Uruti Composting & Vermiculture Facility

Assessment of Environmental Effects

For the discharge of organic material and associated leachate and stormwater to land/water/air in conjunction with the Composting and Vermiculture product processes

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			Date: 27 July 2018

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1 INTRODUCTION

1.1 Background

Remediation (NZ) Ltd is a company specialising in organic fertiliser production and sales. The Vermicast (worm casting) and Compost production capability supplies organic fertiliser to both organic and conventional farmers. Remediation (NZ) Ltd processes and converts, via Vermiculture and Composting, a wide range of organic waste streams into marketable biological products that can be safely placed back on to agricultural and horticultural land as a beneficial fertiliser and soil conditioner. With the continued emphasis on waste minimisation and the resultant success of Remediation (NZ) Ltd's fertiliser products, Vermiculture and Composting now offer a simple, sustainable and highly desirable alternative method for dealing with a range of unwanted organic waste streams that might otherwise require less favourable disposal methods, such as landfilling.

The Uruti Composting facility has been in operation since December 2001 and holds six separate consents with the Taranaki Regional Council, comprising of approximately 90 conditions. Two of the consents for the site expire on 1 June 2018.

1.2 Consents Sought

Under the Resource Management Act 1991 and the Taranaki Regional Council (TRC) 2001 Regional Fresh Water Plan, resource consent is deemed necessary for the Uruti Composting facility to allow for the discharge of leachate and stormwater to land (rules 21-44) and emissions to air. These activities are deemed to be discretionary.

The application by Remediation (NZ) Ltd to the Taranaki Regional Council is to renew the following discharge permits:

Consent 5838-2.2 - To discharge of 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 at Grid Reference (NZTM) 1731656E-5686190N, 1733127E-5684809N, 1732277E-568510N, 1732658E-5684545N & 1732056E-5684927N.

Consent 5839-2 - 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.

The original application for consents was lodged in November 2017, in accordance with section 124 (1) (d) of the RMA. Accordingly, the applicant may continue to operate under the existing consents until such time as a decision is made on these applications under section 124(3) of the RMA.

This revised assessment of environmental effects (AEE) is submitted to address the further information request made by the TRC under s92 of the RMA on 1 February 2018, and is intended to provide the consent authority, as well as any interested and / or affected parties with the

information required to understand the proposed activity including any "effects" it may have on their interests or on the wider environment.

Remediation (NZ) Limited seeks a renewal period of 18 years.

It is also sought to amend some consent conditions as part of the renewal process to better reflect site activities and controls. This is discussed below (section 1.3)

1.3 Changes to Consent Conditions Sought

Changes to the current consent conditions are sought to address the following;

- Autumn spikes in wetland-Analysis has shown a spike in the wetlands discharge that is consistent with plant die back. This is a naturally occurring event -refer section 4.1.5 of AEE
- Biosolids removed-Remediation (NZ) does not require a consent for remediating biosolids.
- Changes to frequency of sampling for groundwater and soil monitoring

Table 1 below details the changes sought.

Table: 1 Changes to consent

Consent No.	Existing Consent condition wording	Proposed consent condition wording	Discussion
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.	Representative soil samples shall, be taken from each irrigation area at intervals not exceeding 12 months and analysed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylene	Monitoring to date shows that there will be only minor changes detected at 6 monthly intervals and 12 months will provide more useful data and be more cost effective.
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.	Representative soil samples shall be taken from each irrigation area at intervals not exceeding 12 months and analysed for chloride, sodium, total, soluble salts, and conductivity.	As above
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	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	6 monthly testing is considered appropriate for these contaminants, and is more cost effective for the consent holder, particularly given the increase in the

	approved by the Chief Executive, Taranaki Regional Council and analysed for; chloride, sodium, magnesium, calcium, total soluble salts, and conductivity.	Executive, Taranaki Regional Council and analysed for; chloride, sodium, total soluble salts, and conductivity.	number of bores to be sampled. Monitoring to date does not suggest any significant adverse effects

1.4 Report Scope

This report provides the supporting material for the resource consent application, in particular an Assessment of Environmental Effects (AEE) prepared as required by the Fourth Schedule of the Resource Management Act 1991. It also details consultation that has been undertaken with those persons or parties considered interested and / or affected by the application.

This report has been revised and added to, to reflect a request for additional information made by the Taranaki Regional Council.

2 SITE DESCRIPTION

2.1 General

The composting and vermiculture operation takes place on river flats that run alongside the Haehanga Stream and its tributaries, as shown in photo 2.1 below. The composting operation is carried out approx. 1 km from the Uruti road boundary to the north. The surrounding hill contours are steep, with a mixture of grass cover, scrub and regenerating native bush.

Photo 2.1 Composting area

Refer to appendix A showing title and property map.

