Remediation NZ Ltd
Uruti and Waitara Road
Monitoring Programme
Annual Report
2018-2019

Technical Report 2019-50

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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 2018 to June 2019 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 improvement required level of environmental performance.

The Council's monitoring programme for the year under review included 14 inspections, 107 water samples and seven soil samples collected for physicochemical analysis. A biomonitoring and fish netting survey of the receiving waters was also undertaken.

The monitoring of the Uruti facility indicated that the wetland treatment system discharge was compliant with consent defined values for the discharge on five of five sampling rounds. One round was defined to be out of scope for pH values, though the sample was collected from the final pond as the discharge was not occurring. The corresponding monitoring location within the unnamed tributary of the Haehanga Stream, in respect to the wetland treatment system discharge, was found to be compliant across eight rounds of sampling. This is the second year this location has not reported an exceedance when compared to consent conditions.

Routine surface water monitoring of the Haehanga Stream and associated tributaries identified elevated contaminates within the surface water at number of locations, in late February 2019 through March 2019. During this period two additional rounds of follow-up sampling were undertaken and they indicated elevated contaminates, which resulted in an abatement notice being issued. By April 2019 the surface water monitoring indicated concentrations within consent conditions.

Groundwater surveys identified two monitoring wells with elevated chloride and in one case, significant levels of ammoniacal nitrogen.

During the monitoring period an assessment of the drilling mud pad and green waste pad was undertaken. The drilling mud pad material will require further composting as it contains measurable hydrocarbons. However, the green waste pad material had reached suitable criteria to allow its use as a soil conditioner within the confines of the Uruti site.

Quarry operations were undertaken sporadically this period. Sediment control was much discussed throughout the monitoring period, which is being undertaken on the access track, though continued adherence is required.

Fish passage is an area which will continue to be improved across the site. The catchment experiences some extreme flow conditions, thus maintaining fish passage across all flows is challenging. A review by the Council biologist indicated that the majority of the culverts required additional work to maintain fish passage across all flows. A report assessing each culvert individually, in terms of fish passage, has been provided to the Company.

The fish survey is proposed to be repeated on a tri-annual basis to allow the Company to undertake and demonstrate the benefits of some significant riparian development across the whole site. This includes the upper catchment which is impacted by a lack of riparian margins and fencing. The survey indicated that environmental pressures on the stream from natural forcing as well as Company operations (non-related to discharges), coupled with limited riparian work up catchment and fish passage restrictions, mask any potential affect from Company discharges. Thus mitigating these variables will allow for a more in depth assessment of changes to be assessed.

Macroinvertebrate community health has declined over the past few years. The decline is likely related to many biotic and abiotic factors, including natural forcing, as well as the various consented activities of the Company. It is recommended that the Company undertake actions to increase the habitat quality of the stream, by better maintenance of the riparian margin through stock exclusion from all parts of the Haehanga Stream within the property and riparian planting.

At the Waitara Road facility, the facility undertook to improve their stormwater system. No odour impacts were reported or noted during inspections. Housekeeping was prevalent with all worms beds covered when not being fed or harvested.

During the year, the Company's Uruti facility demonstrated an improvement required 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 the resource consents

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

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

This report includes recommendations for the 2019-2020 year.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2018 to June 2019 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. They also operate a remediation through 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 catchment, and the air discharge permit held by the Company to cover emissions to air from the site at Uruti.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 18th combined annual report by the Council for the Company.

1.1.2 Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by the Company in the Waitara and Mimitangiatua catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

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

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

Section 4 presents recommendations to be implemented in the 2019-2020 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

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

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

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

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

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

Administrative performance

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

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

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

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

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.[1]

1.2 Process description

The 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 soil conditioner.

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

The current site at Uruti accepts a range of waste streams which include paunch grass, poultry waste, poultry mortalities, green waste and drilling waste. The full acceptable material list is provided in appendix I, consent 5838-2.2.

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 this is termed 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 green waste 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 off site for sale.

Pad 2, the paunch pad, is where paunch from suppliers is delivered. This is one large pond, whereby 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 raupo which functions as a nitrogen sink for the ammonia rich paunch origin 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.

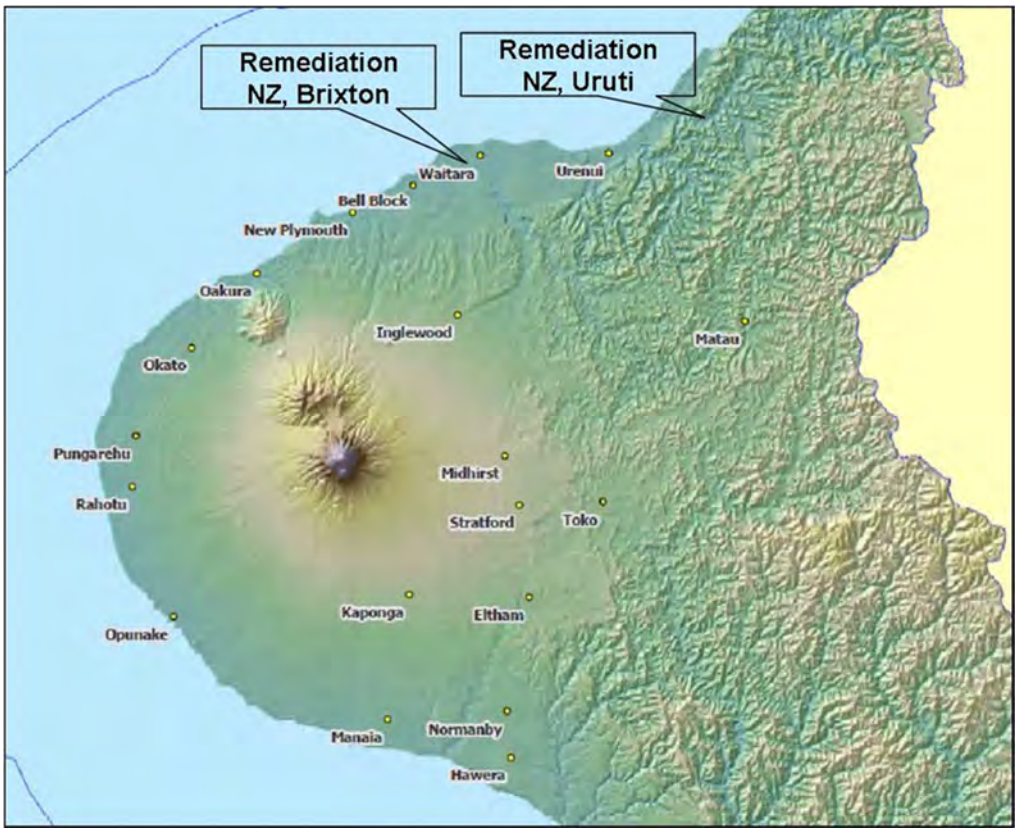

Figure 1 Regional location of the Company operations in Taranaki

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 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 alnd 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
Land use permits				
5938-2.0	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 Mimi 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 Mimi 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 12 occasions this period, 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 wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.3.4 Chemical sampling

The Council undertook compliance sampling across the Company operations, primarily related to the Uruti facility in the 2018-2019 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 12 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 12 locations were tested for a range of analytes which are detailed in Table 2. The Council assesses these 12 surface water locations six times per annum. Noting in Figure 3 are all the surface water sampling locations in relation to the Uruti site, of which 12 are monitored. Spot field parameters are also collected for field screening purposes. These are 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, this network is a consented obligation of resource consent 5838-2.2. The monitoring well network is now comprised of seven wells (Figure 4). The

monitoring network was monitored biannually this period and was assessed for the analytes provided in Table 2. Prior to sample collection, Council field staff undertake a well stabilisation procedure, whereby the sample will not be collected until 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.

Table 2 Monitoring analytes by medium

Surface Water Analytes	
Calcium	Conductivity
Chloride	Total Petroleum Hydrocarbons (TPH) C7-C36
pH	C7-C9
Biochemical Oxygen Demand (BOD)	C10-C14
Benzene	C15-C36
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) C7-C36
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	Temperature
Total Petroleum Hydrocarbon (TPH)	Level
Total Calcium	Dissolved Barium
Total Magnesium	Acid Soluble barium
Total Sodium	

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

Soil analysis

Representative soil sampling is undertaken on the site specific irrigation areas of which originally, 5.2 hectares were available. Note this has now been expanded to 7.0 hectares with the establishment of area F at the end of the monitoring period (Figure 5) and the new lower irrigation area E, which came on line in this monitoring period. The aim of the soil sampling was to ascertain for any specific trends which may be emerging as a direct result of irrigation to these areas.

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 the communities in the stream. In addition to this, a fish netting survey was also undertaken. A summary of these two surveys are provided later in this report in Section 2.2.7.

Figure 2 RNZ Uruti site map

Figure 3 Surface water monitoring locations Uruti

Figure 4 RNZ Uruti groundwater monitoring well locations

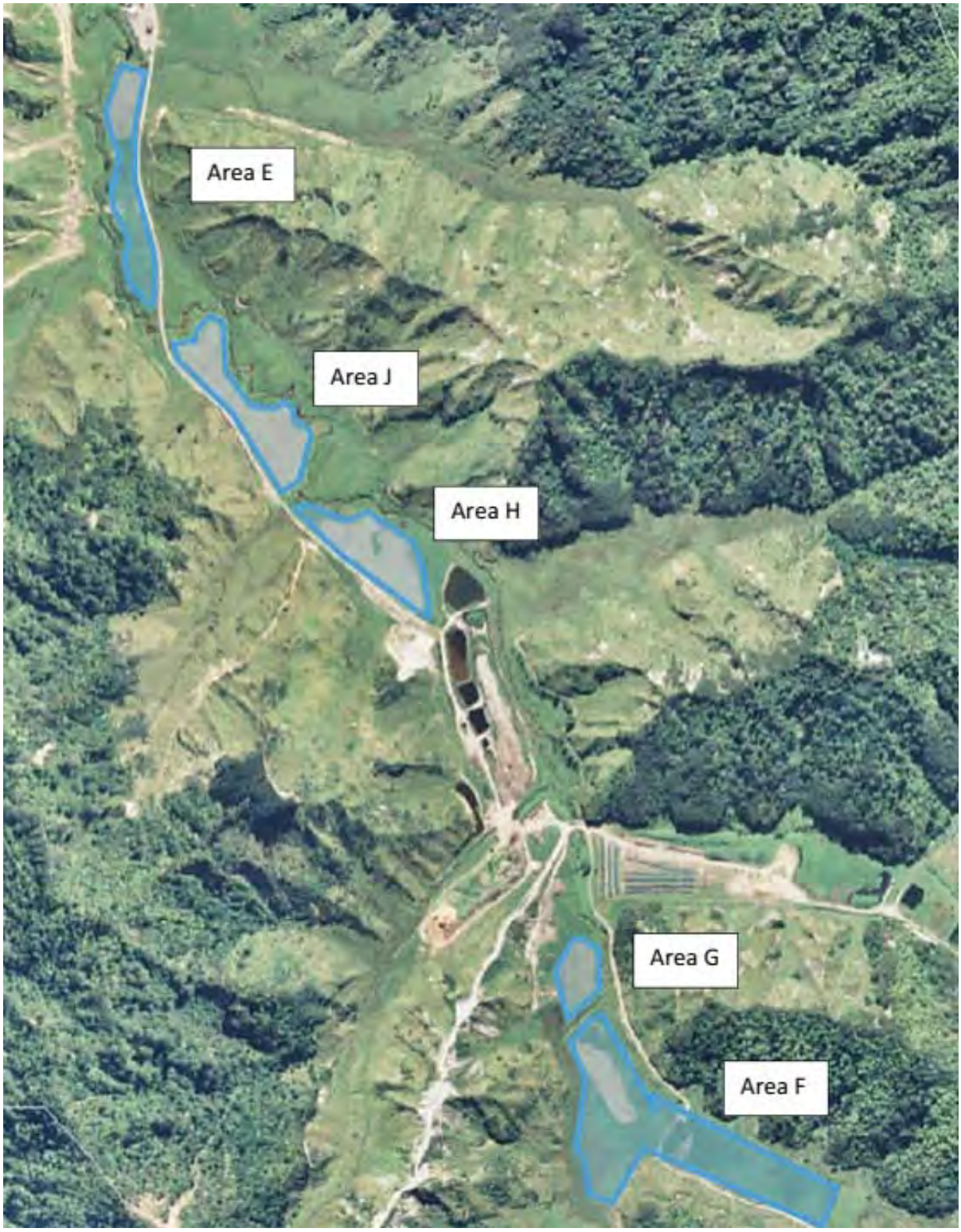

Figure 5 RNZ Uruti irrigation areas

2 Results

2.1 Inspections

RNZ facility Uruti

24 July 2018

An inspection was undertaken as part of routine compliance monitoring during a period of fine weather following recent rainfall over the previous weeks. The inspection found that the irrigation paddocks were visually water logged, especially the three irrigation areas below the irrigation pond. The irrigator was set up within the irrigation area above the twin culverts, but was not in operation. This is in line with best practice. An inspection of the irrigation fields found that while they were visually water logged there was no signs of surface water running overland and into the adjacent stream. Rather the stormwater was pooling on the pasture. The pasture was thick and long which also assisted in minimising potential run-off. The water logged nature of the pasture is expected for this time of year and current rainfall patterns.

Riparian fencing and planting had been undertaken along the banks of the stream from the road (SH3) up towards the twin culverts. Both fencing and planting appear to be of very good quality. The Company are currently working with the Council to obtain further riparian plants to complete the current planting programme. It is anticipated that the riparian planting programme at the site will continue to advance up the gully in a graduated manner over the coming seasons. Further Manuka plantings are also being carried out on the hill country in the valley to assist with ground stabilisation. This is continued on from the original Manuaka planting operation in 2017.

The irrigation pond and contingency pond were reasonably full at the time of inspection. Some free board (approximately 200 mm) remained within each pond. Stormwater was also being held within the bunded area about the lower portion of the drilling mud (solids) pad. This reduced free-board and limited irrigation is appropriate for the current weather conditions. Irrigating in the dry and holding the leachate/stormwater within the ponds during the wet weather when irrigation is not suitable is considered best practice.

The worm beds were visually inspected and were found to be reasonably well covered with shade cloth. The area about the beds is well vegetated which will assist in filtering stormwater from the beds. An inspection of the paunch ponds and associated wetlands found them to be in good order. The wetland treatment system was discharging at the time of inspection. A visual inspection of the wetland discharge found that it was visually clear with no foaming or discoloration noted within the receiving environment.

The following points were identified for consideration during the inspection: Lifting the riser adjacent to the lowermost irrigation area (adjacent to the access track) to prevent overland flow from the irrigation paddock easily discharging into the subsurface drain; undertake works in dry weather to re-contour the bund across the vehicle access point in the bund below the contingency pond; ensure that stormwater from the upper portion of pad 2 (saw dust storage area) is being captured and directed through the treatment pond system.

An inspection of the twin culverts found that they were free of obstructions or the accumulation of debris and flowing freely. A visual observation found that the flow through each culvert was similar in volume and velocity. The work previously undertaken downstream to lift the static water level appears to be stable with no signs of erosion or mobilisation of the artificial rock structures.

The inspection found that the culvert was free of obstructions, debris and blockages. Water was found to be flowing through the culvert freely with no signs of accelerated erosion or restrictions to fish passage. No issues identified as a result of the culvert being within the stream.

The inspection found that the stream level within the stream was elevated and turbid. The re-alignment appeared stable with no signs of erosion of the banks or bed within or immediately upstream or downstream of the re-alignment.

An odour survey was undertaken at the road side and no odour was detected at the site boundary. A second odour survey was undertaken adjacent to the twin culverts and no odour was noted. The bund at this location is still under construction, however will not be worked on again until the weather and associated soil conditions improve and allow for earthworks to be undertaken. A slight odour was detected about the drilling mud pad, however this was light and of a lessor strength than what had been noted on previous inspections. No odour was detected about the worm beds or paunch ponds areas of the site. No issues were identified at the time of inspection.

The inspection also found that the quarry on site was not being operated at the time. An inspection however found that the quarry extraction area is reasonably stable as a result of not being operational for an extended period. Vegetation is beginning to cover the perimeter of the site and some of the level platform. The access track shows signs of riling, however no sediment discharges are observed below the track and within the adjacent pasture. Cut-off drains were in place and appeared to be working well on the site.

26 Sep 2018

Inspection undertaken as part of routine compliance monitoring. Inspection found that all waste material was being delivered to the pit at the drilling mud pad for disposal. The inspection found that an earth bund had been constructed adjacent to the drilling mud pad at the lower end of the culvert near the disposal area. The bund is to prevent any accidental discharges from entering the stream through the unloading process. This is particularly relevant with the dumping of sawdust into the storage pit. The disposal pit had been cleaned out with very little product remaining in the base of the pit. The liquid waste/stormwater was flowing through the treatment system as designed and into the irrigation pond.

At the time of the inspection it was clear that a concerted effort had been made to decrease the level within the irrigation pond by irrigating to pasture during the recent spell of fine weather. This had resulted in the pond having approximately one metre of free board. The irrigator was located at the lower end of the paddock immediately below the irrigation pond but was not in operation at the time of inspection.

All bunds about the drilling mud pad and duck pond were inspected and no signs of pond overflow or accidental discharge via overland flow were detected. An inspection of the stream immediately below the twin culverts located five dead eels. These eels appeared to have been dead for some time and were beginning to decompose. As a result of this discovery, samples within the stream were taken at various locations upstream towards the drilling mud pad. In situ multi-parameter readings were also taken at the time of inspection, to assess any adverse effect on water quality in the area. An inspection of the stream failed to locate any further eels and a thorough inspection of the site did not identify and points of discharge from the facility that may have resulted in the death of eels at the site. Further investigations will be undertaken.

Irrigation records and rainfall data has been requested from the company for review. Sample results will be advised in due course. The paunch pond, worm beds and wetland treatment system were inspected. Approximately 30 cm free board was observed within the paunch pond and a small clear flow was observed discharging from the wetland into the receiving environment. No discoloration was observed within the receiving environment as a result of the discharge. The area about the worm beds was well grassed with no signs of leachate runoff from the beds.

Odour surveys were also undertaken during the inspection. No detectable breeze was noted at the time of arrival at the site however a slight katabatic wind developed during the inspection. An odour survey was undertaken at the site entrance, whereby nil odour was detected. A second odour survey was undertaken at

the site office area, whereby nil odour was detected. The odour is largely generated from the material within the drop-off pit at the top of the drilling mud pad, however at the time of the inspection the pit had been emptied with the product mixed with sawdust and deposited onto the dry drilling mud / composting heap. The result of having the pit emptied was that there was very little odour within the immediate vicinity of the pit. A very slight odour was detected about the irrigation pond, however this quickly dissipated and was not an issue. No odours were being generated from the paunch pad or worm bed operations at the site. No odour issues were identified at the time of the inspection.

In terms of the twin culverts on site, the inspection found that the Haehanga Stream was flowing evenly through the twin culverts with no obstructions. The work earlier undertaken to clear the approach to the culverts appeared to have worked well in allowing the stream to flow evenly through both culverts. The riffles installed downstream to lift the water level in order to prevent the culverts from being perched were holding up well through the winter storm events. No further work is needed on these currently.

Inspection of the other main culverts on site (on the Haehanga Stream and associated unnamed tributaries) found that they were all clear and free flowing. The stream was mid flow and no obstructions to fish passage was observed as a result of the placements of culverts within the streams on site. No signs of erosion was observed within the vicinity of the culverts on site. No issues were identified.

In terms of the quarrying operations, the inspection found that the quarry and associated access track is not currently in use. No issues identified at time of inspection.

In terms of the re-alignment of the Haehanga Stream, the inspection found that the re-aligned portion of the Haehanga Stream was stable with no signs of headward or bank erosion. As previously mentioned, riparian planting of the banks along this portion of stream will assist with ensuring ongoing bank stabilisation. A slip above this area has come down into the upper catchment of the Haehanga. This has resulted in a portion of the stream filling with debris from the slip. The stream has migrated about the slip and back into the narrow channel below the slip. This has resulted in an increase in sediment load within the immediate downstream environment, however during the inspection the stream was found to be running clear. Sediment buildup on the stream bed immediately downstream of the slip was observed. A conversation will be held with the Site Manager on site during finer weather conditions to discuss options for the slip area.

01 November 2018

An inspection was conducted as part of routine compliance monitoring. The inspection was undertaken with sampling of surface waters and soil. At the time of inspection approximately 11 mm of rain had fallen at the site overnight. This had resulted in the surface being damp and the Haehanga Stream and associated unnamed tributaries being turbid and slightly elevated. Weather conditions were still, warm with total cloud cover. Rain was falling intermittently throughout the sampling run. The inspection found that the paunch pond had approximately 300 mm free-board. The wetland treatment system was discharging and the discharge appeared visually clear with no adverse effects noted on visual inspection of the receiving environment post mixing zone. The pump at the paunch pond which pumps the paunch fluid up to the head of the wetland was not on site at the time of inspection as it was currently undergoing maintenance.

The worm beds were covered at the time of observation. The sediment traps which treat the stormwater collected from about the worm beds and track area had been recently cleaned out. This however is an ongoing obligation and will be required to be cleaned out on a regular basis. Work is beginning above the uppermost sampling point to create a further irrigation area. This involved raising the irrigation area by adding soil cut from a nearby spur and also constructing some drains to divert overland flow away from the irrigation field. This work was at the time, in its infancy and will continue through the summer months.

