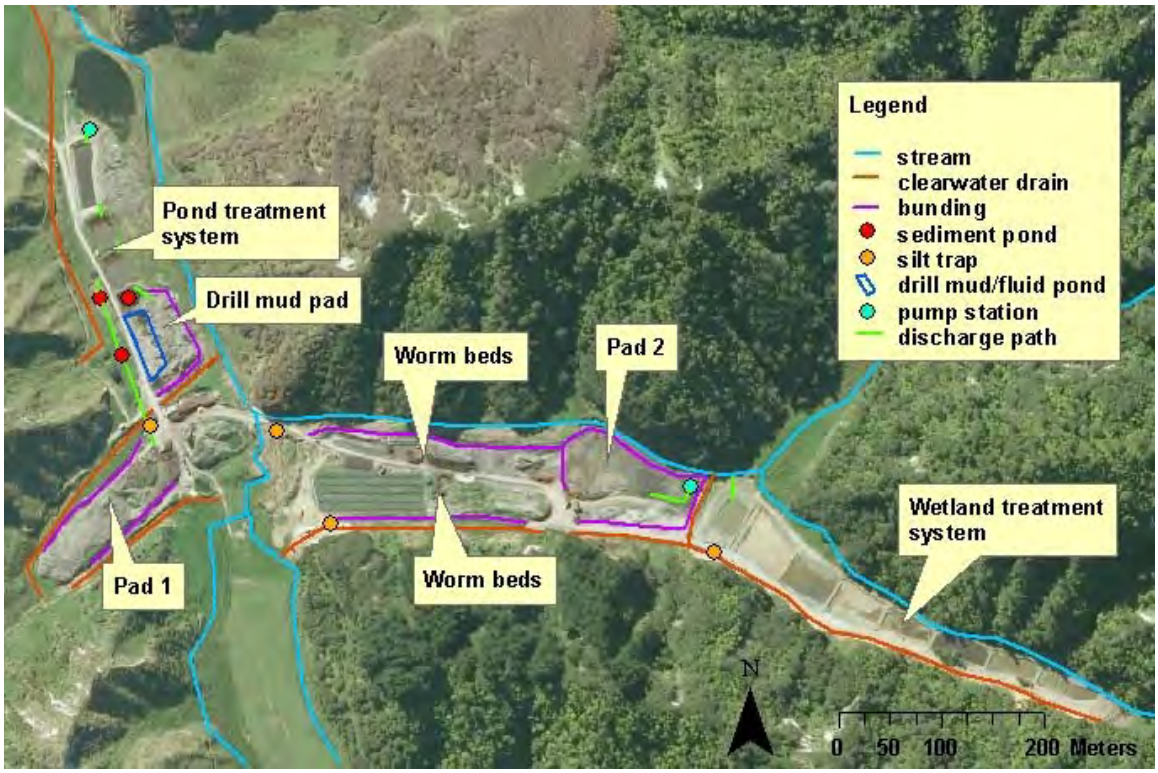

Figure 1 The location and extent of the composting operation including Pads 1 and 2.

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
Consent Granted Date:	7 September 2006

Conditions of Consent

Consent Granted:	To discharge stormwater from worm farming operations onto and into land and into an unnamed tributary of the Waiongana Stream at or about (NZTM) 1705949E-5679907N
Expiry Date:	1 June 2020
Review Date(s):	June 2008, June 2014
Site Location:	96 Waitara Road, Brixton, Waitara
Legal Description:	Lot 1 DP 19670 Blk III Paritutu SD
Catchment:	Waiongana

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. This consent shall be exercised generally in accordance with the information submitted in support of applications 1559 and 4037. In the case of any contradiction between the documentation submitted in support of applications 1559 and 4037 and the conditions of this consent, the conditions of this consent shall prevail.

2. At all times the consent holder shall adopt the best practicable option, as defined in section 2 of the Act, to prevent or minimise any actual or likely adverse effect on the environment associated with worm farming activities and the discharge of stormwater onto and into land.

3. Within three months of granting of this consent the consent holder shall prepare and maintain a stormwater management plan to the satisfaction of the Chief Executive, Taranaki Regional Council. This plan shall be updated as required by any significant changes to plant processes.

4. The consent holder shall keep and make available to the Chief Executive, Taranaki Regional Council, upon request, records of the nature and volume of all wastes received at the site; such records to be kept for at least 12 months.

5. The exercise of this consent shall not result in any contamination of groundwater or surface water, other than as provided for in special condition 6 of this consent.

6. The stormwater treatment system shall be maintained to the satisfaction of the Chief Executive, Taranaki Regional Council.

   The following concentrations shall not be exceeded within the discharge effluent:

Component	**Concentration**
pH (range)	6.5-8.5
suspended solids	100 gm^{-3}

This condition shall apply prior to any stormwater prior to leaving the site into the neighbouring drain, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

7. After allowing for reasonable mixing, with a mixing zone extending seven times the width of the receiving waters downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the unnamed tributary:

   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 or objectionable odour;
   d) the rendering of fresh water unsuitable for consumption by farm animals;
   e) any significant adverse effects on aquatic life.

8. The consent holder shall ensure that except when discharging, windrows shall be covered at all times.

9. Prior to undertaking any alterations to the processes or operations which significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991.

10. The Chief Executive, Taranaki Regional Council, shall be advised in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise effects on stormwater quality, and to meet the criteria of Tables 4.11, 4.14 & 4.20 of the Ministry for the Environment (1999) document 'Guidelines for Assessing & Managing Petroleum Hydrocarbon Contaminated sites in N.Z.'.

11. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2008 and/or June 2014, 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 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