2.2 Location

The site is located on State Highway 3 (1460 Mokau Road) approximately 2 kilometres south of the Uruti Village and lies within the catchment of the Haehanga Stream, which is a tributary of the Mimitangiatua River. The legal Description is Pt Sec 4 Blk 11 Upper Waitara SD. A copy of the title and a map of the property are included in **Appendix 'A'.**

Land Location:	1460 Mokau Road, Uruti, 4379
Legal Description:	Pt Sec 4 Blk II Upper Waitara Survey District
Certificate of Title:	A1/1241
Site Area:	637ha

A plan showing the site layout is also attached in **Appendix A.**

The natural existing surrounding environs inhibit any public visibility from SH3, and the closest neighbour is more than 2 kilometres away.

2.3 Climate

The climate in the Uruti Valley is generally mild and temperate. Rainfall is high, even in the driest months of the year, compared to other parts of the region (See Tables 2 & 3). The temperature average is between 13 and 14 Degrees C.

Rainfall is measured and recorded daily from a weather station situated at the site, this to inform site management of potential issues with stormwater drainage.

Photo 2.3 Weather Station situated on the southern side of the weighbridge hut

Climatic data provided by National Institute of Water and Atmospheric Research (NIWA) and Taranaki Regional Council shows relevant monthly rainfall and maximum rainfall intensities over 10 minute intervals (overlapping) typical for this site. The closest relevant meteorological station is located at Kaka Road.

The top thirteen rain events over the past 6 years is tabulated below (Table 2) for the station at Kaka Road.

High intensity rainfall events are common, and are of most interest to the operation, as they significantly affect site management. Rainfall data from the NIWA High Intensity Rainfall System V3 has therefore also been produced for the Uruti site.

This data is presented in Table 2 which has been prepared by NIWA, and shows the intensity-duration-frequency results for the site (based on the nearest available meteorological station), and also models a 2-degree change in climate to determine the effects this would have on the high intensity rainfall events.

Table 2: Kaka Road Rainfall Events 2011-17

Rainfall Events, Uruti at Kaka Road-6 year period

Date	mm/24hr
24-Jan-11	155
15-May-12	101
16-Jul-12	104
11-Dec-14	85.5
9-Apr-15	95
21-Jun-15	169
26-Aug-15	70
16-Nov-15	58
18-Jan-16	45
24-Jul-16	62
3-Feb-17	87.5
5-Apr-17	119.5
10-Aug-17	73

Table 3: High Intensity rainfall data (NIWA) for site

High Intensity Rainfall System V3

Intensity-Duration-Frequency results (produced on Tuesday 17th of October 2017)

Site name: **Uruti Composting Facility**

Coordinate system: NZMG

Easting: 2642119

Northing: 6247112

Rainfall intensities (mm/h)

					Duration						
ARI(y)	aep	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h
1.58	0.633	53.4	39	32.4	23.6	15.7	8.3	5.5	3.7	2.3	1.8
2	0.5	57.6	42	35	25.4	16.9	8.9	5.9	4	2.5	1.9
5	0.2	73.2	53.1	44.2	32.2	21.4	11.2	7.4	4.9	3.1	2.3
10	0.1	85.2	62.1	51.8	37.7	24.9	13	8.6	5.7	3.6	2.7
20	0.05	99	72.3	60.2	43.8	28.9	15	9.9	6.5	4.1	3.1
30	0.033	108	78.9	65.6	47.8	31.5	16.3	10.7	7.1	4.4	3.4
40	0.025	115.2	83.7	69.6	50.8	33.5	17.2	11.3	7.5	4.7	3.6
50	0.02	120.6	87.9	73	53.2	35	18	11.9	7.8	4.9	3.7
60	0.017	125.4	91.2	75.8	55.3	36.4	18.7	12.3	8.1	5.1	3.8
80	0.012	133.2	96.9	80.6	58.8	38.6	19.8	13	8.5	5.4	4.1
100	0.01	139.2	101.7	84.4	61.6	40.4	20.7	13.6	8.9	5.6	4.2