An odour inspection was also conducted during the inspection. This was initiated at the road frontage, close to the state highway. This initial survey did not detect any odour, nor was any odour detected at the site

office. An inspection of the site found that at the irrigation pond a slight odour was detected within the immediate vicinity of the irrigation pond. At the time work was being carried out with a digger to turn/move solid material on the drilling mud pad. The works were being undertaking approximately half way down the solids pad and this had resulted in only a very minor increase in odour within the immediate facility of the storage area.

The upper storage pad (pad 1) had been subject to re-design which had resulted in the product being stored in windrows. This appeared to be a more appropriate manner of storage as it increased the surface area of the compost piles and allows material within the rows to break down in a more efficient manner. An inspection of the paunch pond (pad 2) and worm bed areas found that no odours were detected as a result of these activities. From recent inspections it appeared that maintaining a low level within the irrigation pond and cleaning out the upper pond (drop off area) for pad 2 in a thorough and more regular basis greatly minimises the discharge of odours from the facility. Maintaining this site management technique going forward would be advantageous to the reduce odour emissions from the site.

As mentioned in the air discharge inspection report, the redesign of the product on the upper pad (pad 1) into windrows will greatly assist with the breaking down of the product within the rows. The perimeter drain about this pad has also been redefined to ensure that all stormwater is directed through the pond system to the irrigation pond for application to land via the travelling irrigator. The upper pond (pad 2) (drop off point) appears to have been cleaned out on a regular basis and is being kept at a lower and more appropriate level. Sufficient free-board was also observed within the irrigation pond. The bund about the solids drilling mud pad (pad 3) area appears to be suitable, however it is important to ensure that all stormwater and leachate collected within the bund area, about the solids pad, is removed on a regular basis so that maximum capacity is maintained. This was discussed with the Site Manager on site. He advised that he is in the process of constructing a system which will allow for irrigation out of the various collection points to be undertaken in a simple manner. It was suggested to build up the vehicle access point through the bund below the duck pond to prevent the risk of overland flow and discharge via this point during storm events.

In relation to culverts on site, an inspection of the culverts on the property found that they were all flowing and free of obstructions or blockages. No signs of accelerated erosion were detected about the culverts, as a result of the structure being placed within the stream bed. No obstructions to fish passage was observed. No issues identified at the time of the inspection.

In relation to the twin culverts onsite, which are situated on the access track, the inspection found the Haehanga Stream to be turbid and slightly elevated. The rock riffles which had been placed below the culverts, to increase the static water level through the culverts, to allow for fish passage, appeared to be reasonably stable. The riffles, on observation, appeared to be withstanding high stream flow events. No signs of erosion were observed about the culverts. An inspection of the culverts found that they were free of obstructions and with a reasonably even flow through both culverts. Some erosion was noted on the headwall, however this does not appear to have increased in size over recent months. There are plans to better stabilise the headwall and spillway to ensure that the access track to this site is protected during high flow storm events. In the past, these events have resulted in the culvert over topping.

In terms of the quarrying operations. The inspection found that works were beginning on the quarry site following an extended period of non-operation. At the time a digger was operating at the quarry to prepare the area for metal extraction over the summer months. The site access track had been reformed to allow vehicle access to the site.

During the inspection it was observed that during a rainfall event on the site, sediment laden stormwater had flowed down the access track and discharged off the end of the track within a reasonable vicinity of the stream. Allowing stormwater to flow for an extended period over the exposed access track creates riling of the track and, as a process, greatly increases sediment load in the discharge. This also results in a point

source discharge from the base of the track. This was brought to the Site Manager's attention. As a process, he duly instructed one of his digger drivers to create further cut-off drains along the length of the access track. Cut-off drains are a form of stormwater management rather than sediment control. However ensuring that cut-off drains are placed at reasonable intervals along the track (no greater than 40-50 m apart). The cut-off drains should direct stormwater across stable vegetated slopes. This will allow the stormwater to be treated by vegetation filtration, prior to entry into surface waters, at the base of the gullies. It was requested to ensure that the cut off drains are maintained on a regular basis. Further, continue to monitor the access track during rainfall events to make sure that no stormwater is discharged via overland flow off the base of the access track.

28 November 2018

An inspection was undertaken as part of routine compliance monitoring of the RNZ Uruti site. The inspection found that normal site operations were being undertaken on the site. The irrigation pond (associated with pad 3) was reasonably full with approximately 30-40 cm free board. The open drains about the access track and pond system were open and working well by draining the uncontaminated stormwater away from the storage and treatment system. The windrows on the upper pad (pad 1) were found to be well maintained. A well defined bund about the pad had collected all contaminated stormwater, which directed it to the irrigation pond. Hay had recently been cut and removed from the two irrigation paddocks immediately below the irrigation pond. The worm beds had been recently fed. The sediment traps about the worms beds had been recently cleaned out, however it would benefit from a clean out on a regular basis. The expansion of these sediment trap pits going forward would be beneficial, especially considering this area also captures and treats the stormwater from the storage area for the quarrying operation.

The wetlands (associated with the wetland treatment system) appeared to be working well. These had a low flow discharging from them, and the discharge appeared to be a good quality (visually) leaving the final wetland pond and into the unnamed tributary of the Haehanga Stream. No visual change in water quality was noted as a result of the discharge. The level of the paunch pond appeared much lower than usual, with plenty of free-board available. No issues were identified at the site at the time of inspection.

In terms of odour on site. The inspection found that minimal odour was being emitted from the drilling mud pad (pad 3). No odours were noted about the property boundaries. A very slight odour was detectable immediately above the worm beds, however this quickly dissipated. No issues were identified at the time of inspection.

In terms of the twin culverts on the access track. An inspection of the twin culverts was undertaken while the Haehanga Stream was in moderate flow. The inspection found that the water approached the twin culverts in an even manner. This had resulted in similar flows through each of the culverts. No accelerated erosion was observed within the vicinity of the twin culverts. An inspection of the downstream rock riffles found them to be stabilised. This as a result, meant the downstream end of the culverts were below the water level as required by special condition 1 of this consent. No issues were identified at the time of the inspection.

In terms of the other culverts. The inspection of culverts on the property found that all were free of blockages and/or obstructions. No accelerated erosion was observed as a result of the culverts being placed within the stream bed and no fish passage obstructions were observed.

In terms of quarrying operations. The inspection found that operations had recommenced at the quarry. Material was being extracted from the quarry site and transported to the valley floor where it was stockpiled adjacent to the worm beds and paunch pond. The material is likely screened in this area prior to being trucked off site. Work had been undertaken to the access track with further cut-off drains placed along the track. A further detailed inspection will take place with the Site Manager during the December inspection to ensure BPO is being undertaken in minimise sediment in the discharges from the site.

In terms of the Haehanga Stream realignment. The inspection found that the realigned section of stream was stable with good vegetation cover on the banks of the realignment. Stock exclusion in this area is making sure that there is no accelerated erosion along the realigned section. No issues identified at the time of inspection.

19 December 2018

An inspection was undertaken at the Company's Uruti site as part of routine compliance monitoring. The inspection was undertaken in fine weather conditions. The Haehanga Stream and associated unnamed tributaries were found to be in low flow conditions. The inspection found that the irrigation pond (pad 3) had adequate free board for the pending weather conditions. The irrigation was on going at the property. There were no signs of run off from the irrigated areas. An inspection of the drilling mud pad (pad 3) found that the bunds were of good working order, with all waste material contained within the designated storage areas. The drop off pit was full of organic matter (dead chickens) from a recent delivery, however it appeared that the pit was being cleaned out on a regular basis.

The recently constructed windrows in the storage area (of pad 1) adjacent to the drilling mud pad were still in place. It will be important that this new organisation of the waste material (compost windrows) on this pad is maintained for composting efficiency purposes, as new material is brought in and stored on this pad area. The worm beds on site had been recently fed, with no odour detected from them. The paunch pond level remained low. This will enable the paunch storage pit to be better managed going forward. An inspection of the wetland treatment system (associated with the paunch pond) found that there was no discharge from the final pond. A sample was collected from within the final pond to assess various parameters for compliance incase a discharge occurs.

The bund wall of the wetland treatment system adjacent to the stream was inspected and although the bund wall is narrow in one particular area, there was no signs of any accelerated erosion which may result in further narrowing of the bund wall.

It was noted that metal had been used to build up the entrance ways to the drilling mud storage pad (pad 3) which run between the liquid treatment ponds. Although further work is still required in this area. The work undertaken will make sure that if there is an accidental overflow, then any liquid waste which overtops the pond will be directed into the lower pond to ensure that all waste material is contained within the treatment system.

In terms of odours on site. The inspection found that no odour was detected about the paunch pond or the worm beds. The dump pit at the drilling mud pad (pad 3) appeared to be getting cleaned out on a regular basis. A faint odour was noted within the immediate vicinity of the pit, however this was less than noted on previous occasions. No issues were identified at the time of inspection.

In terms of the twin culverts. An inspection of the twin culverts found that they were free of blockages and/or obstructions. The riffles placed within the stream, downstream of the culverts, appeared to be stabilised. The air spaces between the rock materials were noted to be filling up with sediment as a result of natural stream processors.

There was no sign of any erosion of the riffle material, as this would result in the lowering of the stream static level upstream from these two locations. The static level of the water remained above the invert of both culverts and as such no barrier to fish passage was observed at the twin culverts. No issues identified.

Culverts all inspected on the property and found to be flowing freely and free of any blockages and/or obstructions. No barriers to fish passage were observed and no adverse environmental effects were noted as a result of the culverts on the property.

The culvert installed at the head of the drilling mud pad was free of blockages and/or obstructions. The bund placed about the lower headwall appeared to be working well to make sure that no sawdust is able to accidently mobilise into the stream during the offloading of material at this location.

An inspection of the realigned section of stream found no signs of bank erosion. The general area of the realignment was found to be stabilised. Fish passage is provided for throughout the realignment with no adverse effects on water quality observed as a result of the realigned section of stream. No issues identified at the time of the inspection.

In terms of quarrying operations, the inspection found that metal had been transported from the quarry site down onto the valley floor. From here it will be dry screened, before being exported from the site. Cut-off drains and a low bund have been placed at various points along the quarry access track to make sure that stormwater was managed and prevented from flowing along the exposed access track surface for any extended distance. Sediment traps were in place near the base of the access track. These accept and treat any stormwater from the lower most portion of track. As well as the general site access, which is over a culvert, on the approach to the worm beds and metal stockpiling area. It was communicated to the Site Manger to make sure that these traps are cleaned out on a regular basis to make sure that the capacity of the traps are maintained. The sediment traps on the valley floor would benefit from being enlarged to allow for better treatment of stormwater. The area about the stockpile (of quarried material) is well vegetated and a considerable distance from any surface water. Any stormwater from this area is filtered via a low lying grassy area prior to be treated via the aforementioned sediment traps.

31 Jan 2019

An inspection was undertaken as part of routine compliance monitoring. The inspection found that the site was operating as normal. The solid waste drop off pit, at the top of the drilling mud pad (pad 3) was found to be approximately two thirds full, with sufficient room for further product. Compost from the Waitara Road facility had been bought to site and off loaded at the top of the drilling mud pad near the culvert. The intention of this material is to be added to the solid material and increase the organic content of the solid waste on the drilling mud pad. This is proposed to assist with the composting of the material on the drilling mud pad. The ponds below the drop off pit are filling up with solids and require a clean out soon.

This irrigation pond and leachate holding area were both found to be reasonably full with reduced storage. Site Manager was spoken to and asked to take action to lower the levels in these ponds which he agreed to concentrate on. It was also noted that the honey wagon was in operation, applying liquid waste to the lower irrigation area. The general area about the drilling mud pad and the adjacent storage pad were clean and tidy with well-defined boundaries and ring drains/bunds.

Inspection of the worm beds indicated that the beds had recently been fed and the material covers were yet to be put back over. The paunch pond had liquid within it. An inspection of the wetlands found that the upper wetlands were dry. The corresponding water levels in the lower wetlands were also well below the point of discharge. As a process, the wetlands were not discharging at the time of inspection. Similarly, the receiving environment was in low flow conditions.

It was recommended to limit any discharge from the wetland to make sure that the downstream consent limits were complied with. It was also suggested to pump from the paunch pond into the wetland in small volumes at regular intervals. This will make sure that the upper wetlands remain damp (best for the biology of the wetlands) while making sure that there is no discharge from the final pond within the wetland treatment system.

Works were also being undertaken for the development of a new upper irrigation area (Area F). This work involved earthwork to lift the level of the irrigation paddock above the natural valley floor. Cut off drains and bunds about the Haehanga Stream will also be included, to make sure that all stormwater is directed away from the irrigation area. This will also protect surface water when irrigation of stormwater/liquid waste

is undertaken. The works had been undertaken in dry weather conditions with no signs of sediment run off. Compost was at the time being brought to the irrigation paddock from the Waitara Road facility. It was intended to be mixed with the limited top soil on site to encourage good grass growth. It was anticipated that the area will be seeded in the coming week or so.

In terms of odour on-site, a slight odour was detected about the drilling mud pad (pad 3) near the drop off point. However this was not detected at or beyond the site boundary. A slight odour was found to be discharged from the worm beds, however again this was not detectable at or beyond the site boundary. At the time liquid waste from the irrigation pond was being applied to pasture via a honey wagon in the lower most irrigation area. No odour was noted as a process of this activity.

In terms of the realignment, the inspection found that the stream flowing through the diversion was in low flow conditions. The inspection found no sign of bed or bank erosion within the diversion with no adverse effects noted as a result of the works.

In terms of site culverts, the inspection found that all streams on the property were in low flow condition. All culverts inspected were found to be free of obstructions or blockages. Fish passage was allowed for in the inspected culverts, however due to the low flow conditions, fish passage through the water bodies on the property would be difficult to assess. No issues were identified at the time of the inspection.

Inspection of the twin culverts found that the stream was in low flow conditions with very little water observed passing through each of the culverts. The culverts were found to be free of blockages or obstructions with no barrier to fish passage observed. The rock riffles installed downstream appeared to remain stable. They were working well to increase the water level within the stream below the twin culverts. This engineering control appeared to prevent the culverts from becoming perched and therefore a barrier to fish passage. No issues were identified with the culverts at the time of the inspection.

22 February 2019

An inspection was undertaken at the Company's Uruti site and it included both surface water and groundwater sampling. The inspection found that the development of the upper irrigation area was on going. The final levels were close to completion. Bunding of the stream had occurred and compost had been brought to site to be mixed with top soil. This was spread over the irrigation area so that grass seed could be applied and stabilisation achieved. The Site Manager was spoken to on site and advised and although some sediment traps were observed about this area of development, further traps were recommended.

The inspection also found that the levels of stormwater within the paunch pond were at a good level with reasonable free board. The wetland treatment system was not discharging at the time of inspection and it appeared that it had not discharged for some time. The drilling mud pad (pad 3) was continuing to be operated as per usual site operations. The drop-off pit was reasonably full, however sufficient capacity remained to handle incoming waste. The associated irrigation pond was found to have approximately 30-40 cm of free-board and the leachate collection area about the solids pad was dry.

No irrigation was occurring at the time of the inspection. Sampling of the surface waters found that there was very limited flow throughout the catchment with no flow observed at the twin culverts. The riffle below the twin culverts was found to be approximately 10 cm above the water line. This indicated that the flow and general water levels within the streams on site were very low.

Subsequent sample analysis of samples taken on the day found elevated levels of various parameters at sites HHG000106 and at subsequent sites downstream. HHG000106 detailed excessive chloride 450 g/m^3, ammonia 22 g/m^3 and dissolved CBOD of 7.8 g O_2/m^3. Chloride was similarly elevated at HHG000109 (200 g/m^3) and HHG000115 (420 g/m^3).

07 March 2019

A follow-up inspection was undertaken at the Company's Uruti facility following the surface water samples collected from the site on 22 February 2019. The inspection was undertaken in fine weather conditions, however there had been some rainfall since the previous inspection resulting in better flows within the surface waters. However, the stream would still be considered to be in very low flow conditions. The inspection found that the wetland system was not discharging. No irrigation was taking place on site at the time of the inspection. Works had been carried out to the upper bund of the drilling mud pad (adjacent to the unnamed tributary/pad 3) in an effort to reinforce it and improve the barrier between the pad and the receiving environment. This involved removing the previous bund and digging down to locate the 'virgin papa'. Papa was then placed back within the excavation and rolled with a digger for compaction. The bund had also been widened along this interface. Samples were collected from the following sites HHG000115, HHG000150, HHG000190, HHG000106, HHG000103, HHG000093, HHG000109 and immediately upstream of the culvert which is placed beneath the access track immediately up gradient of the drilling mud pad.

An interim report of the analysis of sample results (received by TRC on 15 March 2019) again showed elevated levels of contaminants within the receiving environment adjacent to and downstream of the drilling mud pad (pad 3). A copy of the interim report was attached to communicate this to the consent holder. The finalised report was supplied once available.

12 April 2019

An inspection was undertaken in accordance with routine compliance monitoring. The inspection was undertaken during still weather conditions with low fog throughout the valley. A very slight katabatic wind was detected upon entry to the site. An odour survey was undertaken at the State Highway. No odour was detected about the site boundary. A further odour survey was undertaken at the site office and again no odour was detected. An inspection of the site found that the irrigation pond was full with approx. 0.5 m freeboard. The odour detected about the irrigation pond was noticeably less than what had been detected on previous inspections. A slight odour was detected about the drop-off pit at the drilling mud pad. It was noted that although there was no detectable odour being emitted from the worm beds, they were uncovered at the time of inspection. BPO requires that these beds are covered following feeding or harvesting of the worms.

The inspection found that the redirected stream was stable with no signs of bank erosion. A moderate flow was observed at the time of inspection, following a fresh in the previous days. No issues identified as a result of the inspection.

An inspection of the culverts found them to be free of blockages or obstructions with no signs of increased erosion about the culverts. Works had recently been undertaken on a culvert adjacent to the access track leading to the worm beds. Rock was placed downstream of the culvert to create a pool. This was aimed at attempting to lift the static water level below the culvert to prevent the culvert from being perched which would present a barrier to fish.

The works appeared to be working well with no obstruction observed throughout the culvert. This will need to be re-inspected during lower flow conditions to ensure that there is no barrier to fish passage. The culverts are required to be monitored and managed on a regular basis to ensure that all culverts on site (both consented and those placed in under the permitted activity rule) do not become obstructions to fish passage. If it is found that fish passage is not provided for, especially during low flow or following flood events, then please ensure that work in undertaken to remedy the issue.

The inspection also found that the quarry was not in operation at the time, no metal had been recently extracted from the site. Previous conversations with the Site Manager in respect to stormwater management on the quarry access track appeared to have been adhered to. With stormwater directed off the track at regular intervals and the directed flow was observed to be running overland, this would allow sediment to

be captured via vegetation before discharging into any surface water body. It was communicated to the Site Manager to continue to monitor these works and undertake maintenance work when required. It was also communicated that when further extraction is undertaken at the quarry, that the over-burden is dealt with in an appropriate manner and deposited on stable ground away from water bodies. This may involve hauling some of the material back to the larger quarry area where material had already been extracted.

The inspection also found that the twin culverts were free of obstructions and were deemed not to be a barrier to fish passage. The riffles installed downstream, to raise the stream levels below the culvert, appeared to be stable and working well.

16 May 2019

An inspection was undertaken in fine weather as part of routine compliance monitoring. The inspection found that no material had been extracted from the quarry over the winter months. The bunds placed at intervals across the quarry access track were working well to minimise riling and prevent sediment laden stormwater from discharging down the access track and into the adjacent stream. It was requested that the Company continue to monitor these bunds. Especially during wet weather to ensure that they are collecting and directing stormwater to grass laden slopes where appropriate filtration may take place, before the stormwater enters surface water. If insufficient filtration of stormwater is occurring then further controls will be required.

During the inspection it was noted that the Company had recently ordered a number of plants from the TRC riparian planting programme. These are intended for use at the site, to further increase the extent of the riparian planting that was carried out last winter. The inspection found that the surface waters were slightly elevated and lightly turbid. A visual inspection of the surface water throughout the site found no visual adverse effects as a result of the discharge from the wetland treatment system or from irrigation activities taking place on the irrigation flats adjacent to the streams. The inspection found that material was continuing to accumulate on the drilling mud pad.

At the time conversations were being held between TRC and the Company. These were aimed at drafting an acceptable process by which the composted material can be sampled and potentially removed from pad 1 and pad 3, based on the outcome of the sample analysis.

At the time of the inspection, work was being undertaken on site to remove solid material from the ponds within the pond treatment system associated with the drilling mud pad. This would aid the facility by operating in accordance with their site management plan. The material on observation appeared to be very wet and 'sloppy' and therefore was required to be de-watered before being reintroduced into the solids composting pile within the drilling mud pad.