Coefficients												
c1	c2	c3	d1	d2	d3	e	f					
0.0003	-0.0053	0	0.5433	0.4165	0.325	0.2088	3.1601					
log(h(D))												
10m	20m	30m	60m	2h	6h	12h	24h	48h	72h			
1.792	1.099	0.693	0	-0.693	-1.792	-2.485	-3.178	-3.871	-4.277			
Standard errors (mm/h)												
					Duration							
ARI(y)	aep	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h	
1.58	0.633	7.2	3.6	2.4	1.3	0.6	0.2	0.1	0.1	0	0	
2	0.5	7.2	3.7	2.5	1.3	0.7	0.2	0.1	0.1	0	0	
5	0.2	7.3	3.8	2.6	1.4	0.7	0.3	0.2	0.1	0.1	0	
10	0.1	7.6	4.1	2.9	1.7	0.9	0.4	0.2	0.2	0.1	0.1	
20	0.05	8.2	4.7	3.5	2.1	1.1	0.5	0.3	0.2	0.2	0.1	
30	0.033	8.7	5.2	4	2.5	1.3	0.7	0.4	0.3	0.2	0.1	
40	0.025	9.3	5.7	4.5	2.9	1.5	0.8	0.5	0.4	0.2	0.2	
50	0.02	9.8	6.2	4.9	3.2	1.6	0.8	0.5	0.4	0.3	0.2	
60	0.017	10.3	6.6	5.3	3.5	1.7	0.9	0.6	0.5	0.3	0.2	
80	0.012	11.1	7.4	5.9	3.9	2	1	0.6	0.5	0.3	0.2	
100	0.01	11.9	8	6.5	4.4	2.1	1.1	0.7	0.6	0.4	0.3	
Extreme rainfall assessment with climate change												
Projected temperature change: 2.0 degree Celsius												
Rainfall intensities (mm/h)												
					Duration							
ARI (y)	aep	10m	20m	30m	60m	2h	6h	12h	24h	48h	72h	
1.58	0.633	61.8	45	37	26.8	17.6	9.2	6.1	4	2.5	1.9	
2	0.5	66.6	48.6	40	28.8	19.1	9.9	6.5	4.3	2.7	2	
5	0.2	85.2	61.2	50.8	36.8	24.2	12.5	8.3	5.5	3.4	2.6	
10	0.1	99	71.7	59.6	43.3	28.6	14.8	9.7	6.4	4	3	
20	0.05	114.6	84	69.6	50.5	33.4	17.2	11.3	7.5	4.7	3.5	
30	0.033	125.4	91.5	76	55.4	36.5	18.9	12.4	8.2	5.1	3.9	
40	0.025	133.8	97.2	80.8	58.9	38.8	20	13.2	8.7	5.4	4.1	
50	0.02	139.8	102	84.6	61.7	40.6	20.9	13.8	9.1	5.7	4.3	
60	0.017	145.2	105.9	88	64.1	42.1	21.7	14.3	9.4	5.9	4.5	
80	0.012	154.8	112.5	93.4	68.2	44.8	23	15.1	9.9	6.2	4.7	
100	0.01	161.4	117.9	98	71.5	46.9	24.1	15.8	10.3	6.5	4.9	

In preparing this table, all reasonable skill and care was exercised using best available data & methods. Nevertheless, NIWA does not accept any liability, whether direct, indirect or consequential, arising out the use of HIRDSV3. (c)2017 NIWA		

The above tables have been used in calculating peak flow and volume for the Uruti composting site.

2.4 Hydrology / Hydrogeology

The site has been constructed to control and manage stormwater flows with the intention to divert clean stormwater flows from the catchment around the site activities, and minimise the amount of clean water that becomes entrained in the process and site ponds.

The pre-composting area within the facility is bounded by a constructed drain / stream on the Northeast that discharges to the Mimitangiatua River which is to the northwest. At the closest point, the Haehanga stream is 10m from the composting pad and this area is 3500m upstream of the confluence with the Mimitangiatua River, with no other permanent or major watercourses in the locality.

A groundwater investigation has been undertaken and a model has been produced for the site. This is attached as **Appendix 'I'** (2 July 2015 BTW Company). This report finds that;

- the clay soils form a semi-impervious shallow groundwater table overlain by more porous silty loamy-clays and the shallow groundwater table is in almost constant interaction with the more porous loamy silty- clays.
- Highest groundwater levels were recorded in winter and spring
- There is a close hydraulic connection between the Haehanga Stream and shallow groundwater.

Ground water is close to surface, with water levels of approx. 0.28 and 1.2 m below ground level.

No deep groundwater information has been sourced for this assessment and it is considered the upward movement of shallow groundwater would restrict downward movement of surface water from the catchment area. There are no deep groundwater bores located between this composting pad and the Mimitangiatua River.

2.5 Groundwater quality

Monitoring of groundwater has occurred on the site for bores GND 2188, GND 2189 and GND 2190 (installed as a condition of the original consent) and more recently the first samples have been taken from the four new bores installed on the site in conjunction with the extended irrigation area (consented 2015). One of the new bores is shown to the left.

The results of this monitoring are included as **Appendix X** and show that the composting and discharge of irrigation fluid has had only minor effect on the environment.

2.6 Soil Quality

Based on information provided by BTW the soils in the area are classified as Orthic brown soils from the Whangamomona Complex loams, which have a high clay content (NZ Soil Classification, V4)[1]. Profiles indicated shallow soil with varying coarse to fine sandy / clay horizons with a papa clay base.

[1] Uruti Composting Facility Management Plan BTW section 2.3 see Appendix 'D'

2.7 Surface Water Quality

Monitoring of surface water in the catchment has been occurring for a number of years, and the results are presented in **Appendix X**. These show that the composting operation has had only minor effect on surface water quality.

Monitoring of the Mimitangiatua River upstream and downstream of the Haehanga confluence was undertaken on the 2nd of May 2018.

Photo 2.7 Haehanga -Mimitangiatua Confluence

This showed that there was no effect from the discharge of the Haehanga Stream into the Mimitangiatua River. These results are attached as **Appendix 'W'**.

2.8 Air Quality

Remediation (NZ) acknowledges that there have been odour complaints from neighbours in the past. Odour complaints have been taken seriously with the problem identified and as a result Remediation (NZ) no longer take product that has caused this issue.

The existing air quality is expected to be very good, due to the relatively undeveloped rural area characterised by low intensity farming surrounding the site, and indigenous bush inland.

Existing air emissions in the area are very limited and will have only localised effects (e.g. motor vehicles using the existing SH3; domestic heating emissions, if any, from the residential houses nearby and intermittent discharges from farming activities). There could be minor influences associated with salt spray in the area.

3 DESCRIPTION OF PROPOSED OPERATION/ACTIVITIES

With the continued growth of composting and "a worm driven waste management industry" and the resultant success of the organic biological fertiliser products produced by Remediation (NZ) Ltd and marketed by Revital Fertilisers, Remediation (NZ) Ltd seeks to renew and update its consent for the Uruti Composting Facility.

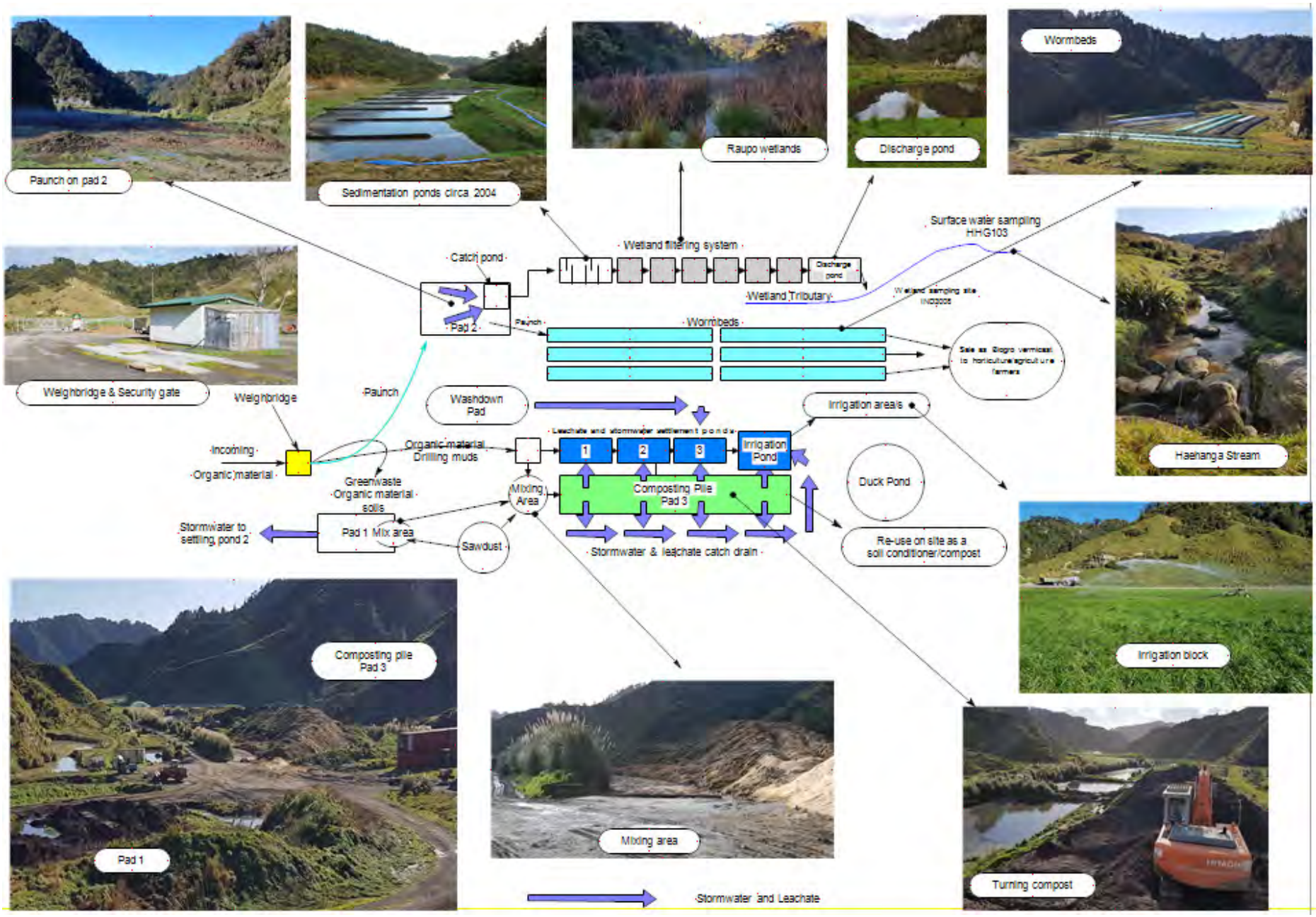
The current site consists of two composting pads, a drill mud/composting mixing pad, and a series of remediation ponds used for liquid waste. Pad 1 is used for composting chicken mortalities, fish waste, hatchery waste, and greenwaste. Paunch which is used in Vermicast production is pre-composted on the back of Pad 2, and any associated leachate is processed through the wetland system. The lower section of Pad 2 is used as a worm breeding bed. The drill mud/composting pad adjacent to the liquid settling/hydrocarbon separation ponds is now known as Pad 3.