To allow for the dewatering of the material, the material had been exported to pad one where it was placed within a bunded area to allow for dewatering to be carried out. Pad 1, where the dewatering was occurring is ring drained and all liquid waste material and contaminated stormwater captured and directed back to the aforementioned treatment ponds. This fluid is then applied to land via a travelling irrigator. An inspection of the irrigation pond found sufficient free board available to address any inflows during rainfall events. A conversation was held with the Site Manager about undertaking some work to the drilling mud pad to make sure that there is a well defined ring drain within the bunded area. This located adjacent to the solids pile to make sure that any contaminated stormwater and associated leachate is able to flow freely around the pile to the collection area at the base of the drilling mud pad.

The inspection found no signs of overflow or spillage from the drilling mud pad or stormwater treatment system. As discussed it was strongly recommended that all solid material be removed from the pond treatment system. The site is managed to make sure that any solid material brought to site is quickly removed from the 'drop off pit' and placed onto the composting pile. This action would likely be beneficial to reduce the nitrogen loading within the irrigation pond. Organic material would likely break down in a

controlled manner within the composting process rather than simply rotting within the liquid waste within the stormwater treatment system.

An inspection of the irrigation areas found good grass cover, this was also noted across the lower irrigation areas. The irrigator had been removed from the lower irrigation areas and installed on the newly constructed upper irrigation area. The permanent pipework had been installed, to transfer contaminated stormwater and leachate from the irrigation pond to the upper irrigation area. The pipe had been installed overland, allowing for it to be monitored on a regular basis to make sure the integrity of the pipe was not compromised. The pipe had also been placed within a steel pipe and elevated over adjacent streams to make sure that it is protected and elevated above any potential high water levels during flood events. At the time of the inspection irrigation had occurred on the upper irrigation area but was not occurring at the time of inspection.

An inspection of the upper irrigation area found that the sediment ponds installed within the bunds were working well in treating any stormwater coming off the irrigation area during heavy rainfall events. It is recommended that these ponds are cleaned out at the end of the winter period (during dry conditions) to set the ponds up for the long term where a good grass cover should minimise any sediment mobilisation. Grass on the upper irrigation area and associated bunding had taken well with a good grass cover noted across the entire irrigation area. A small area near the entrance to the irrigation area had not had a sufficient grass strike to stop sediment mobilisation and so hay had been spread across this area as a form of stabilisation. Although the grass was growing well across the irrigation area, it was noted that the grass was still young and therefore does not have the density and associated attenuation that more established grass provide. Therefore it was advised to the Site Manager on site that the liquid waste be applied to the field at a rate that allowed the grass to uptake the material and not allow it to run off. Applying the irrigation material at a low rate will likely achieve this. The irrigator onsite had setting that would likely allow the application rate to be adjusted to suit various conditions. The worm beds on site were covered with no issues identified in this area. The paunch pond had sufficient free-board to allow for wet weather events. The wetland treatment system was discharging at the time of the inspection. A visual inspection of the discharge found it to be clear with no foaming, odours or scums noted within the receiving environment. No change in clarity was noted as a result of the discharge. It was noted that cheese waste was being disposed of at the site. A review of the records were unable to locate authorisation for the disposal of this material which is not a specific authorised material under special condition 2 of this resource consent.

The inspection of the realigned section of stream found that it remained stable with no signs of headward or bank erosion. Work had recently been undertaken to further develop the irrigation field adjacent to the realignment. These works have not resulted in any further works to the realigned section of stream and have not had any visible effect on the stream. No further works are required at this stage. An inspection of culverts onsite were undertaken in accordance with routine compliance monitoring. The inspection found that the culverts on site were free of any obstructions and/or blockages. No significant erosion or scour was noted about the culverts. Work had recently been undertaken on the culvert adjacent to the access track leading to the worm beds. The works entailed to lift the bed level downstream of the culvert, and subsequently lift the static water level. While this had worked as designed and prevented the culvert being perched, it was observed that there was a further perched section within the culvert. This will require remediation via relaying the culvert or further lifting the static water level in a controlled manner to remove the perch.

A small section of bank slumpage was noted at the culvert entrance. Both issues were discussed with Site Manager onsite, who will undertake works to fix the culvert. A conversation is to be held between the Council’s freshwater biologist and the Company to discuss requirements around fish passage for the main culvert leading under the access track to the worm beds. It was suggested to the Site Manager to refer to the recently completed fish passage inspection report undertaken by Council’s freshwater biologist which discusses these culverts along with other 'permitted activity' culverts onsite.

In terms of odour. An odour assessment was undertaken at the roadside prior to entering the site. The assessment found an odour was detected about the site entrance and State Highway bridge area. The odour was reasonably consistent and considered to be of an intensity of one to two on the hedonic scale. This intensity was deemed to be within the resource consent limits for the site. An inspection of the site found that there was odours detected about the drilling mud pad three and pad one.

Pad 1 does not usually emit odour, however it was noted on this inspection that the pad was being used to hold and de-water solid material that had been removed from the upper treatment ponds within the pond treatment system. This material was odorous while the de-watering phase was being completed. The odour being emitted from the drilling mud pad was deemed to be consistent with previous inspection. Further inspection found that the worm beds on site were covered as required by the site management plan. No odour was detected about the drilling mud pad. A slight odour was detected at the lowermost corner of the paunch pond. This was best described as a 'dairy effluent type odour'. However it is unlikely that this odour was contributing to the odour detected at the site boundary.

An inspection of the twin culverts found that water was flowing freely and evenly through both culverts. No blockages or obstructions were observed about the culverts. The riffles below the culverts were observed to be in good working order, as a process they lifted the static water level to make sure that the culverts are not perched. No erosion or scour was observed about the culverts or the riffles installed downstream. The Site Manager was spoken to at the culverts. The company currently looking into options to better stabilise the headwall of the culvert and the access track, to minimise potential erosion during high flow events, when the stream over-tops the culverts. No issues identified at the time of inspection.

27 June 2019

An inspection was undertaken as part of routine compliance monitoring. It was conducted in fine weather conditions. An odour survey was undertaken along the site boundary (State Highway) upon arrival at the site. At the time of the odour survey the weather conditions were very cold with a heavy frost on the ground. Low fog was present throughout the Uruti Valley, but upon clearing, the sky was clear of clouds. The road surface was dry and no detectable wind was noted. The only air disturbance about the odour survey was from passing traffic. The odour survey found a slight odour about the northern approach to the site over a distance of approximately 10-15 m. A slight odour was also detected immediately south of the State Highway bridge. At both detection locations the odour was best described as a very slight musty/ sulphur type odour. The odour was measured to be a one on the scale of odour intensity and found to be within consent limits for odour beyond the boundary of the property. A site inspection found that only a very slight odour was being emitted from the irrigation pond which was less that noted on previous inspections. Further odour was being emitted from the top end of the drilling mud pad and the product 'drop-off' pit. This is the area of site in which product is in the initial stages of composting and hence an odour is expected. No odour was noted about the paunch pond or worm beds. No irrigation was occurring at the time of the inspection and as such no assessment could be made on how the irrigation of waste material effects to overall odour generation at the facility.

The inspection found that the stream flowing through the realignment was of a moderate flow for this time of year. The stream was very slightly turbid, as is common with regards to the soil and catchment hydrological characteristics of the area. The realigned section of stream was found to be reasonably stable with no signs of accelerated erosion of the banks or stream bed. Fish passage was provided throughout the length of realigned stream.

An inspection of the culverts on site found that they were free of obstructions and/or blockages with the stream being able to flow through the culverts unobstructed. Work had recently been completed on the culvert that is adjacent to the access track leading to the worm beds. This involved removing some sediment on the upstream side of the culvert which had discharged into the stream as a result of slumpage of the stream bank in the immediate area. The removal of this material had opened up the entrance to the culvert.

Work was also completed in the stream immediately below the culvert. This involved adding some further rocks to lift the static water level which in turn removed a small perch that was observed within the center of the culvert. The rock work is bedding in well and will be assessed going forward to make sure that it does not scour and that fish passage is maintained both over the rock structure and through the culvert. Photographs were taken. A conversation will be held with the Site Manager on site regarding wider fish passage matters that were noted by the Council freshwater biologist on his recent site visit. This will include having a discussion about the culvert below the access track to the worm beds to see if fish passage can be improved.

In terms of the quarrying operations, the inspection found that the quarry was not in operation with no material being exported from the site. The bunds were placed across the access track. These control stormwater and direct it away from the lower site and adjacent stream. These appeared to be working well. These will need to be monitored to make sure that they are still working as desired and that the stormwater is not eroding the bunds or discharging over or around them.

Surface water sampling was undertaken of the wider receiving environment in accordance with the monitoring programme. This is to assess compliance with resource consent conditions. At the time of the inspection the streams were in a moderate flow and slightly turbid. No scums / sheens or odours were noted within the receiving environment throughout the sampling run. An inspection of the site found that irrigation (although not occurring at the time of the inspection) was being applied to the upper irrigation area by way of the travelling irrigator. The pasture throughout the irrigation areas was wet and saturated in lower sections of these areas.

The weather had been reasonable for the application of liquid waste to land, however it is important that during the winter months any irrigation is carried out with regard to weather forecasting and applied at a light rate to make sure that the material is assimilated by the soil/pasture and runoff (overland flow) is prevented.

An inspection of the lower area of the irrigation area that was in use at the time, (upper irrigation area) found that the sediment ponds adjacent to the stream were full but clear with no signs of contamination. The bund about the stream had stabilised well with a good grass cover. This will likely thicken up over the spring period. A good grass cover was observed throughout the upper irrigation area and again it is expected that this will thicken up during the spring growing period.

Plantings had been undertaken on the bund adjacent to the stream, however it appeared that some of the plants had been damaged by grazing animals, which were most likely wild goats and so further planting may be required in the future. The general fencing about the site has improved over the recent year. There was no evidence found of stock grazing or having access to any of the irrigation areas. Liquid waste had also been applied to the lower most irrigation area by way of honey wagon application. Plans were in place to set up a spray irrigation system for the lowermost irrigation area, as this area has been found to be long and narrow. This means that it is not considered appropriate to use the travelling irrigator on this area due to the risk of applying liquid waste to close to surface water bodies due to the irrigators' wide application area.

Setting up an irrigation system on this area will allow waste to be applied to the pasture under damp conditions where using the honey wagon would not have been a viable option due to the risk of extensive pasture damage. An inspection of the worm beds found that they were all covered. No issues identified. An inspection of the paunch pond found that product was piled high near the bottom end of the pond next to the quarry product storage area. Work had been done to lift the bund on the corner of the pond to prevent accidental discharge to land, however this needs to be monitored to make sure that there is sufficient storage throughout the pond.

This concern was raised with the Special Projects Manager, whom was on site during the inspection. He was to arrange the digger to move the product within the pit to make sure free board was maintained. No

pumping to the wetland was being undertaken at the time of the inspection and it was noted that although the paunch pond still had approximately 300 mm free board, that there has been a slow reduction in free board over recent inspections. It was suggested to continue to pump the stormwater/leachate to the wetland at regular intervals to make sure that free board is maintained, while at the same time making sure that the volume of liquid waste pumped to the wetland is at a rate that allows appropriate treatment through the wetland treatment system.

At the time of the inspection the wetland treatment system was discharging from the final pond into the receiving environment. The discharge was sampled as part of the wider sampling programme. The discharge from the wetland treatment system was best described as slightly green/brown in colour with a discharge rate of approximately 1 L/10s. A visual inspection of the mixing zone within the receiving environment found no discoloration post the confluence with the Haehanga Stream.

An inspection of pad 1 found that the pad had a well-defined bund and stormwater collection area, directing all stormwater and any leachate from the composting process to the treatment system adjacent to the drilling mud pad. The pad was still being used to de-water solid material that was being removed from the liquid waste treatment system. This is part of the work being undertaken to gain compliance with Abatement Notice EAC-22632. An inspection of the drilling mud pad and associated liquid waste treatment system found the drop off pit was full of product. An inspection of this pit did not identify any unauthorised material.

The upper end of the composting pile on the drilling mud pad was beginning to migrate against the newly installed wider bund between the drilling mud pad and the adjacent tributary. While free board was being maintained by the higher original bund located close to the stream, it would be considered best practice to pull the solid composting material away from the newly installed bund. This would allow the liquid waste to either drain back into the drop off pit or into the wider ring drain system.

An inspection of the ring drain around the perimeter of the drilling mud pad found that it was open and unobstructed allowing leachate and associated stormwater to flow to the collection area at the bottom end of the drilling mud pad.

An inspection of the liquid storage and treatment ponds found that the upper ponds were still full of solid material and further work is required to remove solids to ensure that the solid material is less than 20% of the capacity of the pond to ensure compliance with resource consent conditions and the associated Abatement Notice and site management plans. The irrigation pond had no visible hydrocarbon sheen on the surface and only a very slight sulphur odour. 0.6-0.8 m free board was observed within the irrigation pond which was considered appropriate for the current weather conditions and condition of the irrigation fields.

An inspection of the adjacent 'duck pond' found that it was full. Any water from the duck pond needs to be applied to pasture via the irrigators and not allowed to overflow and discharge into the surface water bodies. This is because the water within the duck pond is not clean to a standard where a discharge to surface water would be deemed to be compliant with rule 21 of the *Regional Freshwater Plan for Taranaki*.

The inspection found that the stream was flowing evenly through each of the twin culverts on site. No blockages or obstructions were observed within the culverts and no accelerated erosion was noted about the structures. The rock riffles were in place and working well by lifting the static water level to make sure that the culverts were not perched and that no barriers to fish passage exist. No remedial works required at this stage.

RNZ facility Waitara Road

19 September 2018

An inspection was undertaken during fine weather conditions. The inspection found that all worm beds were covered with the exception of one which was being harvested at the time. The area about the front of the storage sheds, from which the stormwater discharges at the rear of the site, was found to have product scattered across the area, as a result of truck movements. This area was quickly cleaned up during the inspection by site staff, to prevent the risk of product from being entrained within the stormwater system. It was suggested that keeping this area clean of product at all times could be a focus for operators at the site. A slight discharge was also observed at the rear of the site into the drain on the neighboring property.

The discharge point into the neighboring drain, on observation would likely benefit from a clean out. The creation of a sump area was suggested, as it would likely allow solids to settle out prior to discharging from the site. No odours were detected at the time of the inspection.

17 April 2019

An inspection was undertaken as part of routine compliance monitoring. The inspection found that usual site operations were taking place at the facility. The worm beds on site were covered and no leachate was observed discharging from the beds. The concrete pad between the sheds had some material spilt on it as a result of tracking and normal site operation. This was being cleaned up at the time of inspection. The sump in this area appeared to have been cleaned out on a more regular basis than previously noted.

The stormwater discharge pipe leading to the rear of the site had been dug up to allow it to be re-laid with a more constant gradient. It was suggested that the pipe discharge into a sediment type pit (3:1 length /width ratio with a level spreading bar for discharge). This may allow for any sediment to be captured before being discharged from site.

The inspection found a small amount of paunch onsite, however this was due to be fed to the worm beds later that day. No odour was detected about the site at the time of the inspection. The neighboring property on the south east boundary had erected a large wind break fence as part of their site operations. This may be beneficial to the RNZ facility as it may assist to minimise any odours discharging in that direction. No issues were identified at the time of inspection.

2.2 Results of discharge monitoring

2.2.1 Surface water monitoring –Wetland treatment system discharge (WTS)

The consent holder 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.

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 bullrush raupo. This effectively treats the ammonia enriched water though assimilation, while the dense planting of the raupo enables it to act as a filter. Post the tiered raupo wetland is sample location IND003008.

Consent 5838-2.2 stipulates specific concentrations which the discharge point must abide by.

Specifically Condition 24 of Consent 5838-2.2 states:

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.*
b. *The pH shall be between 6.0 and 9.0.*

Table 3 Surface water discharge location IND003008 2018-2019

Date	Parameter	Temperature	Chloride	Electrical Conductivity (EC)	Free Ammonia as N	Total Ammoniacal-N	Nitrate-N + Nitrite-N	pH	Total Suspended Solids
Collected	Time (24hr)	°C	g/m^3	mS/m	g/m^3	g/m^3	g/m^3	pH	g/m^3
28 Aug 2018	10:11	12.1	11.7	46.3	0.29	26	2.2	7.7	11
29 Oct 2018	11:07	17.7	8.2	22.6	0.102	1.62	1.75	8.3	22
19 Dec 2018	09:50	23.9	10.2	25.2	0.026	0.037	0.65	**9.7**	34
28 Feb 2019	No D/S	-	-	-	-	-	-	-	-
12 Apr 2019	09:20	15.9	14.1	27.8	0.0062	1.78	0.137	7.1	22
28 Jun 2019	10:21	6.9	29	76.5	0.27	35	0.91	7.7	31

The monitoring undertaken on the WTS discharge location (IND003008) indicated that on one occasion, (19 December 2018) the reported value for pH was above the guideline (9.7 pH) value as set by the consent. However a review of the associated inspection notice indicated that at the time of sampling the discharge was not discharging to the unnamed tributary of the Haehanga Stream, the sample was collected from the pond. Thus no exceedance was found.

- The remaining four occasions indicated compliance with the pH of the discharge.
- All five monitoring rounds indicated compliance for the suspended solids.
- On one occasion (22 February 2019) the discharge was not occurring, thus no sample was obtainable.

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 3).

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/m^3*
b. *A level of un-ionised ammonia greater than 0.025 g/m^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.*

Table 4 Surface water monitoring location HHG000103 2018-2019

HHG000103	Parameters	pH	Chloride	Dissolved C-Biochemical Oxygen Demand ($CBOD^5$)	Electrical Conductivity (EC)	Free Ammonia as N (NH_3)	Sample Temperature	Total Ammoniacal-N	Total Suspended Solids
Collected	Time (24hr)	pH Units	g/m^3	g O2/m^3	mS/m	g/m^3	°C	g/m^3	g/m^3
28 Aug 2018	11:03	7.1	11.5	< 1.0	17.3	0.0027	11.1	1.1	6
29 Oct 2018	13:13	7.4	8.5	< 1.0	16.8	0.00047	13.9	0.084	190
19 Dec 2018	09:44	7.3	9.4	< 1.0	24.1	0.00038	18.2	0.051	5
28 Feb 2019	10:19	7.1	12	< 1.0	24.2	0.00082	18.2	0.189	11
07 Mar 2019	09:45	7.3	10.8	< 1.0	27	0.00034	16.1	0.056	6
21 Mar 2019	12:00	7.4	10.7	< 1.0	28.9	0.00051	17.3	0.067	5
12 Apr 2019	09:33	7.1	9.4	<1.0	15.3	0.00007	13.8	0.023	29
28 Jun 2019	10:30	7.2	14.2	<1.0	24	0.0029	4.6	1.47	4

- Filtered carbonaceous biochemical oxygen demand ($CBOD^5$) was reported below the prescribed limit of 2.0 g/m^3 on the eight occasions it was monitored.
- The concentration of un-ionised ammonia (NH_3) remained below the limit of 0.025 g/m^3 in the eight monitoring rounds. This limit is set for the protection of fish populations.
- This is the second year running where there has not been an exceedance in terms of NH_3 at this monitoring location. The last time was during the 2016-2017 monitoring period when two exceedances were reported.

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

The Haehanga Stream and its associated unnamed tributaries were monitored on a bi-monthly schedule this period. The water course was assessed at 12[2] locations down its length (Figure 3 and 6). The analysis of the six compliance monitoring rounds and two additional follow up assessments are provided in the following Tables 5-12.

[2] Please note that a new monitoring location was re-instated this monitoring period HHG000090 due to the consent holder expanding their upper irrigation area.