The flow of received material through the site is shown in figure 1 below.

Product that has deemed to have completed the composting process is tested against the NZ Standard for composting and soil conditioner[2], and if within the standard is used as a soil conditioner around the Uruti site. A recent independent test of the finished compost carried out by Hill's Laboratories is attached -see Appendix 'H'. This shows that the maturated compost meets the NZ standards for soil conditioners.

[2] New Zealand Standard: NZS 4454:2005 Compost, Soil Conditioners and Mulches

Figure 4: Process Diagram of the Uruti Composting and Vermiculture Facility



A map of the current site is attached-see **Appendix A**.

3.1 Pad Construction

All pads have been constructed of a 1 metre deep compacted layer of papa and bunded on the perimeter to contain organic material and stormwater within the area.

Photo 3.1 Pad 1 construction

This papa base can be seen in photograph 3.1 underlying pad 1.

Exclusion drains have also been cut to divert stormwater from the surrounding catchments. These exclusion drains run eventually into the Haehanga Stream.

Photo 3.1.1 Exclusion drain around the duck pond

3.2 Organic material Inputs and Capacity

The Uruti site accepts a range of organic material and drilling waste and through the process of composting and vermiculture converts these inputs into a soil conditioner and organic fertiliser.

The majority of the material accepted on site comprises of green wastes, paunch grass, chicken mortalities, fish waste, drilling waste, carbon compounds (sawdust) and manures.

The acceptance of products onto site are guided by the resource consent conditions as listed in the Uruti site resource consent 5838-2.2 and the Waste Acceptance Plan.

The Waste Acceptance Plan, refer to **Appendix 'C'**, outlines the process of accepting material including the approval of new waste, monitoring and sampling of the waste products and the waste reception protocol. A series of Standard Work Place Instructions (SWPI's) describe in detail how the tasks required to carry out the acceptance of waste products onto site is carried out.

It is anticipated that the current input volumes of raw organic material at the composting site will remain similar over the coming years. The majority of the material will comprise of green wastes; paunch grass, chicken mortalities, fish waste, drilling waste, carbon compounds (sawdust) and manures as these materials provide the balance of carbon to nitrogen needed for effective composting

It is noted that the current consent lists biosolids in the Acceptable Wastes to be composted (condition 2). This will be removed as it is not acceptable to Ngati Mutunga, and these wastes have not been received for many years.

3.3 Discharges to Land - Composting Procedures

3.3.1 Composting Process

Composting is the controlled microbial transformation of organic materials under aerobic and thermophilic conditions into a soil conditioner and organic fertiliser. Organic material is blended with carbon rich products such as sawdust and green waste to achieve the required carbon to nitrogen ratios and then heaped into windrows. The composting process is carried out by a large number of micro-organisms and depending on the raw materials can take a number of months or in the case of drilling muds a number of years.

Photo 3.3.1 Composting Operation

The Site Practices Plan, refer to **Appendix 'D'**, outlines the composting process and a series of Standard Work Place Instructions (SWPI's) describe in detail the tasks required to carry out the composting process.

3.3.2 Vermiculture Process

Vermiculture is the decomposition of organic material by earthworms.

Paunch (partly digested grass from a cattle beast's stomach at slaughter) is spread out into vermiculture rows approximately 3 metres wide and 0.5 metre high. The beds are raked and then the beds are covered, as can be seen in photo 3.3.2 below. The worms digest the paunch and convert it into vermicompost and finally to vermicast.

Photo 3.3.2 Vermiculture Beds

Vermicast, apart from suppling nutrients to plants, improves soil structure leading to an increase in water and nutrient holding capacities of soil.

The Site Practices Plan, refer to **Appendix 'D'**, outlines the vermiculture process and a series of Standard Work Place Instructions (SWPI's) describe in detail the tasks required to carry out the vermicast process.

3.3.3 Pad 1-Organic material

Pad 1 is 7,764 m^2 in size, material received on this pad is blended with shredded greenwaste and untreated sawdust to achieve required carbon/nitrogen ratios, wedge piled and left for up to 4 weeks before being turned. The main purpose of this procedure is to mitigate as much as possible any odour at the beginning of the composting process. The compost is turned up to 5 times as it moves towards the back of the pad, where it is left to maturate. Untreated sawdust for the composting operation is also stored on this pad, over a 2,000m^2 area. Completed compost is stored on this pad in a 3,000m^2 area until disposal.