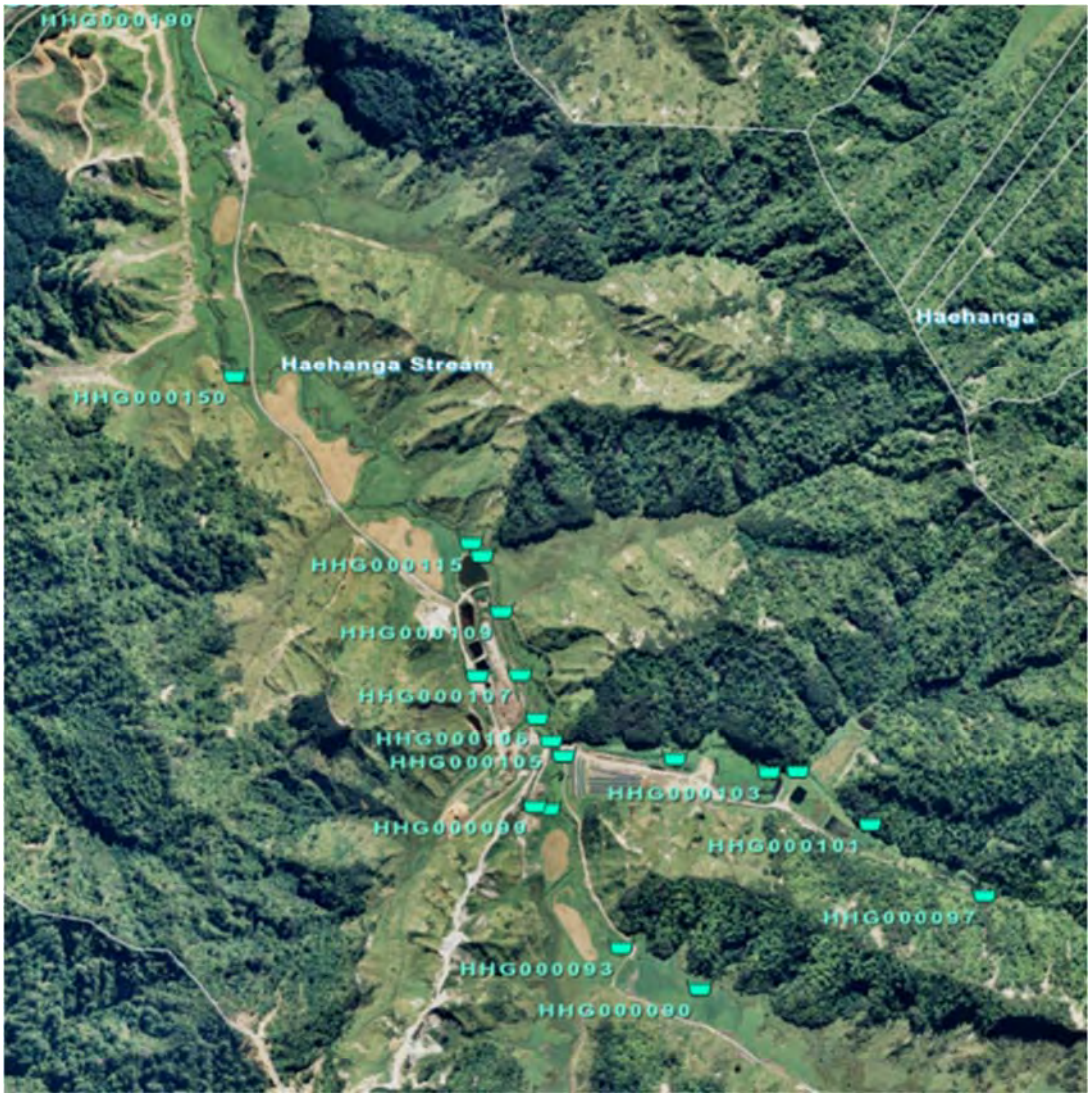

Figure 6 Surface water monitoring locations

Consent 5838-2.2, condition 11 states the following:

Discharges irritated to land shall not give rise to any of the following adverse effects in the Haehanga Stream, after a mixing zone extending 30 meters from the downstream extent to the irrigation areas:

a. *A rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 g/m^3;*
b. *A level of un-ionised ammonia greater than 0.025 g/m^3;*
c. *An increase in total recoverable hydrocarbons;*
d. *Chloride levels greater than 150 g/m^3*
e. *The production of any conspicuous change in colour or visual clarity;*
f. *Any emission of objectionable odour;*
g. *The rendering of fresh water unsuitable for consumption by farm animals; and*
h. *Any significant adverse effects on aquatic life*

In this monitoring period, monitoring location HHG000150 was the monitoring location located 30 m below the downstream extent of the irrigation areas. This will be augmented in the upcoming monitoring period as the consent holder has now brought the new lower irrigation area into operation.

Six surface water monitoring rounds were undertaken at the Uruti facility this period. In addition to the six planned surveys, two additional surveys were also undertaken in relation to elevated containments identified through routine monitoring.

Table 5 Surface water monitoring 28 August 2018

Surface water	Parameter	Temperature	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Surface water 1							
HHG000093	28 Aug 2018	11.1	7.3	0.00008	0.105	0.022	5
HHG000097	28 Aug 2018	9.4	7.1	0.00017	0.086	0.079	9
HHG000098	28 Aug 2018	9.5	7.1	0.00023	-	0.098	7
HHG000099	28 Aug 2018	10.4	7.1	0.00009	-	0.04	92
HHG000100	28 Aug 2018	10.8	7	0.000079	0.092	0.043	32
HHG000106	28 Aug 2018	14.8	7.2	0.00183	-	0.46	-
HHG000109	28 Aug 2018	12.3	7.2	0.0007	-	0.198	-
HHG000115	28 Aug 2018	12	7.2	0.00086	0.191	0.22	-
HHG000150	28 Aug 2018	11.4	7.1	0.0011	0.27	0.44	15
HHG000190	28 Aug 2018	12.6	7	0.00099	-	0.43	-

Surface water	Parameter	Filtered ($CBOD^5$)	Chloride	Total Sodium	EC	non filtered ($cBOD^5$)	E-Coli
Site	Collected	$g\ O_2/m^3$	g/m^3	g/m^3	mS/m	$g\ O_2/m^3$	MPN / 100 mL
Surface water 1							
HHG000093	28 Aug 2018	< 1.0	10	9.2	15.2	-	-
HHG000097	28 Aug 2018	< 1.0	11.6	-	17.3	-	-
HHG000098	28 Aug 2018	< 1.0	11.1	-	17.9	-	-
HHG000099	28 Aug 2018	< 1.0	12.6	-	23.1	-	-
HHG000100	28 Aug 2018	< 1.0	12.4	9.8	17.6	-	-
HHG000106	28 Aug 2018	< 1.0	16.5	-	25.1	-	-
HHG000109	28 Aug 2018	< 1.0	14	-	19.8	-	-
HHG000115	28 Aug 2018	< 1.0	15.1	10.5	19.7	-	-
HHG000150	28 Aug 2018	< 1.0	23	13	22.4	-	-
HHG000190	28 Aug 2018	-	22	-	22	-	-

Surface water monitoring round 1-28 August 2018

Minimal impacts were reported during the August 2018 monitoring round (Table 5). Of note was slight increases in saline, nitrogen and electrical conductivity concentrations (chloride (Cl), ammoniacal nitrogen (NH_4) and EC) down catchment. However the increases reported (10 g/m^3-22 g/m^3 Cl, 0.022g/m^3-0.43 g/m^3 NH_4, 15.2 mS/m-22 mS/m EC) were minimal. No exceedance was reported when compared to consent condition 11 above.

Table 6 Surface water monitoring 29 October 2018

Surface water	Parameter	Temperature	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Surface water 2							
HHG000093	29 Oct 2018	15.2	7.4	< 0.00007	0.003	< 0.010	10
HHG000097	29 Oct 2018	12.1	7.4	0.0002	0.06	0.034	380
HHG000098	29 Oct 2018	15.2	7.5	0.0001	-	0.011	20
HHG000099	29 Oct 2018	14.1	7.4	< 0.00007	-	< 0.010	300
HHG000100	29 Oct 2018	14.6	7.3	0.00007	0.016	0.013	102
HHG000106	29 Oct 2018	15.8	7.4	0.00167	-	0.2	-
HHG000109	29 Oct 2018	15.1	7.6	0.00126	-	0.111	-
HHG000115	29 Oct 2018	15.1	7.6	0.00118	0.066	0.109	-
HHG000150	29 Oct 2018	14.8	7.5	0.00066	0.067	0.079	199
HHG000190	29 Oct 2018	14.8	7.5	0.0022	-	0.24	-
Surface water	**Parameter**	**Filtered ($CBOD^5$)**	**Chloride**	**Total Sodium**	**EC**	**non filtered ($cBOD^5$)**	**E-Coli**
Site	**Collected**	**g O_2/m^3**	**g/m^3**	**g/m^3**	**mS/m**	**g O_2/m^3**	**MPN / 100 mL**
Surface water 2							
HHG000093	29 Oct 2018	1.1	8	10.2	17.4	-	-
HHG000097	29 Oct 2018	< 1.0	8	-	18.5	-	-
HHG000098	29 Oct 2018	< 1.0	8.5	-	15.6	-	-
HHG000099	29 Oct 2018	< 1.0	8.6	-	19	-	-
HHG000100	29 Oct 2018	< 1.0	8.7	10	18.1	-	-
HHG000106	29 Oct 2018	< 1.0	11.5	-	21.5	-	-
HHG000109	29 Oct 2018	< 1.0	11.3	-	21.9	-	-
HHG000115	29 Oct 2018	< 1.0	11.6	11.3	21.3	-	-
HHG000150	29 Oct 2018	< 1.0	12.2	11.1	19.9	-	-
HHG000190	29 Oct 2018	-	18.8	-	27.3	2.8	**> 2420**

Surface water monitoring round 2-29 October 2018

Minimal impacts were reported during the October 2018 monitoring round (Table 6). In similarity to the previous monitoring round, a slight increase in chloride, ammonia and conductivity was observed (8 -18 g/m^3 Cl, <0.010 g/m^3-0.24 g/m^3 NH4 and 17.4 mS/m-27.3 mS/m EC) down the catchment. Of note was the elevated E-Coli result reported at HHG000190 at >2,420 MPN/100 ml. This was also coupled with an elevated non-filtered CBOD, however the corresponding upstream sites indicated no elevated filtered CBOD, above the detection limit. Thus no exceedance was found.

Table 7 Surface water monitoring 19 December 2018

Surface water	Parameter	Temperature	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Surface water 3							
HHG000093	19 Dec 2018	20.9	7.5	< 0.00013	< 0.002	< 0.010	< 3
HHG000097	19 Dec 2018	16.6	7.3	0.00109	0.157	0.191	6
HHG000098	19 Dec 2018	18.3	7.5	0.0008	-	0.07	5
HHG000099	19 Dec 2018	915	7.3	0.00009	-	0.012	3
HHG000100	19 Dec 2018	19.7	7.3	< 0.00009	0.021	< 0.010	3
HHG000106	19 Dec 2018	18.6	7	0.0095	-	2.7	-
HHG000109	19 Dec 2018	21	7.4	0.0023	-	0.24	-
HHG000115	19 Dec 2018	20.5	7.2	0.0055	0.55	0.85	-
HHG000150	19 Dec 2018	22.5	7.2	0.00111	0.57	0.162	17
HHG000190	19 Dec 2018	21.3	7.3	0.00061	-	0.072	-
Surface water	**Parameter**	**Filtered ($CBOD^5$)**	**Chloride**	**Total Sodium**	**EC**	**non filtered ($cBOD^5$)**	**E-Coli**
Site	**Collected**	**g O_2/m^3**	**g/m^3**	**g/m^3**	**mS/m**	**g O_2/m^3**	**MPN / 100 mL**
Surface water 3							
HHG000093	19 Dec 2018	< 1.0	8.9	12.9	18.6	-	-
HHG000097	19 Dec 2018	< 1.0	9.6	-	20	-	-
HHG000098	19 Dec 2018	< 1.0	9.5	-	25	-	-
HHG000099	19 Dec 2018	< 1.0	18.9	-	28.6	-	-
HHG000100	19 Dec 2018	< 1.0	19.8	15.7	23.8	-	-
HHG000106	19 Dec 2018	< 1.0	60	-	47.7	-	-
HHG000109	19 Dec 2018	< 1.0	40	-	34.1	-	-
HHG000115	19 Dec 2018	< 1.0	57	28	42.2	-	-
HHG000150	19 Dec 2018	< 1.0	77	32	45.3	-	-
HHG000190	19 Dec 2018	-	50	-	36	1.9	-

Surface water monitoring round 3–19 December 2018

The December 2018 monitoring round was coupled with lower flows during the sampling. Any potential impacts are more likely to be observed during lower flows as the process of less dilution in the Haehanga Stream and associated unnamed tributaries.

The results (Table 7) indicated an increase in chloride down the catchment, the values were slightly elevated when compared to the previous two surveys (range 8.9 g/m^3–77 g/m^3 Cl), however, not in exceedance of consent condition 11. The associated ammonia analysis also identified a slight elevation around monitoring location HHG000106 with a value of 2.7 g/m^3. Fortunately the corresponding pH at the same monitoring location was reported at 7 pH, which negated any rise in NH_3 values. Sodium values also identified a slight increase down catchment (12.9 g/m^3- 36 g/m^3 Na). Similar increases were also noted in the EC as function of increased minerality.

Table 8 Surface water monitoring 22 February 2019

Surface water	Parameter	TEMP	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Surface water 4							
HHG000093	22 Feb 2019	18.7	7.2	< 0.00007	< 0.002	< 0.010	11
HHG000097	22 Feb 2019	17	6.8	0.0015	0.077	0.73	23
HHG000098	22 Feb 2019	17.9	7.3	0.00045	-	0.061	15
HHG000099	22 Feb 2019	19.8	7.4	0.00016	-	0.018	8
HHG000100	22 Feb 2019	20.4	7.2	0.00018	0.003	0.028	26
HHG000106	22 Feb 2019	17.7	6.3	0.0133	-	**22**	-
HHG000109	22 Feb 2019	20.6	7.2	< 0.00008	-	< 0.010	-
HHG000115	22 Feb 2019	21.1	7.2	0.0143	1.08	2.2	-
HHG000150	22 Feb 2019	22.6	7.5	< 0.00014	< 0.002	< 0.010	8
HHG000190	22 Feb 2019	20.7	7.4	< 0.00011	-	< 0.010	

Surface water	Parameter	Filtered ($CBOD^5$)	Chloride	Total Sodium	EC	Non filtered ($CBOD^5$)
Site	Collected	g O_2/m^3	g/m^3	g/m^3	mS/m	g O_2/m^3
Surface water 4						
HHG000093	22 Feb 2019	< 1.0	11.5	15.6	26.8	-
HHG000097	22 Feb 2019	< 1.0	10.7	-	26.9	-
HHG000098	22 Feb 2019	< 1.0	11.2	-	24.5	-
HHG000099	22 Feb 2019	< 1.0	21	-	35.6	-
HHG000100	22 Feb 2019	< 1.0	22	19.7	34	-
HHG000106	22 Feb 2019	**7.8**	**450**	-	202	-
HHG000109	22 Feb 2019	< 1.0	**200**	-	96.8	-
HHG000115	22 Feb 2019	< 1.0	**420**	**139**	174.5	-
HHG000150	22 Feb 2019	< 1.0	50	29	41	-
HHG000190	22 Feb 2019	-	42	-	39.4	1.6

Surface water monitoring round 4-22 February 2019

The February 2019 surface water monitoring round observed significantly low flows in the Haehanga Stream and associated unnamed tributaries. The corresponding analysis (Table 8) reported elevated values for the target contaminates of ammoniacal nitrogen (NH_4 22 g/m^3), chloride (450 g/m^3) and filtered carbonaceous biochemical oxygen demand ($CBOD^5$ 7.8 gO_2/m^3) at monitoring location HHG000106. A similar elevated increase in chloride was reported at the subsequent monitoring locations of HHG000109 (200 g/m^3 Cl) and HHG000115 (420 g/m^3 Cl) slightly downstream from HHG000106. Monitoring location HHG000115 also reported an elevated value for sodium (136 g/m^3 Na) and slightly elevated ammonia (2.2 g/m^3 NH_4).

As a process of the elevated surface water values, an additional surface water monitoring round was undertaken, to further assess for impacts to fresh water.

Table 9 Follow up surface water monitoring 07 March 2019

Surface water	Parameter	TEMP	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Follow up to surface water 4							
HHG000093	07 Mar 2019	17.8	7.2	< 0.00006	0.007	< 0.010	< 3
HHG000106	07 Mar 2019	16.1	6.6	0.0071	-	**6.4**	-
HHG000109	07 Mar 2019	17.4	7.2	0.00195	-	0.37	-
HHG000115	07 Mar 2019	17.3	7	0.0051	0.32	1.43	-
HHG000150	07 Mar 2019	19.1	8.8	**1.51**	2	**9.4**	35
HHG000190	07 Mar 2019	17.4	7.2	0.015	-	2.8	-

Surface water	Parameter	Filtered ($CBOD^5$)	Chloride	Total Sodium	EC	Non filtered ($cBOD^5$)
Site	Collected	g O_2/m^3	g/m^3	g/m^3	mS/m	g O_2/m^3
Follow up to surface water 4						
HHG000093	07 Mar 2019	< 1.0	10.5	12.8	23.3	-
HHG000106	07 Mar 2019	< 1.0	**143**	-	80	-
HHG000109	07 Mar 2019	< 1.0	69	-	49.1	-
HHG000115	07 Mar 2019	< 1.0	94	43	62	-
HHG000150	07 Mar 2019	**3.5**	**310**	**91**	141.2	-
HHG000190	07 Mar 2019	-	**195**	-	96.6	1.1

Follow up surface water monitoring round-07 March 2019

In response to the elevated contaminates identified during surface water monitoring round 4, an additional monitoring round was undertaken at six monitoring locations (Table 9). In similarity to February 2019 monitoring round, surface water flows were low in the Haehanga Stream and associated unnamed tributaries.

The analysis reported elevated ammoniacal nitrogen at two locations, HHG000106 (6.4 g/m^3 NH_4) and HHG000150 (9.4 g/m^3 NH_4) and to a lesser extent at HHG000190 (2.8 g/m^3 NH_4). Fortunately the monitoring location HHG000106 reported a lower pH at 6.6 pH, which negated the formulation of un-ionised ammonia. However, this location also recorded elevated chloride (143 g/m^3). Conversely, monitoring location HHG000150 with a corresponding pH, reported as 8.8 pH, recorded a unionised ammonia of 1.51 g/m^3 and a chloride value of 310 g/m^3 and a sodium value of 91 g/m^3. The site also held an elevated $CBOD^5$ with a reported value of 3.5 g O_2/m^3. A similar increase in chloride value was also reported at the lowest monitoring location HHG000190 with a value of 195 g/m^3.

The monitoring of site HHG000150 specifically indicated the consent holder was in breach of condition 11, of consent 5838-2.2.

In response to the results of the follow up survey undertaken in the 07 March 2019, a second follow up sample round was undertaken on the 21 March 2019.

Table 10 Second follow up surface water 21 March 2019

Surface water	Parameter	TEMP	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Second follow up to surface water 4							
HHG000093	21 Mar 2019	19.4	7.1	< 0.00006	< 0.002	< 0.010	13
HHG000106	21 Mar 2019	18.8	7.2	0.0101	-	1.61	-
HHG000109	21 Mar 2019	20.2	7.3	0.00144	-	0.186	-
HHG000115	21 Mar 2019	20	7.2	0.0027	0.27	0.42	-
HHG000150	21 Mar 2019	21.3	7	**0.027**	1.68	**5.7**	8
HHG000190	21 Mar 2019	19	7	0.0063	-	1.77	-
Duckpond	21 Mar 2019	23.7	8.6	**0.20**	-	1.24	
Surface water	Parameter	Filtered ($CBOD^5$)	Chloride	Total Sodium	EC	Non filtered ($cBOD^5$)	
Site	Collected	g O_2/m^3	g/m^3	g/m^3	mS/m	g O_2/m^3	
Second follow up to surface water 4							
HHG000093	21 Mar 2019	< 1.0	10.6	12.8	22	-	
HHG000106	21 Mar 2019	< 1.0	46	-	45.8	-	
HHG000109	21 Mar 2019	< 1.0	28	-	34	-	
HHG000115	21 Mar 2019	< 1.0	36	22	37.6	-	
HHG000150	21 Mar 2019	< 1.0	**174**	55	91.1	-	
HHG000190	21 Mar 2019	-	103	-	61.9	1.5	
Duckpond	21 Mar 2019	**28**	**500**	-	218	-	

Second follow up surface water monitoring round-21 March 2019

The second follow up monitoring round sampled six monitoring sites. On this occasion the reported (Table 10) results indicated slightly elevated ammoniacal nitrogen at monitoring location HHG000106 (1.61 g/m^3), elevated ammoniacal nitrogen at monitoring location HHG000150 (5.7 g/m^3) and slightly elevated ammoniacal nitrogen at HHG000190 (1.77 g/m^3). The results reported for HHG000106 also recorded a unionised ammonia value (0.027 g/m^3), which was marginally above the consent derived value. In addition, elevated chloride was also reported at HHG000150 (174 g/m^3) and to a lesser extent at HHG000190 (103 g/m^3).

A spot sample was also collected from the duck pond. The values indicated that there is likely conductivity between the drilling mud pad irrigation pond and the duck pond. The values recorded were elevated. With chloride concentrations of 500 g/m^3, a filtered CBOD of 28 gO_2/m^3 and unionised ammonia at 0.20 g/m^3. This would indicated that the site was not operating within it management plans and an abatement notice was issued.

Table 11 Surface water monitoring 12 April 2019

Surface water	Parameter	TEMP	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Surface water 5							
HHG000090	12 Apr 2019	13.5	7.2	0.00023	0.37	0.056	12
HHG000097	12 Apr 2019	13.5	7.1	0.00012	0.103	0.038	69
HHG000098	12 Apr 2019	13.8	7	0.00038	-	0.172	46
HHG000099	12 Apr 2019	13.3	7.1	0.00013	-	0.042	121
HHG000100	12 Apr 2019	13.5	7.1	0.00016	0.29	0.049	63
HHG000103	12 Apr 2019	13.8	7.1	0.00007	-	0.023	29
HHG000106	12 Apr 2019	15	7.3	0.00067	-	0.118	-
HHG000109	12 Apr 2019	14	7.7	0.00129	-	0.103	-
HHG000115	12 Apr 2019	14.1	7.2	0.00034	0.41	0.093	-
HHG000150	12 Apr 2019	14.2	7	0.00024	0.66	0.106	78
HHG000190	12 Apr 2019	14.5	6.9	0.00026	-	0.115	-

Surface water	Parameter	Filtered ($CBOD^5$)	Chloride	Total Sodium	EC	Non filtered ($cBOD^5$)
Site	Collected	$g\ O_2/m^3$	g/m^3	g/m^3	mS/m	$g\ O_2/m^3$
Surface water 5						
HHG000090	12 Apr 2019	< 1.0	10	10	16.6	-
HHG000097	12 Apr 2019	< 1.0	11.4	-	21.3	-
HHG000098	12 Apr 2019	< 1.0	10.9	-	19.6	-
HHG000099	12 Apr 2019	< 1.0	10.5	-	20.7	-
HHG000100	12 Apr 2019	< 1.0	13	10.1	18.8	-
HHG000103	12 Apr 2019	< 1.0	9.4	-	15.3	-
HHG000106	12 Apr 2019	< 1.0	11.9	-	22.7	-
HHG000109	12 Apr 2019	< 1.0	12.6	-	21	-
HHG000115	12 Apr 2019	< 1.0	13.4	12	20.7	-
HHG000150	12 Apr 2019	< 1.0	19.8	12.9	23.2	-
HHG000190	12 Apr 2019	-	18.4	-	22.8	< 1.0

Surface water monitoring round 5 –12 April 2019

This monitoring round, undertaken on the 12 April 2019, observed increased stream flows in the Haehanga Stream and associated unnamed tributaries. The analysis reported (Table 11), indicated no elevated contaminates of concern. In similarity to the earlier monitoring rounds of the year (Rounds 1-3) a minor increase in ammoniacal nitrogen (0.56 g/m^3-0.115 g/m^3) and chloride (10 g/m^3-18.4 g/m^3) was noted down catchment, however the concentrations and increases were minimal.

Table 12 Surface water monitoring 28 June 2019

Surface water	Parameter	TEMP	pH	NH_3	Nitrate-N + Nitrite-N	NH_4	TSS
Site	Collected	°C	pH Units	g/m^3	g/m^3	g/m^3	g/m^3
Surface water 6							
HHG000090	28 Jun 2019	4.2	7.4	0.00022	0.23	0.074	8
HHG000093	28 Jun 2019	4.1	7.3	0.00146	0.26	0.63	7
HHG000099	28 Jun 2019	3.2	7.7	0.00117	-	0.195	36
HHG000097	28 Jun 2019	5.1	7.4	0.00031	0.133	0.091	4
HHG000098	28 Jun 2019	3.9	7.3	0.00022	-	0.103	71
HHG000100	28 Jun 2019	4.7	7.1	0.00096	0.22	0.57	7
HHG000106	28 Jun 2019	5.9	7.2	0.00138	-	0.72	-
HHG000109	28 Jun 2019	4.6	7.3	0.00171	-	0.76	-
HHG000115	28 Jun 2019	4.3	7.2	0.00155	0.31	0.76	-
HHG000150	28 Jun 2019	4.7	7.1	0.00161	0.45	1.12	11
HHG000190	28 Jun 2019	5.8	7.4	0.0033	-	0.92	-

Surface water	Parameter	Filtered ($CBOD^5$)	Chloride	Total Sodium	EC	Non filtered ($cBOD^5$)	
Site	Collected	$g\ O_2/m^3$	g/m^3	g/m^3	mS/m	$g\ O_2/m^3$	
Surface water 6							
HHG000090	28 Jun 2019	< 1.0	11.3	11	16.8	-	
HHG000093	28 Jun 2019	< 1.0	17.7	11.8	20.7	-	
HHG000099	28 Jun 2019	< 1.0	15.5	-	31.8	-	
HHG000097	28 Jun 2019	< 1.0	12.4	-	22.1	-	
HHG000098	28 Jun 2019	< 1.0	13	-	19.1	-	
HHG000100	28 Jun 2019	< 1.0	20	12.4	25.1	-	
HHG000106	28 Jun 2019	< 1.0	23	-	29.4	-	
HHG000109	28 Jun 2019	< 1.0	23	-	27	-	
HHG000115	28 Jun 2019	< 1.0	23	14.3	26.9	-	
HHG000150	28 Jun 2019	< 1.0	35	17.6	30.3	-	
HHG000190	28 Jun 2019	-	36	-	30.4	< 1.0	

Surface water monitoring round 6-29 June 2019

The final surface water monitoring round was undertaken on the 29 June 2019. The results (Table 12), indicated similar results to round 5, with minor increases observed in terms of ammoniacal nitrogen (0.074 g/m3-0.92 g/m^3) and chloride (11.3 g/m^3-36 g/m^3) down catchment. The concentrations reported for these target contaminates were minimal, and no exceedance in consent condition 11 was observed during this round.

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 7.0 Ha. Note during this period only 5.2 Ha was available.

In this period the irrigation pond was sampled on six occasions. The analysis is provided in Table 13.

Table 13 Irrigation pond (IND002044) monitoring 2018-2019

IND002044	Site	IND002044	IND002044	IND002044	IND002044	IND002044	IND002044
Parameter	Unit/Date	28/08/2018	29/10/2018	19/12/2018	28/02/2019	12/04/2019	28/06/2019
Temperature	°C	13.8	18.1	23.6	23.2	16.8	8.4
pH	pH Units	7.6	7.4	7.6	8	8	7.5
Electrical Conductivity (EC)	mS/m	492	1,289	1,130	1,836	519	819
Acid Soluble Barium	g/m^3	-	-	-	2.1	0.36	0.87
Dissolved Barium	g/m^3	-	-	-	0.77	0.29	0.69
Total Barium	g/m^3	-	-	-	5.6	0.62	0.9
Benzene	g/m^3	0.0072	0.086	0.023	0.0092	0.03	0.03
Toluene	g/m^3	0.0103	0.78	0.125	0.03	0.046	0.062
Ethylbenzene	g/m^3	0.0009	0.0179	0.0066	0.0021	0.0036	0.0046
m&p-Xylene	g/m^3	0.0046	0.144	0.041	0.015	0.022	0.031
o-Xylene	g/m^3	0.0018	0.057	0.015	0.0057	0.0091	0.0122
C_7-C_9	g/m^3	< 0.15	1.17	0.23	0.07	0.1	0.15
C_{10}-C_{14}	g/m^3	0.6	1.2	1.5	0.4	0.6	0.3
C_{15}-C_{36}	g/m^3	16.8	2.7	2.1	0.8	22	0.5
Total hydrocarbons (C_7-C_{36})	g/m^3	17.5	5	3.8	1.3	23	1
Carbonaceous Biochemical Oxygen Demand (cBOD^5)	g O_2/m^3	300	710	410	240	270	820
Dissolved Arsenic	g/m^3	0.048	0.039	0.047	0.028	0.026	0.044
Dissolved Cadmium	g/m^3	-	-	-	< 0.0005	< 0.0003	< 0.0003
Dissolved Chromium	g/m^3	-	-	-	0.028	0.008	0.019
Dissolved Copper	g/m^3	-	-	-	< 0.005	0.007	0.005
Acid Soluble Lead	g/m^3	0.002	0.013	0.03	0.061	0.019	0.006
Dissolved Lead	g/m^3	-	-	-	0.0032	0.0013	0.001
Dissolved Mercury	g/m^3	-	-	-	< 0.00008	< 0.00008	< 0.00008
Dissolved Nickel	g/m^3	-	-	-	0.136	0.049	0.055
Dissolved Zinc	g/m^3	-	-	-	< 0.010	0.016	0.007
Total Ammoniacal-N	g/m^3	200	350	340	590	192	320
Free Ammonia as N	g/m^3	2	3.1	7.2	25	6.4	1.84
Nitrate-N + Nitrite-N	g/m^3	0.013	< 0.02	0.009	0.011	0.01	0.016
Total Kjeldahl Nitrogen (TKN)	g/m^3	-	370	430	600	230	320
Total Nitrogen	g/m^3	-	370	430	600	230	320
Total Potassium	g/m^3	400	1,520	1,620	2,700	380	860
Sodium Absorption Ratio		3.7	6.1	6.5	11	4.9	4.3
Chloride	g/m^3	890	2,800	2,600	4,300	1,010	1,760
Total Magnesium	g/m^3	25	54	43	59	35	47
Total Calcium	g/m^3	210	550	380	470	220	320
Total Sodium	g/m^3	210	560	500	950	290	310

The analysis of the irrigation pond (IND002044) indicated the following.

- Total petroleum hydrocarbons (TPH) (C_7-C_{36}) reported during the monitoring period ranged 1 g/m^3-23 g/m^3. This value was well below the consented maximum limit of 5% TPH which is 50,000 mg/kg as defined by consent 5838-2.2, condition 10.
- The sodium absorption ratio (SAR) reported during the monitoring period ranged 3.7-11 SAR. The consented value as defined in consent 5838-2.32, condition 10 is for a maximum of 18. The facility were in compliance with the limit for SAR on the six occasions monitored.
- The temperature ranged 8.4°C-23.6°C across the six monitoring rounds.
- The pH of irrigation fluid ranged between 7.4-8 pH.
- The electrical conductivity ranged 492 mS/m-1,836 mS/m across the six rounds.
- Barium analysis was recently added to the monitoring programme as the source of the fluid is of drilling waste origin.
    - Acid soluble barium ranged 0.36 g/m^3-2.1 g/m^3 across the three rounds undertaken.
    - Dissolved barium ranged 0.29 g/m^3-0.77 g/m^3.
    - Total barium ranged from 0.62 g/m^3-5.6 g/m^3.
- Benzene, toluene, ethylbenzene, m & p xylenes and o-xylene (BTEX) analysis were found at low concentrations, the values reported were as follows:
    - Benzene ranged 0.0072 g/m^3-0.086 g/m^3.
    - Toluene ranged 0.0103 g/m^3-0.78 g/m^3.
    - Ethylbenzene ranged 0.009 g/m^3-0.0176 g/m^3.
    - Xylene (m&p) ranged 0.0046 g/m^3-0.144 g/m^3.
    - Xylene (Ortha) ranged 0.0018 g/m^3-0.057 g/m^3.
- Carbonaceous biochemical oxygen demand (cBOD5) ranged 240 g/m^3-820 g/m^3 across the six monitoring rounds.
- Dissolved arsenic ranged 0.026 g/m^3-0.048 g/m^3.
- Dissolved cadmium was found to be below the limit of detection (<0.0005 g/m^3 and <0.0003 g/m^3) on the three monitoring occasions this period.
- Dissolved chromium ranged 0.008 g/m^3-0.019 g/m^3.
- Dissolved copper was found just above the limit of detection (<0.005 g/m^3) with two results of three found marginally above the limit, 0.005 g/m^3-0.007 g/m^3.
- Acid soluble lead within the irrigation pond ranged from 0.002 g/m^3-0.03 g/m^3.
- Dissolved lead ranged 0.001 g/m^3-0.0032 g/m^3.
- Dissolved mercury was found below the limit of detection (<0.00008 g/m^3) on the three occasions it was sampled.
- Dissolved nickel ranged 0.049 g/m^3-0.136 g/m^3.
- Dissolved zinc was reported at 0.007 g/m^3 and 0.016 g/m^3 with the other sample found below the limit of detection which was set at <0.010 g/m^3.
- Total ammoniacal nitrogen (NH_4) ranged 192 g/m^3-590 g/m^3 across the six samples collected.
- Free ammonia (NH_3) ranged 1.84 g/m^3-25 g/m^3.
- Inorganic nitrogen analysis of nitrite/ nitrate nitrogen (NNN) indicated low values with a range of 0.01 g/m^3-0.016 g/m^3.
- Total kjeldahl nitrogen (TKN) and total nitrogen within the irrigation fluid reported similar concentrations, ranging 230 g/m^3-600 g/m^3.
- Total potassium values ranged 380 g/m^3-2,700 g/m^3.
- Chloride values ranged from 890 g/m^3-4,300 g/m^3.
- Total magnesium ranged 25 g/m^3-59 g/m^3.
- Total calcium ranged 210g/m^3-470 g/m^3.
- Total sodium ranged 210g/m^3-950 g/m^3.

Using the irrigation records provided by the Company an assessment of the estimated average total nitrogen (TN) loadings to land were made. The average concentration for TN in the irrigation fluid was found to be 390 g/m^3. Which taken with the consent holder provided volume of irrigation fluid information 17,055 m^3 pa, gives an estimated value of nitrogen loading across the 7.0 Ha of 950 kg N/Ha pa. The Anzecc-armcanz 2000 guidelines for irrigation waters dictate a value of TN for long term use of 5 mg/L (5 g/m^3), while for a short term use a slightly higher value of 25-125 mg/L.

The corresponding chloride loading was estimated to be higher with an average of 2,226 g/m^3 in the irrigation fluid. Which gave an estimated average loading value of 5,423 kg/ Ha/ pa, which is equally excessive.

Anzecc-armcanz 2000 states that elevated values of chloride (>750 mg/L) within irrigation fluid increases the risk of cadmium uptake by crops. There are no crops grown on site, however there is potential for this uptake to occur given the values reported.

It should be noted that in this estimation the irrigation area sizing of 7.0 Ha was utilised. This is the current irrigation area sizing, as of the end of the monitoring period. During the summer of this monitoring period irrigation area F was extended to add an additional 1.8 Ha. For the majority of this period the true irrigation area sizing was 5.2 Ha.

The estimated TN loading for an area of 5.2 Ha was 1,279 kg/Ha/pa.

The estimated chloride loading for an area of 5.2 Ha was 7,300 kg/Ha/pa.

2.2.5 Groundwater monitoring

The monitoring of groundwater is undertaken at the Uruti facility. The monitoring network consists of seven monitoring wells (Figure 4). The monitoring well network which is a consented condition, was expanded during the previous monitoring period (2017-2018). In the period covered by this report (2018-2019) the wells were sampled on two occasions. The analytes are defined in Section 1.3.4. The results are provided in the following Tables 14-20.

Table 14 Monitoring well GND2188 2018-2019

GW 2018-2019	Site	GND2188	GND2188
Parameter	**Unit/Date**	**28 Aug 2018**	**22 Feb 2019**
LEVEL	**m**	0.47	1.715
Temperature	**°C**	13.7	17.7
Electrical Conductivity (EC)	**mS/m**	76.6	77.5
pH	**pH Units**	6.6	6.9
Dissolved Barium	**g/m^3**	-	0.062
Acid Soluble Barium	**g/m^3**	-	< 0.11
Benzene	**g/m^3**	< 0.0010	< 0.0010
Toluene	**g/m^3**	< 0.0010	< 0.0010
Ethylbenzene	**g/m^3**	< 0.0010	< 0.0010
m&p-Xylene	**g/m^3**	< 0.002	< 0.002
o-Xylene	**g/m^3**	< 0.0010	< 0.0010
C_7-C_9	**g/m^3**	< 0.06	< 0.06
C_{10}-C_{14}	**g/m^3**	< 0.2	< 0.2

GW 2018-2019	Site	GND2188	GND2188
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
C_{15}-C_{36}	g/m³	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m³	< 0.7	< 0.7
Chloride	g/m³	82	81
Total Ammoniacal-N	g/m³	-	1.15
Free Ammonia	g/m³	-	0.0036
Nitrate-N + Nitrite-N	g/m³	-	0.4
Total Calcium	g/m³	70	75
Total Magnesium	g/m³	13.6	16.4
Total Sodium	g/m³	50	58
Total Dissolved Solids (TDS)	g/m³	480	470

Table 15 Monitoring well GND2189 2018-2019

GW 2018-2019	Site	GND2189	GND2189
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
LEVEL	m	0.584	1.63
Temperature	°C	12.6	16.6
Electrical Conductivity (EC)	mS/m	19.1	81.7
pH	pH Units	6.4	6.3
Dissolved Barium	g/m³	-	0.49
Acid Soluble Barium	g/m³	-	0.49
Benzene	g/m³	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010
Ethylbenzene	g/m³	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010
C_7-C_9	g/m³	< 0.06	< 0.06
C_{10}-C_{14}	g/m³	< 0.2	< 0.2
C_{15}-C_{36}	g/m³	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m³	< 0.7	< 0.7
Chloride	g/m³	26	111
Total Ammoniacal-N	g/m³	-	0.59
Free Ammonia	g/m³	-	0.00045
Nitrate-N + Nitrite-N	g/m³	-	0.044
Total Calcium	g/m³	12.7	68

GW 2018-2019	Site	GND2189	GND2189
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
Total Magnesium	g/m³	2.4	12.7
Total Sodium	g/m³	12.7	60
Total Dissolved Solids (TDS)	g/m³	125	460

Table 16 Monitoring well GND2190 2018-2019

GW 2018-2019	Site	GND2190	GND2190
Parameter	Unit/Date	28 Aug 2018	16 May 2019
LEVEL	m	0.728	0.58
Temperature	°C	13.6	14.2
Electrical Conductivity (EC)	mS/m	229	112.3
pH	pH Units	6.3	6.1
Dissolved Barium	g/m³	-	0.94
Acid Soluble Barium	g/m³	-	0.92
Benzene	g/m³	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010
Ethylbenzene	g/m³	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010
C_7-C_9	g/m³	< 0.06	< 0.06
C_{10}-C_{14}	g/m³	< 0.2	< 0.2
C_{15}-C_{36}	g/m³	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m³	< 0.7	< 0.7
Chloride	g/m³	570	290
Total Ammoniacal-N	g/m³	-	2.9
Free Ammonia	g/m³	-	0.00109
Nitrate-N + Nitrite-N	g/m³	-	0.006
Total Calcium	g/m³	109	68
Total Magnesium	g/m³	13.2	13.3
Total Sodium	g/m³	168	70
Total Dissolved Solids (TDS)	g/m³	1390	890

Table 17 Monitoring well GND3007 2018-2019

GW 2018-2019	Site	GND3007	GND3007
Parameter	Unit/Date	28 Aug 2018	16 May 2019
LEVEL	m	2.538	1.91
Temperature	°C	14.8	15.2
Electrical Conductivity (EC)	mS/m	23.7	13.6
pH	pH Units	6	5.8
Dissolved Barium	g/m³	-	0.029
Acid Soluble Barium	g/m³	-	< 0.11
Benzene	g/m³	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010
Ethylbenzene	g/m³	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010
C_7-C_9	g/m³	< 0.06	< 0.06
C_{10}-C_{14}	g/m³	< 0.2	< 0.2
C_{15}-C_{36}	g/m³	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m³	< 0.7	< 0.7
Chloride	g/m³	37	15.8
Total Ammoniacal-N	g/m³	-	0.027
Free Ammonia	g/m³	-	< 0.000010
Nitrate-N + Nitrite-N	g/m³	-	0.008
Total Calcium	g/m³	12.7	8.9
Total Magnesium	g/m³	5	2.8
Total Sodium	g/m³	15.9	8.7
Total Dissolved Solids (TDS)	g/m³	156	84

Table 18 Monitoring well GND3008 2018-2019

GW 2018-2019	Site	GND3008	GND3008
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
LEVEL	m	1.96	3.801
Temperature	°C	14.6	17.5
Electrical Conductivity (EC)	mS/m	15.7	30
pH	pH Units	5.9	6.3
Dissolved Barium	g/m³	-	0.017
Acid Soluble Barium	g/m³	-	< 0.11

GW 2018-2019	Site	GND3008	GND3008
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
Benzene	g/m^3	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010
C_7-C_9	g/m^3	< 0.06	< 0.06
C_{10}-C_{14}	g/m^3	< 0.2	< 0.2
C_{15}-C_{36}	g/m^3	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m^3	< 0.7	< 0.7
Chloride	g/m^3	21	24
Total Ammoniacal-N	g/m^3	-	2.7
Free Ammonia	g/m^3	-	0.0022
Nitrate-N + Nitrite-N	g/m^3	-	0.013
Total Calcium	g/m^3	10.9	17.9
Total Magnesium	g/m^3	3	7.3
Total Sodium	g/m^3	8.9	23
Total Dissolved Solids (TDS)	g/m^3	73	230

Table 19 Monitoring well GND3009 2018-2019

GW 2018-2019	Site	GND3009	GND3009
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
LEVEL	m	2.184	2.669
Temperature	°C	14.9	17.8
Electrical Conductivity (EC)	mS/m	472	430
pH	pH Units	6.3	6.3
Dissolved Barium	g/m^3	-	0.77
Acid Soluble Barium	g/m^3	-	1.11
Benzene	g/m^3	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010
C_7-C_9	g/m^3	< 0.06	< 0.06
C_{10}-C_{14}	g/m^3	< 0.2	< 0.2

GW 2018-2019	Site	GND3009	GND3009
Parameter	Unit/Date	28 Aug 2018	22 Feb 2019
C_{15}-C_{36}	g/m³	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m³	< 0.7	< 0.7
Chloride	g/m³	1,310	1,180
Total Ammoniacal-N	g/m³	-	24
Free Ammonia	g/m³	-	0.0197
Nitrate-N + Nitrite-N	g/m³	-	0.005
Total Calcium	g/m³	198	170
Total Magnesium	g/m³	44	39
Total Sodium	g/m³	410	420
Total Dissolved Solids (TDS)	g/m³	3,200	2,500

Table 20 Monitoring well GND3010 2018-2019

GW 2018-2019	Site	GND3010	GND3010
Parameter	Unit/Date	01/11/2018	22/02/2019
LEVEL	m	2.161	3.348
Temperature	°C	15.1	17.2
Electrical Conductivity (EC)	mS/m	41	40.4
pH	pH Units	6.2	6.2
Dissolved Barium	g/m³	-	0.013
Acid Soluble Barium	g/m³	-	< 0.11
Benzene	g/m³	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010
Ethylbenzene	g/m³	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010
C_7-C_9	g/m³	< 0.06	< 0.06
C_{10}-C_{14}	g/m³	< 0.2	< 0.2
C_{15}-C_{36}	g/m³	< 0.4	< 0.4
Total hydrocarbons (C_7-C_{36})	g/m³	< 0.7	< 0.7
Chloride	g/m³	9.7	9.9
Total Ammoniacal-N	g/m³	-	9.1
Free Ammonia	g/m³	-	0.0064
Nitrate-N + Nitrite-N	g/m³	-	0.011
Total Calcium	g/m³	15.1	18.8