The release of the compost is controlled by the Release of Final Product protocols, refer to **Appendix 'G'**, and outlines the selection standards required to be achieved and the monitoring and sampling processes under taken to certify release acceptability.

3.3.4 Pad 2-Paunch

Pad 2 is 8,132 m^2 in size. Paunch (partly digested grass from a cattle beast's stomach at slaughter) is the only product received on this pad Once received it is left for up to 6 months after which it is removed and fed to worm beds at Uruti and Brixton.

Once processed by the worms it becomes vermicompost and finally vermicast.

3.3.5 Pad 3-Drilling Waste

Pad 3 is 5,000m^2 in size. Drilling waste is received in a holding pond, where the material is blended with shredded greenwaste, sawdust, other organic matter, and wood shavings. It is then rowed up for composting, and during this process moved through to the northern end of the pad. Liquid from this process passes through a series of ponds where any hydrocarbons are separated (hydrocarbons are skimmed off and removed from site, and disposed of at an appropriate facility) and is finally discharged (via irrigation) to one of the predefined irrigation areas.

The Irrigation Block Management Plan is included in the Leachate & Stormwater Management Plan (refer to **Appendix 'F'**) and outlines the irrigation process and a series of Standard Work Place Instructions (SWPI's) describe in detail the tasks required to carry out the irrigation process.

The release of the compost is controlled by the Release of Final Product protocols (refer to **Appendix 'G')** and outlines the selection standards required to be achieved and the monitoring and sampling processes under taken to certify product release acceptability.

Once the composting process is completed and meets the standard for soil conditioners, the composted material is used onsite as a soil conditioner.

The finished compost pile has been tested independently and results are included as Appendix 'H'. These show that after 3 years the compost is within the NZ standards for compost and the tier 1 MfE soil acceptance criteria for hydrocarbons.

Table 5:Typical annual drilling mud received

Volume of Drilling Muds Received on Site(Tonnes)													
	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Total
SBM & WBM	818.11	533.86	390.15	1017.36	274	36	0	146.1	90.5	145.17	39.84	247.68	3738.77
SBF	237.88	555.51	71.76	160.37	295.64	252.88	405.82	264.71	383.07	619.46	561.38	665.16	4473.64
Total	1055.99	1089.37	461.91	1177.73	569.64	288.88	405.82	410.81	473.57	764.63	601.22	912.84	8212.41
SBM	Synthetic based mud												
WBM	Water based mud												
SBF	Synthetic based fluid												

The above table shows the drilling mud received on site Dec 16 through to end Nov 2017. This mud is added to organic waste and is composted.

3.4 Discharges of Treated Stormwater and Leachate

The volume of runoff/stormwater generated within the active site areas is dependent on the catchment size, moisture content of the soils on the site, runoff characteristic of the site and intensity of the rain. The majority of the contaminants contained in Stormwater, if any, will be in the "first flush" of water leaving the site. The concentration of contaminants will therefore be potentially higher in lower rainfall events due to less dilution.

Stormwater is likely to be generated immediately after rain events. It is also likely that there may be some drainage (leachate) from the windrows and sawdust storage piles onsite once the rain has stopped, as the windrows act like sponges, slowly releasing moisture as well as absorbing it.

Cut off drains, bunds and diversions are in place to prevent clean stormwater from areas surrounding the active operational site becoming entrained in the treatment system. The drains and bunding are shown in **Appendix 'F'**.

Stormwater flows from pads 1 and 3 that may become contaminated are directed into the pond system for treatment through the process at various points. Once collected through the system, the discharge of treated stormwater and leachate occurs to land, via. irrigation.

The Irrigation Block Management Plan is included in the Leachate & Stormwater Management Plan, refer to **Appendix 'F'**, and outlines the irrigation process and a series of Standard Work Place Instructions (SWPI's) describe in detail the tasks required to carry out the irrigation process.

Photo 3.4: Irrigator in operation

Leachate and stormwater from pad 2 are collected in the catch pond and pumped to the wetland. This process is outlined in the Wetland Treatment System Management Plan, refer to **Appendix 'E'**.

The material that is irrigated is collected in the 'irrigation pond'. This is sampled, and results are shown in **Appendix X**. This provides information on the characteristics of the material that is irrigated.

3.4.1 Stormwater Volume

As mentioned above, frequent low intensity storm events have the potential to generate high contaminant concentrations, and therefore a 1 in 10-year 60 minute storm is considered appropriate to evaluate likely discharges from the site. In a 1 in 10-year 60 minute storm the figure of 43mm of rainfall per hour will be utilised. This is a very conservative figure as values for the top 30 rain occurrences range from 8.0 to 15mm with the average being 9.4mm (refer Table 2).