GW 2018-2019	Site	GND3010	GND3010
Parameter	**Unit/Date**	**01/11/2018**	**22/02/2019**
Total Magnesium	**g/m^3**	6.7	8.7
Total Sodium	**g/m^3**	16.3	21
Total Dissolved Solids (TDS)	**g/m^3**	200	196

The analysis of the groundwater monitoring network this period identified the following:

- Total petroleum hydrocarbons (TPH) C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36} and C_7-C_{36} were found below the limit of detection, as set by the laboratory, across all monitoring wells, which was <0.06, <0.2, <0.4, <0.07 all g/m^3 respectively.
- Benzene, toluene, ethylbenzene and xylenes (m, p and o) (BTEX) analysis was similarly below the limit of detection in the two monitoring rounds undertaken across all wells. The limit of detection was as follows: <0.00010, <0.0010, <0.0010, <0.002, <0.002 and <0.0010 all g/m^3 respectively.
- Total dissolved solid analysis ranged from 73 g/m^3-3,200 g/m^3 this period, the elevated result was reported during the February 2019 monitoring round in GND3009 (Table 19), the next highest value was reported in well GND2190 (Table 16) which ranged 890 g/m^3-1,390 g/m^3. The low value result was reported at monitoring location GND3008 (Table 18) during the July 2018 monitoring round[3].
- Chloride analysis indicated elevated values in monitoring well GND3009 (Table 19), both monitoring rounds reported chloride values in excess of 1,000 g/m^3. The most elevated value for chloride reported was 1,310 g/m^3 in this monitoring location during the August 2018 monitoring round. The second survey, undertaken in February 2010 reported a value of 1,180 g/m^3. The next highest result was reported in GND2190 (Table 16) which ranged 290 g/m^3-570 g/m^3. The remaining wells on site reported values for chloride ranging from 9.7 g/m^3-111 g/m^3.
- Sodium values in groundwater followed a similar theme to the chlorides. The most elevated sodium result (420 g/m^3) was recorded in GND3009 (Table 19) during the February 2019 monitoring round. The second highest reading (410 g/m^3) was also found in GND3009 during the August 2018. monitoring round. Similarly, GND2190 (Table 16) held the next elevated sodium results with a range of 70 g/m^3 -168 g/m^3. The remaining wells recorded values ranging from 8.7 g/m^3-60 g/m^3.
- Total ammoniacal (NH_4) nitrogen was added to the monitoring for the second round of sampling this period. The analysis indicated that GND3009 (Table 19) held a significant value of 24 g/m^3, followed by GND3010 with a value of 9.1 g/m^3, GND2190 2.9 g/m^3 and GND3009 with a value of 2.7 g/m^3. The remaining wells ranged from 0.027 g/m^3-1.15 g/m^3.
- Nitrate/ Nitrite nitrogen (NNN) was also added to the second monitoring run. The resultant analysis indicated low values across all wells, the highest recorded was a low value of 0.4 g/m3 recorded in well GND2188, the lowest was 0.005 g/m^3 recorded in GND3009.
- pH values across all wells ranged from 5.8 pH-6.9 pH which is weakly acidic. GND2188 ranged 6.6 pH-5.9 pH, GND 2189 ranged 6.3 pH –6.4 pH. GND2190 6.1 pH –6.3 pH, GND3007 ranged 5.8 pH –6 pH, GND3008 ranged 5.9 pH –6.3 pH. GND3009 remained stable at 6.3 pH, while GND3010 also remained stable at 6.2 pH.

[3] The two groundwater monitoring rounds planned for this monitoring period were on the 28/08/2018 and the 22/02/2019. During the 28/08/2019 sample run, monitoring well GND3010 was not able to be sampled due to the well cap being seized on the well, thus this was re-sampled on the 01/11/2018. During the 22/02/2019 monitoring run, well GND3007 and GND2190 ran dry during purging and thus no sample was obtained. Thus both these wells were re-sampled 16/05/2019.

- Free ammonia (NH_3) results ranged from below the limit of detection in GND3007 (Table 17) (<0.0000010 g/m^3) to 0.0197 g/m^3 in GND3009.
- Dissolved barium analysis was also added to the second monitoring round across all wells. The analysis indicated a range of 0.013 g/m^3-0.94 g/m^3. The highest result was reported in GND2190 and the lowest in GND3010. Note the NZ drinking water standard for barium is set at 0.7 mg/L[4]
- Acid soluble barium analysis indicated a range of 0.49 g/m^3-1.11 g/m^3 in three of seven wells, four wells did not report anything above the limit of detection which was set at <0.11 g/m^3. The elevated result was reported in GND3009 and the lowest recorded in GND2189.
- Total calcium results reported a range of 8.9 g/m^3-198 g/m^3 this period. The highest values were reported in GND3009 (170 g/m^3-198 g/m^3), with the next highest recorded in GND2190 (68 g/m^3 - 109 g/m^3).
- Total magnesium results recorded a range across all wells of 2.4 g/m^3-42 g/m^3. The highest result was recorded in GND3009 with the second highest (39 g/m^3) also recorded at this well source.

The monitoring well which appeared the most impacted was monitoring well GND3009. This well is located down gradient of the duck pond and it contained an elevated salinity concentration (>2,500 g/m^3) and significant ammonia (24 g/m^3). GND2190, is on the watch list, as this well contained concentrations of TDS close to the 1,000 g/m^3 concentration, with similarly elevated chloride concentrations. In the upcoming monitoring period these wells will be sampled quarterly to further assess for seasonality across the site.

2.2.6 Irrigation area-soil monitoring

The Company irrigates fluid leachate from the irrigation pond (Section 2.2.4) to five irrigation areas at Uruti (Figure 5). The irrigation areas are termed area E, area J, area H, area G and area F. They now total a combined area of 7.0 Ha. Prior to the extension of the area F at the end of the 2018-2019 monitoring period, the total area was 5.2 Ha.

In this monitoring period seven soil samples were collected. Two samples were collected from area E, two samples from area J and three from area F. The results of the sampling are presented in the following Table 21. The transect locations are graphically presented in Figures 7 and 8.

Table 21 Soil monitoring results 2018-2019

Soil monitoring	Transect/Area	Transect E/ Area F	Transect A/Area F	Transect D/Area F	Transect F/Area J	Transect B/Area J	Transect G/Area E	Transect C/Area E
Parameter	**Unit/Date**	**01/11/2018**	**12/04/2019**	**12/04/2019**	**01/11/2018**	**12/04/2019**	**01/11/2018**	**12/04/2019**
Polycyclic aromatic hydrocarbons								
1-Methylnaphthalene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
2-Methylnaphthalene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Acenaphthene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Acenaphthylene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Anthracene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Benzo[a]anthracene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	0.019	< 0.016	< 0.017
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.05	< 0.04	< 0.04	< 0.04	< 0.05	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.05	< 0.04	< 0.04	< 0.05	< 0.05	< 0.04	< 0.05

[4] Drinking water standards for New Zealand 2005 (revised 2018)

Soil monitoring	Transect/Area	Transect E/ Area F	Transect A/Area F	Transect D/Area F	Transect F/Area J	Transect B/Area J	Transect G/Area E	Transect C/Area E
Parameter	**Unit/Date**	**01/11/2018**	**12/04/2019**	**12/04/2019**	**01/11/2018**	**12/04/2019**	**01/11/2018**	**12/04/2019**
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Benzo[e]pyrene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Benzo[k]fluoranthene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Chrysene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Fluoranthene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	0.02	< 0.016	< 0.017
Fluorene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Perylene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Phenanthrene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Pyrene	mg/kg dry wt	< 0.019	< 0.016	< 0.013	< 0.017	< 0.019	< 0.016	< 0.017
Naphthalene	mg/kg dry wt	< 0.10	< 0.08	< 0.07	< 0.09	< 0.10	< 0.08	< 0.09
Total of Reported PAHs in Soil	mg/kg	< 0.5	< 0.4	< 0.4	< 0.4	< 0.5	< 0.4	< 0.4
Total Petroleum Hydrocarbons								
C_7-C_9	mg/kg dry wt	< 12	< 10	< 8	< 10	< 11	< 10	< 10
C_{10}-C_{14}	mg/kg dry wt	< 30	< 20	< 20	< 20	< 30	< 20	< 20
C_{15}-C_{36}	mg/kg dry wt	< 50	< 40	< 40	82	125	84	149
Total hydrocarbons (C_7-C_{36})	mg/kg dry wt	< 80	< 70	< 70	82	125	84	149
BTEX								
Benzene	mg/kg dry wt	< 0.10	< 0.08	< 0.06	< 0.09	< 0.10	< 0.08	< 0.08
Toluene	mg/kg dry wt	< 0.10	< 0.08	< 0.06	< 0.09	< 0.10	< 0.08	< 0.08
Ethylbenzene	mg/kg dry wt	< 0.10	< 0.08	< 0.06	< 0.09	< 0.10	< 0.08	< 0.08
m&p-Xylene	mg/kg dry wt	< 0.19	< 0.15	< 0.11	< 0.17	< 0.19	< 0.15	< 0.16
o-Xylene	mg/kg dry wt	< 0.10	< 0.08	< 0.06	< 0.09	< 0.10	< 0.08	< 0.08
Cations/ Anions/ Salts								
Chloride	mg/kg dry wt	54	200	8	580	1060	470	270
Total Recoverable Magnesium	mg/kg dry wt	4,800	4,300	6,300	5,100	4,700	5,500	3,800
Total Recoverable Calcium	mg/kg dry wt	5,600	3,900	5,500	13,800	17,200	10,900	9,900
Total Recoverable Potassium	mg/kg dry wt	1,950	1,360	1,410	2,500	3,300	1,470	1,990
Total Recoverable Sodium	mg/kg dry wt	160	165	156	520	690	340	300
Total Recoverable Barium	mg/kg dry wt	-	780	270	-	1,380	-	1,660
Soluble Salts	g/100g dry wt	< 0.05	0.07	< 0.05	0.18	0.31	0.15	0.1
Conductivity from soluble salts	mS/cm	< 0.2	0.2	< 0.2	0.5	0.9	0.4	0.3
Dry Matter (Env)	g/100g as rcvd	53	64	77	59	54	63	61
pH	pH Units	6.8	5.5	6.5	7	7.2	7	7
Sodium Absorption Ratio (SAR)		1.2	1.5	0.7	4.3	4.3	1.6	1.8
Heavy Metals								

Soil monitoring	Transect/Area	Transect E/ Area F	Transect A/Area F	Transect D/Area F	Transect F/Area J	Transect B/Area J	Transect G/Area E	Transect C/Area E
Parameter	Unit/Date	01/11/2018	12/04/2019	12/04/2019	01/11/2018	12/04/2019	01/11/2018	12/04/2019
Total Recoverable Arsenic	mg/kg dry wt	5	4	5	5	6	6	5
Total Recoverable Cadmium	mg/kg dry wt	0.19	< 0.10	< 0.10	0.32	0.27	0.2	0.28
Total Recoverable Chromium	mg/kg dry wt	18	19	20	18	19	20	16
Total Recoverable Copper	mg/kg dry wt	14	12	14	32	24	24	19
Total Recoverable Lead	mg/kg dry wt	13.2	13.4	16.2	22	29	22	19.8
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	12	14	20	13	13	15	10
Total Recoverable Zinc	mg/kg dry wt	63	56	67	94	109	98	95

The soil sample results (Table 21) indicated the following:

- Polycyclic aromatic hydrocarbons (PAH) analysis reported two compounds, benzo (a) pyrene (BaP) and fluoranthene at very low concentrations in area J, transect B, during the April 2019 monitoring round. The values recorded (0.019 g/m^3 BaP and 0.02 g/m^3 fluoranthene) were just above the limit of detection for both analytes. The remaining soil samples did not record any other PAH's above the limit of detection.
- Total petroleum hydrocarbons (TPH) carbons chains C_7-C_9 and C_{10}-C_{14} did not record any values above the limit of detection across the seven soil samples. Carbon chain C_{15}-C_{36} did record low values in four of seven soil samples. The values (range 82 g/m^3-149 g/m^3) reported were from area E (transects C and G), and area J (transects B and F). Note similar concentrations were also reported in the C_7-C_{36} category, which is the sum of all the carbon chains.
- Benzene, toluene, ethylbenzene and xylenes (m&p and o) (BTEX) analysis indicated no values above the limit detection across all seven soil samples.
- Chloride analysis indicated a range of values across the seven soil samples this period (8 g/m^3-1,060 g/m^3). The lowest concentration (8 g/m^3) was recorded in the new upper irrigation area (area F, transect D). This area (area F) has been recently extended and modified by the consent holder to allow for an increased irrigation area. The lower result indicates less application of irrigation fluid than transect A, which was collected in the older portion of area F, whereas transect E was on the cusp of the old area F. The higher concentrations recorded in area J (580 g/m^3 transect F and 1,060 g/m^3 transect B) represent the older irrigation area which has received significant applications of fluid over time. These results follow a similar theme to the last monitoring period (2017-2018) where area H (not sampled in this monitoring period) reported a value of chloride of 1,254 g/m^3. Area E also recorded elevated chloride concentrations (transect G, 470 g/m^3 and transect C, 270 g/m^3) when compared to the previous monitoring period(2017-2018 73 g/m^3 and 129 g/m^3 area E).
- Calcium values were significantly elevated. Most likely as a process of the elevated calcium within irrigation fluid, which is composed partly of fluid components of drilling mud, primarily water based muds. The values ranged from 3,900 g/m^3-17,200 g/m^3. This analyte has observed some significant increases in recent years. The values in the 2016-2017 monitoring period (range 42 g/m^3-93 g/m^3) and the 2017-2018 monitoring period (range 33 g/m^3-9,600 g/m^3) indicate the significant increase in this analyte this period. The higher values were reported in area J, and to a lesser extent, area E.
- Magnesium values, in similarity to calcium indicated elevated results, the range (3,800 g/m^3-6,300 g/m^3), eclipses the range from the previous two periods. 2016-2017 range 2.5 g/m^3-11.2 g/m^3, 2017-2018 4 g/m^3-4,700 g/m^3.

- Potassium values were significantly elevated across all samples, (range 1,360 g/m^3-3,300 g/m^3). The elevated results (2,500 g/m^3 transect F and 3,300 g/m^3 transect B) were, in similarity to chloride values, reported in area J, which is a long term irrigation area.
- Sodium values followed similar trends to the chloride and potassium results. The elevated results (520 g/m^3 and 690 g/m^3) were again found in area J and to a lesser extent, area E (340 g/m^3 and 300 g/m^3).
- Total barium was recently added to the monitoring programme, as such only four samples were analysed this period. The resultant analysis ranged 270 g/m^3-1,660 g/m^3. The higher results were found in the older irrigation area J (1,380 g/m^3) and area E (1,660 g/m^3). Note area E was constructed from former drilling mud pad material, thus elevated barium in the soil was suspected.
- Soluble field salts ranged from below the limit of detection in two samples (Transect E and D, both area F), to 3,100 g/m^3 in area J.
- pH values across the soil samples remained relatively neutral, ranging 6.5-7.2 pH in six of the seven soil samples. Transect A of area F was the only mildly acidic soil with a pH of 5.5 pH.
- Sodium absorption ratio (SAR) values were all relatively low, due to the elevated calcium and magnesium rates. The range this period, 0.7-4.6 SAR, is lower than the previous monitoring period (2017-2018, 0.8-9.62 SAR).
- Total recoverable (TR) arsenic values were quite stable across the seven samples, with a range of 4 mg/kg-6 mg-kg.
- TR cadmium values ranged at low concentrations from below the limit of detection in two samples (<0.10 mg/kg) to 0.32 mg/kg. Of note the higher values were again observed in area J.
- TR chromium values were similarly low across the seven samples, ranging 16-19 mg-kg.
- TR copper values ranged from 12-32 mg/kg.
- TR lead values ranged from 13-29 mg/kg.
- TR mercury results were all below the limit of detection which was set at 0.10 mg/kg.
- TR nickel results ranged 10-20 mg-kg.
- TR zinc values ranged 56-109 mg/kg.

The analysis of the soil samples this period has identified that area J is impacted when compared to area F with elevated values for chloride, calcium, potassium, sodium, barium and soluble salts. The analysis of the newly extended irrigation area F, details the difference between a slightly utilised area in the case of area F and significantly utilised areas in the case of area J and also area E. The variation is particularly evident when soluble salts concentrations are compared across the areas. Area J contains four times the amount of soluble salts (transect B, 3,100 mg/kg) when compared to area F (700 mg/kg, transect A).

Additional soil samples will be collected from all irrigation areas in the upcoming monitoring period, with particular emphasis on area J and H as these two locations are historically the older irrigation areas. Noting that the company was intending to limit applications in these older areas to mitigate the elevated chlorides recorded in the soil.

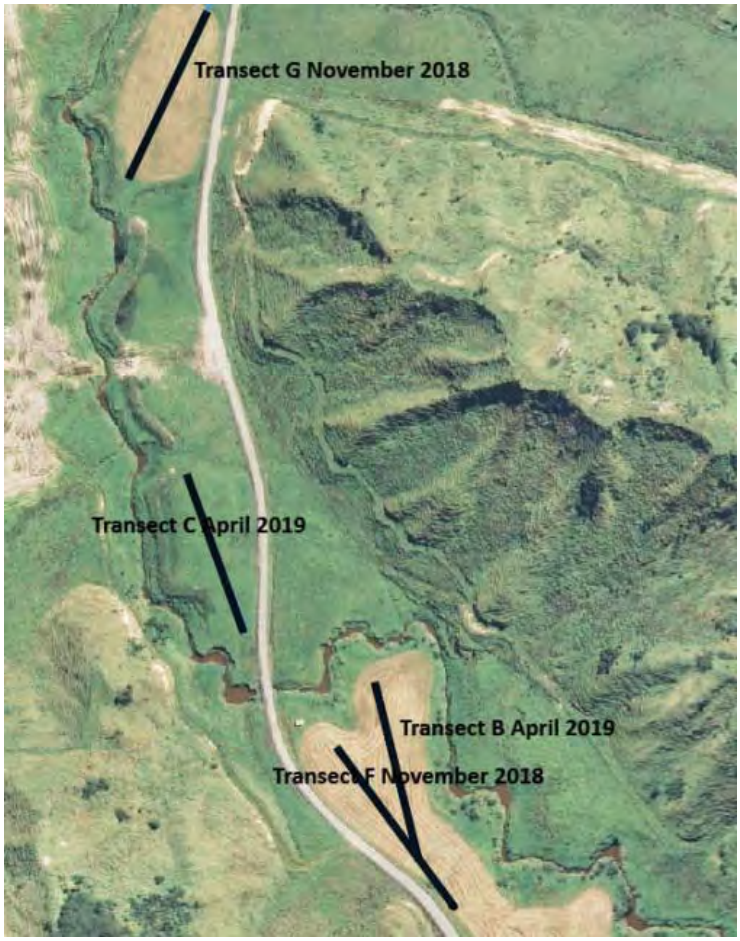

Figure 7 RNZ Uruti lower irrigation area soil transects

Figure 8 Upper irrigation area soil transects 2018-2019

2.2.7 Biomonitoring

2.2.7.1 Fish survey of the Haehanga Stream and associated unnamed tributaries

On the 4th and 5th of April 2019, three sites were surveyed for freshwater fish in the Haehanga Stream in relation to the composting activities undertaken by the Company at their Uruti site. All sites contained moderate fish habitat, with deep pools and good cover; however, the current survey recorded the lowest number of eels to date at site 2 and 3, with a distinct lack of juvenile eels being observed. Although eel abundance was relatively low, the overall condition of eels from all three sites was average. Dramatic variation in fish abundance over time cannot be exclusively linked to the composting and wastewater discharge activities at the Company site.

Much of the variation is likely a result of high variability in flow and habitat associated with this stream along with poor management of the stream margins, constant earthworks, and culvert maintenance. Given the limited amount of data and the variety of influences on fish population in the Haehanga Stream unrelated to the wastewater discharge related activities by the Company, it is difficult to draw sound conclusions in regards to the effects of wastewater discharge on the fish community. However, the condition, or health, of fish that are caught, regardless of abundance, can be a useful metric in assessing wastewater effects on eels.

There were no observations relating to wastewater discharges that posed any concern such as fish kills or hydrocarbon odours. There was some discolouration noted at sites 2 and 3, but no obvious hydrocarbon contamination of the Haehanga Stream like that recorded in the 2014-2015 and 2015-2016 surveys. The degree of discolouration at sites 2 and 3 was minor, and likely a reflection of a lack of flushing due to the low flows.

It is likely that the eel community is still recovering from the commercial eeling that is understood to have occurred just prior to the 2013-14 survey. It is expected it will take over a decade for the community to recover fully, should unhindered recruitment be made possible. The physical condition of the eels showed that most eels captured at all three sites were in average condition, despite the low flows and likely stressful conditions that preceded this survey.

Water temperatures in this stream may occasionally exceed the thermal preference, and maximum thermal tolerance of a number of native fish species, with a maximum recorded water temperature of 28.2˚C in a previous survey. High temperatures within the stream are likely a result of both natural and man-made causes such as consistent decreasing flows over the summer period and the reduction of bed shading through the historical removal of riparian margins respectively.

Three access culverts were assessed for fish passage during this survey, and all were found to present some level of impedance to fish passage likely present under most flow conditions. Even in moderate to higher flows, it is likely that the two upstream culverts restrict the passage of swimming species such as inanga. Varying degrees of remedial works are required on all three culverts to achieve fish passage for the majority of flows with the exception of very high flashy flow events that are typical for the catchment. As a direct result of these identified fish passage issues, a separate summary document was produced and given to the site operators outlining the issues. Consistent contact with the site operators to develop a plan for fixing the fish passage issues is ongoing, with some remediation work already taking place, which will be summarised in the next fish survey report.

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).

As with the conclusion found in the biomonitoring 2018/2019 report (TRC, 2019), we cannot effectively monitor the site for wastewater discharge effects if the stream as a whole is being managed in such a way that any effects of the discharge are undetectable. In order to effectively monitor this site for adverse effects related to the wastewater discharge, other activities effects need to be sufficiently mitigated.

Mitigating activities that could allow more accurate monitoring for the site would be the undertaking of 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, and ensuring that fish passage is strictly achieved under the majority of flows. Any benefits from such works would take several years to eventuate.

Discussions should be held with the consent holder as to when the next sampling round should be undertaken with the outcome to be dependent on an agreed upon approach (either through re-consenting or other formalised agreement) to enhance the habitat within the catchment. Any change in the frequency of monitoring would need to be followed by a provision that ensures that if any event occurs at the site where there is reason to believe fish have been exposed to adverse conditions that a fish survey can be undertaken.

Should an appropriate agreed upon level of enhancement activities be planned and undertaken, then it is suggest as a trade-off for the operators, that less frequent fish monitoring (every three years) could be undertaken, and that more regular general inspections could be done to assess compliance (checking the stream for any obvious discharges or fish kill events). It is also recommended that the fish survey methodology be updated to more closely follow the New Zealand Freshwater Fish Sampling Protocols, to be more reflective of best practice that is being undertaken throughout the country.

2.2.7.2 Haehanga Stream and associated unnamed tributaries macro-invertebrate annual survey

The Council collected streambed macroinvertebrates from seven sites in the Haehanga Stream and an unnamed tributary to investigate the effects of water discharges from the Company composting sites on macroinvertebrate health. The different types of macroinvertebrate from samples were identified, the number of different types counted (taxa richness), and MCI and SQMCI scores were calculated for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of nutrient pollution in streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to pollution. The SQMCI accounts for taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. Significant differences in either the MCI or the SQMCI between sites indicate the degree of adverse effects (if any) of the discharges being monitored and enable the overall health of the macroinvertebrate communities to be determined.

In general, the communities in the Haehanga Stream sites had relatively low proportions of sensitive taxa, which is expected in small, silty-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. The MCI scores at site 6 and 7 were the lowest scores at those sites to date. MCI values recorded in the Haehanga Stream decreased in a downstream direction, aside from site 1. The lowest MCI score in the current survey was recorded at site 7 (56 units) and the highest at site T2 (73 units). With the exception of site 2, all sites recorded scores below their respective medians, significantly so for site 6 and 7.

Overall, macroinvertebrate community health has declined over the past few years. The decline is likely related to many biotic and abiotic factors, including the various consented activities of the Company. It is recommended that the Company undertake actions to increase the habitat quality of the stream to match that of the upstream site 2 by better maintenance of the riparian margin through stock exclusion from all parts of the Haehanga Stream within the property and riparian planting. These actions will reduce the growth of algae and periphyton and temperature of the stream to a reasonable level of seasonal variation. It will also help to reduce the amount of sedimentation that occurs at the lower sites.

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 2018-2019 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 22 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
13 September 2018	A complaint was received regarding objectionable odour discharging beyond the boundary of a site used for composting operations at Mokau Road, Uruti	Y	An officer of the Council attended the compliant. No enforcement was undertaken on this occasion. The observed odour at the State High turn off is within the boundary of the Company site.	Odour surveys found 'rotten offal' type odours were present at the State Highway 3 site turn off, the odour was distinct and constant. No odour was found at the complainants property at the time of inspection; had the same odour been detected it would have been considered objectionable. The valley was foggy, the air was still and the odour was likely caused by katabatic drainage from up valley where the composting materials are stockpiled.
22 February 2019 through to 21 March 2019	Elevated contaminates reported after analysis of routine compliance monitoring of surface water. Note: The samples were collected on the 22 February 2019 and were reported to the Council on the 5 March 2019	N	Abatement notice (EAC-22586) issued requiring the following: Engage a suitably qualified expert to: undertake an investigation to identify the source of the contaminates entering the Haehanga Stream and associated unnamed tributaries, from the waste storage and treatment facility and provide advice on any upgrades to ensure the integrity of the waste storage and treatment facility; and prepare a written report on the outcome of the investigation and the advice on any upgrades or remedial work required. The Company were to provide a report to the Taranaki Regional Council in respect of the above.	Report submitted to the Council: Version two accepted. Remedial work undertaken by the Company. Further assessment to occur in late summer January-February 2020.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
24 February 2019	A complaint was received concerning a milky white substance in the Haehanga and Mimitangitua Streams. A video was also provided.	Y	No enforcement action was taken. An inspection of the site was undertaken in response to a video provided by the complainant of the incident.	At the time of inspection there was no visual effects observed on the Haehanga or Mimitangitua Streams. The inspection identified that earth works were occurring at the top of the catchment at the time of inspection. These works were to extend and develop and new irrigation area and were allowed under the RFWP plan rule 26.
21 March 2019	The consent holder was observed to not be adhering to site specific management plans which was a failure to abide by best practice.	N	Abatement notice (EAC-22632) issued requiring the following: Undertake works to ensure compliance with Special Condition's 1, 21, and 23 of resource consent 5838-2.2.	Compliance required by 11 October 2019.
05 April 2019	The analysis of drilling mud had not been sufficiently supplied as required by special condition 3 of resource consent 5838-2.2. The analysis had been requested on numerous occasions. The analysis of drilling muds is required to be supplied every three months, since the granting of resource consent in August 2015.	N	Abatement notice (EAC-22631) issued requiring the following: Comply with Special condition 3 of resource consent 5838-2.2.	Compliance required by 30 June 2019 and continued compliance required after that date.

3 Discussion

3.1 Discussion of site performance

RNZ Uruti composting facility.

The performance of the RNZ facility at Uruti in the 2018-2019 monitoring period will be discussed by item.

Administrative performance

Drilling waste analysis is to be provided to the Council from each individual source. Only two sources were assessed as required by consent. One other was also assessed, but the analysis undertaken was not complete. In addition, a significant amount of other drilling waste and related material was not assessed at all. This lack of assessment resulted in the issuance of an abatement notice which is now in effect (30th June 2019) and will remain in effect. Any drilling related material which is not assessed after this date, as required by the current consent, will result in an infringement fine.

Acceptance of material without prior approval. A few items had been questioned during inspections as to the authorisation to receive them. The consent holder admitted to accepting some material without prior approval. A review of the annual incoming goods list also identified a significant amount of material which did not appear to be associated with allowed material, as defined by consent 5838-2.2, condition 2. The consent holder has been asked to further identify materials accepted and also the authorisation to receive such materials if they were not on the approved acceptance list.

Riparian management has been undertaken this period, though continued development of the margins is required. Currently the consent holder has planted from the state highway to the twin culverts, which is a reasonable undertaking. However large areas remain upstream from the twin culverts. Additional plant orders have been placed and the degree of riparian development will continue to be observed over time.

It is worthwhile to note that developments of the riparian margin coupled with fencing of these areas are of particular importance to the water courses within them. As they allow for a greater variety of habitat, as well as protection in the form of shade, which will limit the potential for thermal impacts to the water course.

Site management plan adherence has been variable this monitoring period.

> Irrigation areas. Planned development for increasing the sizes and locations of irrigation areas has occurred. These are the lower area E and the upper area F. This was originally planned in 2015, but never undertaken.
>
> Pond management as defined in the plan, was not being adhered to. Ponds were not desilted, desludged, or kept at the defined level.
>
> Pest management. Was not adhered to. Significant vectors were observed in the form of a resident seagull population, feral cats, wild goats and pig tracks throughout the site. It is noted that the Company intends to roll out a new pest management plan.
>
> A storage dam has been in the management plans since 2015, though this development is yet to occur.

The Company were issued with an abatement notice because of variable adherence to management plans. This adherence will be assessed after October 2019.

Site performance, drilling mud pad 3, irrigation pond, paunch pad 2 and greenwaste pad 1

The integrity of the drilling mud pad was also a concern during this monitoring period. Elevated contaminates were reported in surface water at a number of monitoring locations during the 22 February 2019 sample round (note similar values were also recorded in the previous monitoring period, also in

February sample round, 28 February 2018). The elevated contaminates were further reported in subsequent follow up surface water samples throughout March 2019. This resulted in the issuance of an abatement notice which required action to be undertaken by the consent holder. Further details were provided in Section 2.2.3 and 2.3.

The result of the abatement notice was the production of a report. In summary, the report stated that repair works were undertaken. As a result, the corresponding values of target contaminates within the stream had reduced, and no exceedance in consent condition was subsequently observed in the April 2019 monitoring round. However, noted in the report, as well as observed by the Council was the increase in stream flows within the Haehanga Stream during this time period.

As stated by the Company, the rise in stream flows made it difficult for the Company to identify whether the leaking contaminants had been fully eliminated, or had been diluted by increased stream flows. The report further stated that the upcoming summer low flows will allow for further assessment of the remedial works. The caveat with the report stated that if the works undertaken were not sufficient and elevated contaminates are identified in the upcoming summer, a geotechnical engineer will be engaged to mitigate the issue.

Paunch pad, pad 2 and the wetland treatment system appeared to function as planned. Note, the desludging of the corresponding paunch pond and section 1 of the wetland treatment system has yet to occur. Annual desludging should occur annually, as stated in the management plan. The environmental effect of this system is further discussed in the following section.

Final use of compost from drilling mud pad and greenwaste pad

This is an area which has undergone renewed scrutiny throughout this monitoring period. In previous monitoring periods the volume of composting material on the drilling mud pad (pad 3) has been noted to be increasing in size, not diminishing. The original intent of the consent (in terms of the compost created on the drilling mud pad and to a certain extent, the greenwaste pad 1) was to compost material on the drilling pad for a period of time. Once the initial composting was complete, it would then be fed through the worm beds, where it would be vermi-composted and then taken off site for screening at the other RNZ facility on Waitara Road, Brixton. This procedure meant that material would be remediated, and once stabilised through one round of composting and further through vermicomposting, would then leave the site.

However, on site observations have indicated that the material from the drilling mud pad does not leave the pad. There have been a number of cases where the consent holder has utilised this material, (unauthorised), for bunding of the duck pond. Or by the twin culverts for a cold air drainage bund and also partly in the new lower irrigation area E. Despite the reuse the vast majority of this material (Pad 1 and 3) remains in-situ.

The worm bed area remains separate from the other two pads. The worms are fed primarily grass from the paunch pad, pad 2. They are then covered, and subsequently harvested for vermicompost when required. Observed has been a minimal amount of composted material from pad 1 or 3 included in the worm beds.

The company is now solely focused on using the composted drilling mud and greenwaste compost around the site as a soil conditioner, and or bunding. This approach is different from the original intent of the consent and required a standard to be derived to accommodate the hydrocarbon and E-coli bacterial risk associated with the waste. New Zealand Standard NZS 4454:2005 together with regional fresh water plan rule 29 are now used to demonstrate that the material is suitable to reuse around the site.

Rule 29 contained some older guideline values, as such, it was determined that evolving these guidelines would be required.

Subsequent discussions resulted in a framework with which to assess the compost, which takes into account the degree of industrial components that have fed into the compost waste streams. This framework

included guidance from the Beneficial Use of Organic Material on Production Land[5] (draft for comment 2017), the Ministry for the Environment (MfE) Module 4: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (revised 2011), NZS4454:2005 (2005) and Landcare Research: Land application of waste from oil and gas wells: Implications for food safety and animal welfare (2015).

The results of the assessment are discussed in section 3.2.

Quarry operations

Quarry operations were observed to undergo sporadic operations this period. The extracted material was sorted in close proximity to the worm beds. Commented during inspections was the control of sediment and silt from the quarry access road. Continued adherence to sediment control is an area which is continually communicated by the inspector during inspections. The final inspection indicated that this appears to be working, though the nature of site and the weather requires continued adherence to the stormwater and sediment control systems. A review of the quarry size on line indicated that the degree of the bare quarry area is within consent conditions.

Fish passage

An assessment of culverts on site was undertaken and reported on by the Council's biologist. It was noted that this assessment was undertaken during the summer low flows in the Haehanga Stream and associated unnamed tributaries. This assessment indicated that most of the culverts require attention if they were not to present a barrier to fish passage. The following culverts were identified as barriers to fish passage. Two culverts on the Haehanga Stream, these were the twin culverts on the main access track, and the large single culvert on the access track to the worm beds; the multi-stacked culvert, on the unnamed tributary to the wetland treatment system (WTS); as well as two drainage culverts from unutilised areas of the site. One newly installed culvert in the new extended upper irrigation area was found to be in good condition with no barrier to fish passage found.

The Council's inspector had noted, post the report delivery, that some of the report defined options had already been undertaken by the Company, with a number of possible fish barrier areas mitigated. Some further work will be required. It was also reinforced that this is a continual assessment. In similarity to monitoring the sediment control on the access road to the quarry, the continued assessment of culverts for fish passage will continue to be communicated and assessed during inspections.

Irrigation areas

Two new irrigation areas have now been constructed at the site area E and area F. These two areas have increased the irrigation area size from 5.2 Ha to 7.0 Ha+/-. Council uncertainty remains with respect to nitrogen and chloride loading rates and the adequacy of the irrigation areas to mitigate them. These will be addressed during the current ongoing consent renewal.

Waitara Road, Brixton

The inspections of the Waitara Road facility indicated that site operations were continuing as normal. In the previous monitoring period a couple of issues with material management and odour were noted and enforcement was undertaken. In this period no odour issues were noted or reported. Material management and housekeeping was on-going with the site observed to be operating within its consent conditions during inspections. Discussions were held with respect to augmenting the stormwater system and also to prevent the potential for debris from becoming entrained within the stormwater system. This included regular maintenance of onsite sumps and frequent housekeeping if materials were spilled.

[5] Please note that this guideline, once accepted, is the replacement for the 2003 New Zealand Biosolid Guidelines.

The onsite stormwater discharge pipe was re-laid towards the end of the monitoring period with a more constant gradient. However, this will likely be changed to an open drain with a sump to allow the sediment to settle out prior to discharging. During inspections the worm beds were found to be covered, apart from during feeding or harvesting. The stormwater system was not found to be discharging during the monitoring period.

3.2 Environmental effects of exercise of consents

Environmental effects of the Uruti facility will be discussed by item.

Wetland treatment system (WTS)

The WTS functions as an ammonia sequestration system. Ammonia rich fluid, as a process of decomposing paunch from pad 2 (paunch pad) is pumped to the top of a multi-tiered, raupo (bulrush) filled, wetland. From here it slowly flows down gradient until it discharges in to an unnamed tributary of the Haehanga Stream. The Council assessed this location on six occasions this period. On one occasion February 2019, the WTS was not discharging, thus no sample was collected. The analysis indicated that on one occasion (December 2018) of five, the corresponding pH was reported at 9.7 pH. This was outside the consent defined criteria of pH 6-9. However, a review of the corresponding inspection indicated that the sample was collected from the final pond, as the discharge pipe was not discharging. This recorded value was most likely a process of natural forcing, where by photosynthetic activity within the pond system likely increased the pH. The other consent defined limit is for suspended solids and the corresponding analysis indicated that the WTS was below the maximum allowable value (<100 g/m^3) for suspended solids on all five occasions.

There is a cycle of propagation within this system, whereby during a set time period (June-August) of each year the natural abilities for this system to sequester ammonia is reduced. The Company is aware of this and reduces the flow through the system during that time.

Following the discharge to the receiving waters of the unnamed tributary of the Haehanga Stream is monitoring location HHG000103. This monitoring location assesses the effect of the discharge post a set mixing zone (40 m). This period the location (HHG000103) was monitored on eight occasions (six normal compliance monitoring rounds and two in relation to incidents). On all eight occasions the monitoring site was reported to be in compliance with consent defined values. Of note, this is the second year where there has been no recorded value for NH_3 (un-ionised/ or free ammonia) above the consent defined limit (0.025g/m^3).

Surface water monitoring of the Haehanga and associated unnamed tributaries

Six normal compliance monitoring rounds were undertaken this period, two additional rounds were also carried out in response to the finding of elevated contaminates within the surface water. One spot round (September 2018) was also undertaken during a compliance monitoring inspection, in relation to the finding of five dead eels within the Haehanga Stream, at monitoring location HHG000150[6].

[6] The finding of dead eels is the second time at this monitoring location. The last observation of dead eels was during the 2015-2016 monitoring period. During the previous find, the dead eels were found with live eels, during biological survey in that year. In both cases the eels were found in a state of decay which negate the ability for the Council to have an autopsy undertaken on them. In the current monitoring period, the finding of perished eels resulted in spot surface water samples which did not indicate anything of an adverse nature. The corresponding inspection (September 2018) traversed the full length of the Haehanga Stream to visually inspect for any observable effects, of which none were noted. No other perished biology were noted in the area.

The main findings of the compliance monitoring surface water rounds was during the summer low flows this period. While the earlier rounds of surface water monitoring indicated slight increases in chloride and ammoniacal nitrogen concentrations down catchment. These were within consent conditions. In comparison, the late summer rounds indicated elevated contaminates within the surface water at multiple locations. These were in close proximity to the drilling mud pad, associated irrigation pond and downstream of the irrigation areas. The surface water was assessed on four occasions from 22 February 2019 through to 12 April 2019. Across three of these rounds were elevated values of ammoniacal nitrogen, chloride, sodium and oxygen demand. It was also noted that during this time, the flow within the Haehanga Stream and associated unnamed tributaries was very low.

As discussed in the above section, an abatement notice was issued for the elevated contaminates identified within the surface water, whereby an investigation into the source of the contaminants was required, it was also requested to advise on the necessary remedial actions.

The results of the Company's internal investigation suggested that a leak in a non-compacted area of the bund may have been the cause for the elevated contaminates observed in the February and March 2019 surface water rounds.

Remedial works were undertaken by the Company during this time period. The Company stripped back a specific area of bunding, in close proximity to the drilling mud pad drop off point, and rebuilt the bund. The Company also undertook an assessment, via spot sampling for field parameters (pH, dissolved oxygen, conductivity, ORP) to allow them to understand if there were any further elevated contaminates. Their assessment indicated that their remedial works appeared to be successful, though they did indicate they were not conclusive.

The Council's April 2019 surface water monitoring round recorded values which were within compliance standards, as set by the consent. However, it was noted that there was an increase in Haehanga Stream flows. The Company also had the same conclusion and stated that with the increase in the flows in the stream, it was not possible to fully confirm that the leak had ceased. Noting that the process of dilution may be masking any leak to surface water.

Moving forward the Company intend to continue assessing the area, as will the Council, through the bi-monthly surface water monitoring rounds. The upcoming summer, January 2020, will indicate if the Company works on the bund have been successful. If they are not, the Company will engage geotechnical engineers to assess the issue.

It was observed that the subsequent monitoring rounds (April and June 2019) did, in line with the earlier rounds, continue to exhibit a small increase in ammoniacal nitrogen and chloride down catchment. These increases were within consent conditions.

Irrigation pond and irrigation area

The constituents of the irrigation pond were provided in Section 2.2.4. The estimated loading rates for both chloride and total nitrogen were both significantly elevated. Further work in terms of loading rates is required to be undertaken by the Company. The current estimated loading rates are not sustainable. Cut and carry options for nitrogen may aid in removing it, if it is loaded at a sustainable rate. While for chloride further options or limits need to be established.

Groundwater monitoring

Biannual groundwater monitoring indicated that the monitoring well in close proximity to the duck pond (GND3009) is significantly impacted. The monitoring of this location identified elevated values for ammonia, chloride and total dissolved salts this period.

Noting that in the previous period the drilling mud pad leachate was observed discharging into the freshwater source next to the leachate pond and drilling mud pad (the duck pond). A spot sample from the

duck pond was collected this period, this recorded significant chloride, oxygen demand and measurable unionised ammonia. The values recorded during the spot sample suggest that further discharges have occurred.

GND2190 is to a lesser extent impacted with slightly elevated TDS and measurable chloride. This well is located in the old lower irrigation area and has historically received high applications of irrigation. The Company intends to spell this area for a period of time, to enable the impacts of the irrigation to this area to reduce over time. This spelling has yet to occur.