Runoff of the falling rain will be influenced by the site's runoff coefficient. This has been calculated to be 0.25 as per MBIE Verification Method E1/VM1 (1 January 2017). Remediation (NZ) Ltd considers this coefficient to be a conservative runoff coefficient as the composting material provides a very high degree of permeability. Compost requires 40-60% moisture for the composting process to be effective.

3.4.2 Pad 1 & 3 (shared stormwater collection system) stormwater capacity

Stormwater leaving catchment area of pads 1 and 3 is channelled and directed to a single discharge point via a series of ponds. This potentially results in a less concentrated discharge compared to non-point source discharges.

The calculated flow rate of water leaving the catchment area is approximately 122L/s. This is a very conservative value and will only be observed in 1 in 10 year 60 minute duration storm events. It should also be noted that this is an instantaneous runoff and does not take into account the lag time for water to flow from one end of the composting pad the uptake of water into the windrows in favourable conditions.

Based on a site area of 1.4 ha (Pad 1 & 3), a rainfall intensity of 43 mm/hr (i.e. 7 mm in 10 mins = 42 mm in 1 hour), and the above coefficients, the estimated runoff flow rate from Pad 1 and 3 will be 438m3/hr. This is an extremely conservative estimate and is likely to overestimate the volume to be actually discharged from the composting pad 1 & 3 during this 1 in 10 year 60 minute storm event. Pond level is maintained to ensure that there is enough capacity should a 43mm/hr rain event occur (see **Appendix 'C'** Uruti Consent Compliance Management Plan).

The Pond Management Plan is included in the Leachate & Stormwater Management Plan, refer to **Appendix 'F'**, and outlines the process required to manage the pond level.

As can be seen from Table 3 the potential discharge characteristics are such that any discharge of leachate is likely to be contained and/or assimilated, without any impact on resultant receiving groundwater or surface water quality.

If rainfall is continuous and exceeds the capacity of the settling ponds (4,000 m3 capacity) a contingency is provided by the duck pond being able to take excess. Refer to the Irrigation Model in **Appendix 'F'**.

3.4.3 Pad 2 stormwater capacity

Stormwater and leachate from this pad is collected in a 200,000-litre capacity pond, from where it pumped to a wetland system which has sediment retention pond and seven terraces. Each terrace is planted with various species of plants to deal with varying nutrient levels of leachate. Once the leachate has passed through the wetland system it is collected in a 1,000 m3 capacity pond before discharge to an un-named tributary of the Haehanga Stream.

Based on a site area of 1ha, a rainfall intensity of 43 mm/hr (i.e. 7 mm in 10 mins = 42 mm in 1 hour), and the above coefficients, the estimated runoff flow rate from Pad 2 will be 153m3/hr. This is an extremely conservative estimate and is likely to overestimate the volume to be actually discharged from the composting pad during this 1 in 10 year 10 minute storm event. Pad 2 drainage area is maintained to ensure that there is enough capacity should a 43mm/hr rain event occur.

Table 6: Stormwater Peak Flow Calculation

	Stormwater Peak Flow and Volume Calculation, Revital Uruti Site			
	Calculations based on a 1 in 10yr event			
Pad 1	(Organic)			
	Run-off Coefficient, C=	0.25		bush, gardens, lawns-MBIE Table 1 Run-off Coefficients
	10 year ARI, 60 min duration storm rainfall intensity, I=	43.3	mm/hr	ie HIRDS v3 increased for climate change 2 degrees
	Run-off Area, A=	0.7764	ha	
	Run-off flow Q=CIA=	0.023	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	124.2	m3	leachate pond volume required for Pad 1
		Volume always available in leachate pond is 652m3 therefore OK		
Pad 3	(Drill mud/organic)			
	Run-off Coefficient, C=	0.25		bush, gardens, lawns-MBIE Table 1 Run-off Coefficients
	100 year ARI, 60 min duration storm rainfall intensity, I=	43.3	mm/hr	ie HIRDS v3 increased for climate change 2 degrees
	Run-off Area, A=	0.8132	ha	
	Run-off flow Q=CIA=	0.0242	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	130.68	m3	leachate pond volume required for Pad 3
		Volume always available in leachate pond is 652m3 therefore OK		
Settling Ponds	(Pad 3 settling ponds)			
	Run-off Coefficient, C=	1		Ponds
	100 year ARI, 60 min duration storm rainfall intensity, I=	43.3	mm/hr	ie HIRDS v3 increased for climate change 2 degrees
	Run-off Area, A=	0.43	ha	
	Run-off flow Q=CIA=	0.051	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.0(Q) d	183.6	m3	pond volume required for Pad 3
		Volume always available in leachate pond is 652m3 therefore OK		
	Total	438.48	m/3	capacity required in irrigation pond
Pad 2	(Paunch)			
	Run-off Coefficient, C=	0.25		Stormwater peak flow calcs 130618
	100 year ARI, 60 min duration storm rainfall intensity, I=	43.3	mm/hr	ie HIRDS v3 increased for climate change 2 degrees
	Run-off Area, A=	0.9534	ha	
	Run-off flow Q=CIA=	0.0284	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	153.36	m3	pond volume required for Pad 2
		Volume always available in Pad 2 settlement pond is 1,000m3 therefore OK		