Soil monitoring

Assessment of soil was undertaken across three of five irrigation areas this period. The breadth of the sampling included the newly augmented area F, the now lower irrigation area E, and the long term irrigation area J. The results indicated that area J is impacted with elevated values of chloride, calcium, potassium, sodium, barium and soluble salts. Note that area J is where monitoring well GND2190 is located which showed groundwater to be impacted by salts. Area E, which was partly constructed from former drilling mud pad material also contained elevated values for similar parameters. The Company had proposed to spell area J, however recent analysis shows that this has not occurred.

The increase in the overall irrigation area will allow for greater ability to balance applications. However the estimated loading concentrations indicate that the overall area may still be too small to sequester the leachate as leaching is occurring.

Fish passage

Fish passage is an area which is continually regarded by the Council's inspector during inspections. As noted previously, the dynamics of the catchment influence a range of flow conditions. Which at times may lead to barrier for fish passage. This is especially prevalent during summer low flows, where the stream is not fully connected, irrespective of the culverts. Thus satisfying fish passage through the culverts with barely a trickle is challenging. The Company is aware of this and a report with respect to fish passage was provided after the Council's biologist attended the site in April 2019. Maintaining for fish passage at the site will continue to be monitored during inspections.

In addition, the fish survey suggests that further work is required to be undertaken on the fencing and riparian development further up catchment, as these areas are currently unprotected from stock access and also sparse riparian development. This may be leading to thermal impacts to the proceeding water conditions which will inadvertently effect the downstream communities of the Haehanga Stream.

Strict sediment controls are required to be adhered to, this includes limiting any instreams works to a minimum. The decision to limit the fish survey to a triannual survey, which will see an increase in nets set in the water course, was undertaken to allow the Company to undertake some significant developments in these key facets which are proposed to enhance the quality of the habitat for fish and macroinvertebrates within the water course. It is further noted that these developments will not be able to occur over night and will take some years to fully implement. These facets, as noted by the biologist are limiting the Council's ability to assess whether the exercise of consent in terms of discharges to land and water are affecting the in-stream biology which is already under stress due to these keys issues.

Compost assessment

Following on from the previous section. The analysis of two compost streams was undertaken this period. This is not strictly part of the compliance monitoring programme.

The aim of the compost assessment was to identify the concentration of likely contaminates of concern within the compost, and in doing so, be able to assess whether the material could be discharged to land under the Regional Plan rule 29.

In short, the material from pad 1 (greenwaste) was able to be put to land with rule and guideline defined controls which must be adhered to by the Company. This included the requirement that it was covered with top soil to prevent any potential pathogenic impacts from occurring. The pad 3 (drilling mud pad) material will require further composting as it contained significant values for total petroleum hydrocarbons. Noting this material had been composted for longer than five years. None of this material will leave the site, as defined by the Company.

Waitara Road, Brixton

Minimal environmental effects were found during the monitoring period with respect to the Company facility at Waitara Road, Brixton. No discharge samples were obtained, as the stormwater system was not found to be discharging. Potential effects with respect to material entrainment within the onsite stormwater system were discussed and this system was modified towards the end of the monitoring period. Inspections will aim to target specific times in the upcoming monitoring period to obtain discharge samples. Inspections noted the facility to be operating with its consent conditions at the time of inspection. No odour related impacts were observed or complaints received in this monitoring period.

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 23-30.

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 Elevated contaminates identified in surface water monitoring on three occasions - Abatement notice issued The consent holder was observed to not be adhering to site specific management plans which was a failure to abide by best practice - Abatement notice issued The analysis of drilling mud had not been sufficiently supplied as required by special condition 3 of resource consent 5838-2.2. The analysis had been requested on numerous occasions - Abatement notice issued
2. Only acceptable waste accepted onto site	Site inspections/review of supplied records	No The review indicated some wastes accepted without authorisation. Further materials questioned and a discussion - Infringement fine issued

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?**
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	No The records supplied by the Company indicated that limited and insufficient analysis had been supplied - Significant material received - Abatement notice issued during the monitoring period requiring that any future material of drilling waste origin must be quantified as required by this consent condition from 1 June 2019 onwards. This is in effect and will remain in effect
4. DAF residue not to be accepted	Site inspections/review of supplied records not listed as accepted	Yes
5. Maintenance of stormwater systems	Inspections	Maintenance ongoing
6. Maintenance of treatment systems	Inspections.	No Desilting of the ponds not undertaken as defined in the management plan - Abatement notice issued as these were not being maintained
7. Adequate pond construction to prevent any leak to surface water or groundwater from any leachate or stormwater holding pond	Inspections and monitoring	No Leak to Haehanga Stream resulted in elevated concentrations of target contaminates identified during the February 2019 surface water monitoring round Further contaminates reported on two follow up surface water surveys undertaken in March 2019 - Abatement notice issued - Investigation undertaken by Company - Remedial works undertaken by Company - Surface water monitoring undertaken in April 2019 did not find any elevated contaminates Spot sample collected from the duck pond indicated elevated contaminates
8. Keep and supply irrigation records	Supply of records	Yes Supplied 28/08/2019

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?**
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 Sampling reported elevated contaminates at HHG00150 on the 7 March 2019 and 21 March 2019
12. Soil sampling to be undertaken for TPH and BTEX	Soil sampling undertaken by the Council	Yes
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	No Inspection comments relating to the BTW management plan: - Irrigation areas E and F have been constructed - Water level recorders or flow meters on final leachate pond not installed - Riparian margin on-going - No storage dam constructed Inspection comments relating to Uruti site compliance plan: - Significant vectors on site - Feral cats, seagulls, biting flies, pig tracks and wild goats
15. Establish groundwater monitoring bores	Site inspections	Yes Additional monitoring wells have been installed
16. Groundwater monitoring wells installed as per standard	Undertaken	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?**
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
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 - Inspections identified that sediment ponds not maintained at 20% - Not cleaned out on a 20% full basis - Irrigation pond not maintained at 80% - Abatement notice issued
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	No - Inspections identified that the collection pond on Pad 2 (paunch pad) did not have sludge removed on an annual basis
24. Wetland discharge not to exceed certain parameters	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?**
25. Wetland discharge not to cause certain effects at site HHG000103	Sampling	Yes
26. Maintain riparian plantings	Inspection identified that riparian planting is developing. This will be on-going	For the most part Developing riparian, further work required
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	N/A
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		**Poor**
Overall assessment of administrative performance in respect of this consent		**Poor**

Table 24 Summary of performance for consent 5839-2

Purpose 5839-2: *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 - Not adhering to management plans and accepting items without authorisation
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
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 Additional materials questioned
4. DAF residue not to be accepted	Site inspections/review of supplied records	Yes

Purpose 5839-2: *To discharge emissions to air at Mokau Road, Uruti*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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 Site inspections indicated that the older plan was not adhered to: - Vectors on site - Biting flies - Significant avian (seagulls) on site - Pigs tracks on site - Wild goats - Solids pond observed to be more than 20% full on numerous occasions, abatement notice issued - Final pond (irrigation pond) at more than 80% capacity
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	Yes No offensive odour observed beyond site boundary
14. Install a weather station and provide data	Inspection and weather updates.	Yes, though frequently faulty Last update 2 February 2017
15. Conduct odour surveys	Undertaken by the Council during inspections	Yes
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

Purpose 5839-2: *To discharge emissions to air at Mokau Road, Uruti*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
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		**Improvement required**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

Table 25 Summary of performance for consent 5892-2

Purpose 5892-2: *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 prevalent with limited odour noted. All worm beds were covered when not being fed. Stormwater discharge area to be modified in upcoming monitoring period
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 Though no samples were collected from the stormwater system as this was not found to be discharging There are no groundwater monitoring wells on this site, thus assessing groundwater is currently not possible

Purpose 5892-2: *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	Not assessed this period as the stormwater was not discharging
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	None communicated
10. Reinstatement of site	Not required currently	Not assessed
11. 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 compliance with this consent		**High** **High**

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	For the most part - In terms of adequate downstream construction inspections indicated that this is being adhered to - However, it was noted that to achieve provision for fish passage across all stream flows additional work is required, especially during summer low flows when this culvert can become considerably perched - This was identified during the fish survey while the stream was in summer low flow and communicated via a report in this

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?**
		monitoring period to the consent holder
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
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		**Good** **Good**

Table 27 Summary of performance for consent 6211-1

Purpose 6211-1 : *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**

Table 28 Summary of performance for consent 6212-1

Purpose 6212-1 : *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 Inspectorate informed - Some additional rocks were added to the downstream side of the culvert which lifted the static water level within the stream to relieve a slightly perched area from the centre of the culvert - The works will be assessed over time to make sure that fish passage is not hindered
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 - However more work is required and a report was provided by the Council's biologist post the summer fish survey which was undertaken in low flow conditions - Continual monitoring of this will be undertaken moving forward
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** **Good**

Table 29 Summary of performance for consent 10063-1.0

Purpose: *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 operations were sporadic this period	Yes
2. Notification of quarry works	Consent exercised	Yes
3. Adopt best practicable option	Inspection identified the quarry was in sporadic use this period.	Yes - Some riling on the access track was noted during inspections as process of the rainfall on the bare track. Cut off drains and sediment traps were suggested during inspections and these have been implemented
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	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	Sampling	For the most part. Sampling of surface water indicated on one occasion of six (29 October 2018) a marginal value

Purpose: *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?**
b. suspended solids: <100g/m3 c. total hydrocarbons: <15 g/m3		of suspended solids (102 g/m^3) was reported at HHG000100
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-did not indicate any of the following effects as process of the quarry operations	Yes
13. The discharge shall not give rise to any of the following effects: a. A change in turbidity measurements upstream of the discharge point and below the discharge point of more than 5NTU b. A change in turbidity measurements of greater than 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	Not supplied
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	Not received

Purpose: *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?**
16. Notification pertaining to the change of nature of discharge	No notification received	NA
17. Consent lapse	Consent in effect	NA
18. Review condition	No review required (Quarry operations suspended by consent holder for the 2016 2017 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** **Good**

Table 30 Summary of performance for consent 10547-1.0

Purpose: *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 metres.	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 above the invert of the culvert.	Inspections	Yes
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the 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

Purpose: *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?**
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.	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; - 50% greater than 600 mm diameter; - 90% greater than 350 mm diameter.	Inspections	Yes
8. The culvert shall not restrict fish passage.	Not assessed	Not assessed by the Council biologist This culvert is very big and the biologist did not feel safe to enter
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		Yes On observation this appears to be in line with the gradient

Purpose: *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?**
gradient of the stream bed at the site.		
11. On completion of works, the banks of the channel upstream and downstream of the culvert shall be no steeper than the existing natural banks. Where the bank consists of fill, the fill must be well compacted with batter slopes no steeper than 2 horizontal to 1 vertical.	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.		NA
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.		Yes 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

Purpose: *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?**
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 31 RNZ consent compliance 2018-2019

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

Year	Consent no	High	Good	Improvement req	Poor
	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			
	6211-1	1			
	6212-1	1			
	10063-1.0	Not assessed as quarry operations suspended			
Totals		20	5	9	1

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

While the paunch area and associated worm beds appear to function well, with minimal impacts, the drilling mud pad, for the second year, has led to surface water contamination in the Haehanga Stream. The irrigation pond's constituent concentrations and estimated loading volumes leave questions as to the loading rates discharged across the irrigation areas. Specifically, whether this can be undertaken in a sustainable way to negate significant leaching to groundwater and surface water.

The confidence in the irrigation pond system to keep its integrity, or be managed in a controlled fashion is an area of concern, noting the elevated values in the duck pond and associated monitoring well. These questions need to be addressed by the Company whom are in the process of consent renewals at present.

3.4 Recommendations from the 2017-2018 Annual Report

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

1. THAT in the first instance monitoring of consented activities at Waitara Road, Brixton, in the 2018-2019 year continues at the same level as in 2017-2018, with special consideration for site practice management and odour.
2. Monitoring of the RNZ Pennington Road will cease upon successful surrender of the consent, post consent required analysis, which will be provided in the upcoming monitoring period.
3. THAT should there be issues with environmental or administrative performance in 2017-2018, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
4. Monitoring of the RNZ Uruti composting facility, Mokau Road, will continue unchanged from the 2017-2018 monitoring period with the inclusion of four additional monitoring well locations and one additional soil sampling location. Spot surface water monitoring via multi parameter probe for field screening parameters will also be included to surface water monitoring on all surface water monitoring rounds.
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.

All recommendations apart from point five were undertaken this period.

3.5 Alterations to monitoring programmes for 2019-2020

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

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

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

It is proposed that for 2019-2020 monitoring period:

1. That the groundwater analysis be expanded to quarterly to account for further seasonal variation.
2. That the soil sampling be expanded to account for a sample from each irrigation area in order to assess change across the irrigation areas, rather than portions.
3. The establishment of new surface water monitoring locations (three) below the new lower irrigation areas.
4. Surface water monitoring to assess the summer low flows specifically.
5. Inspections at the Waitara Road facility aim to be conducted at certain times to collect stormwater discharge samples.
6. 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.

7. 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.
8. 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.
9. 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.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the sites in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2019-2020.

During the year at Uruti, the paunch area and associated worm beds appear to function well, with minimal impacts. The drilling mud pad, for the second year, has led to surface water contamination in the Haehanga Stream. The irrigation pond's constituent concentrations and estimated loading volumes on the paddocks, indicate that overall area maybe too small to sequester leachate despite being expanded.

The confidence in the irrigation pond system to keep its integrity, or be managed in a controlled fashion is an area of concern, noting the elevated values in the duck pond and associated monitoring well. These questions need to be addressed by the Company whom are in the process of consent renewals at present.

4 Recommendations

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:
2. THAT the groundwater analysis be expanded to quarterly to account for further seasonal variation.
3. 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.
4. The establishment of new surface water monitoring locations (three) below the new lower irrigation areas.
5. Surface water monitoring to target summer low flows specifically.
6. Inspections at the Waitara Road facility to be conducted at certain times in order to collect stormwater discharge samples.
7. 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.
8. 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.
9. 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.
10. 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.
11. THAT should there be issues with environmental or administrative performance in 2019-2020, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

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

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.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in mS/m.
Cu*	Copper.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
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.
mS/m	Millisiemens per metre.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM_{10}, $PM_{2.5}$, $PM_{1.0}$	Relatively fine airborne particles (less than 10 or 2.5 or 1.0 micrometre diameter, respectively).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
Zn*	Zinc.

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

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

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

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Appendix I

Resource consents held by Remediation NZ Ltd

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

Consent No.	Site	Purpose	Expiry Date	Review Date(s)
5838-2.2	Uruti	Discharge to land and water	June 2018	Yearly
5839-2	Uruti	Discharge emissions to air	June 2018	Yearly
5938-2.0	Uruti	Install culvert	June 2015	-
6211-1	Uruti	Divert stream	June 2021	-
6212-1	Uruti	Install culvert	June 2021	-
10063-1	Uruti	To discharge treated stormwater (quarry)	June 2033	June 2021
5892-2	Brixton	Discharge to land/water	June 2020	-
10547-1	Uruti	Install a culvert	June 2033	June 2021

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

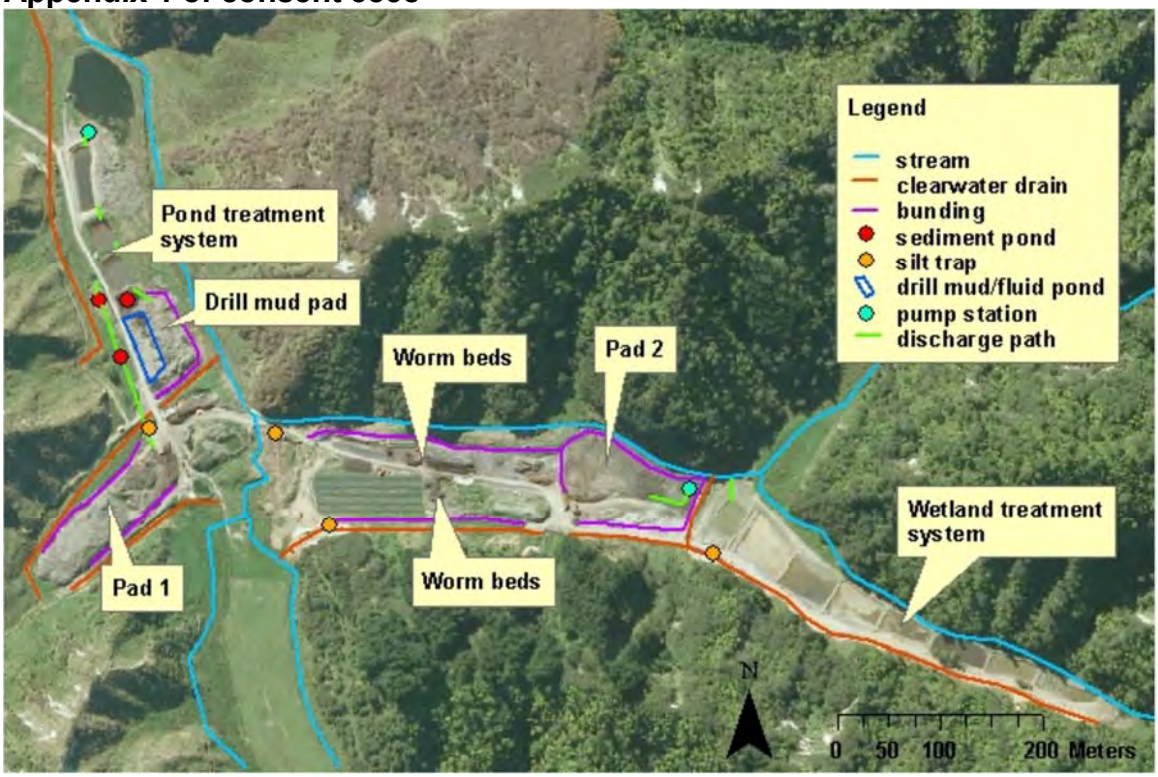

Figure 1 The location and extent of the Pond Treatment System, Wetland Treatment System, Pads 1 and 2, and the Drill Mud Pad.

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

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Director-Resource Management

Appendix 1 of consent 5839-2

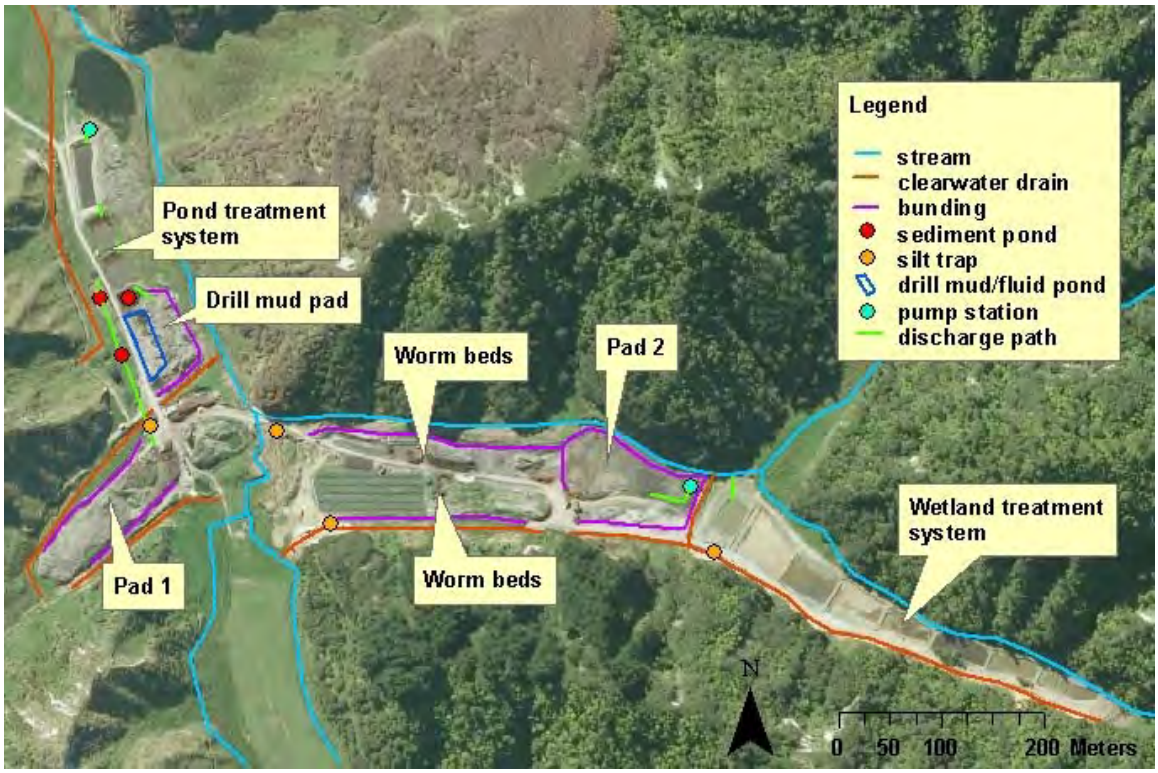

Figure 1 The location and extent of the composting operation including Pads 1 and 2.

Discharge Permit

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

Name of Consent Holder:	PEL Waste Services Limited P O Box 3091 HAMILTON
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 GR: Q19:160-416
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 12 December 2006

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Land Use Consent

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

Name of Consent Holder:	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

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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

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Director-Resource Management

Land Use Consent

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

Name of Consent Holder:	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

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	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