3.4.4 Discharge Characteristics

Pad 1 and Pad 3

The material to be composted will be variable, however the majority of the material from Pad 1 is likely to consist of greenwaste and poultry waste. Liquid discharges from this area are likely to be either directly as a result of leachate from the composting material or stormwater following a rain event. All material from pad 1 is directed to the pond system and treated through the system before being irrigated.

The material to be composted on Pad 3 is Drilling Mud and organic material. Sawdust is mixed with the drilling mud and other organic material at the reception pit area and is then composted and moved to the Northern end of the pad as part of the composting process.

Stormwater and leachate is collected and directed to the pond system and treated prior to being irrigated. The applicant is considering collecting this stormwater and leachate in a separate pond and pumping it to the wetland, to reduce the loading on the downstream ponds, and if assessment of the wetland indicates that it has the capacity, this may occur in the future.

Table 7: Stormwater discharge characteristics Pad 1 & Pad 3

Analyte	Units	Remediation (NZ) Ltd sample
BOD5	gm^{-3}	200
NH^3	gm^{-3}	50
Temp	ºC	15
Conductivity	mSm^{-1}	13.8
Turbidity	NTU	7.5

Table 7 is referenced from a sample from the runoff from Pad 1 & Pad 3 and sampled in the irrigation pond.

Pad 2 (Paunch)

The material to be pre composted on Pad 2 is Paunch only, and the stormwater and leachate is collected and processed through the wetland system onsite. Based on a pad size of 9,534m^2 and using the equation in Table 3 the total volume of stormwater/leachate in a 10 year event would be 153m^3. The catchment pond on pad 2 has a capacity of 1,000 m^3.

Table 8: Stormwater discharge characteristics of the Paunch Pad (2)

Analyte	Units	TRC sample – 2-11-2008
BOD5	gm^3	180
NH_3	gm^3	5
Temp	^oC	18
Conductivity	mSm^{-1}	
NH_{4-1}	gm^3	196
pH	pH	

3.5 Discharges to Air

Operations on the site have the potential to create odour and dust discharges.
Discharges of odour can occur from all aspects of the site; however, experience has shown that the key sources of odour are;

- the main receiving pond/area when material is placed there, and;
- the compost piles when the compost is turned.

Site management processes have been developed and implemented to minimise and/or mitigate the production of odour from the site operation and can viewed in the Site Practices Plan. In summary the processes employed to minimise odour are;

- Identifying odorous materials arriving on site and if they are not to be processed immediately, covering them with sawdust.
- Turning the windrows on a regular basis to ensure the rows do not turn anaerobic.
- Turning the windrows when weather conditions limit the drift of odour towards the Northern boundary.

Discharges of dust from vehicles using the access track have been observed by site staff and management but the effects are localised, and no dust has been observed drifting beyond the boundary.

The Site Practices Plan, refer to **Appendix 'D'**, outlines the management processes required to mitigate the effects of air discharges.

4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

The potential and / or likely environmental impacts arising from composting and vermiculture production are considered to be both well anticipated and understood. Environmental effects which are relevant to the consents sought from the Taranaki Regional Council and that may be expected to arise from this activity, primarily relate to the potential discharge of leachate and /or stormwater to land and emissions of odour and dust to air.

The composting operation has the potential to generate contaminants, in particular from stormwater flow and leaching of organic nutrient from the windrow piles. The following covers the management of Stormwater from the composting pads.

The actual effects on the environment of the activity for which consent is sought have been monitored by the Taranaki Regional Council for seventeen years and the results are available to the public, and this is discussed below to provide assurance in relation to effects and how they are mitigated.

The following section of this document discusses the effects on the environment resulting from the existing Uruti waste remediation site.

Potential effects associated with the operation of composting and a vermiculture production facility include the discharge of exploration drilling cuttings (liquid and compost) and associated buffering organic material.

4.1 Stormwater and Leachate Discharges

4.1.1 Sensitivity of Receiving Environment

Environment impact and health risk involves 3 factors being:

- Source and type of contaminant
- Contaminant pathways
- Presence of receptors

As the factors above are removed or reduced the potential risk is greatly reduced. On the current production site it is not considered practical to remove the source, especially as it is an existing activity. Hence management of any contaminant to reduce contaminant pathways and / or receptors are practical measures for minimizing effects on the receiving environment. The management of contaminant pathways is the focus of site stormwater management. The presence of receptors is one of the mitigating factors for the effects of the air discharges from the site.

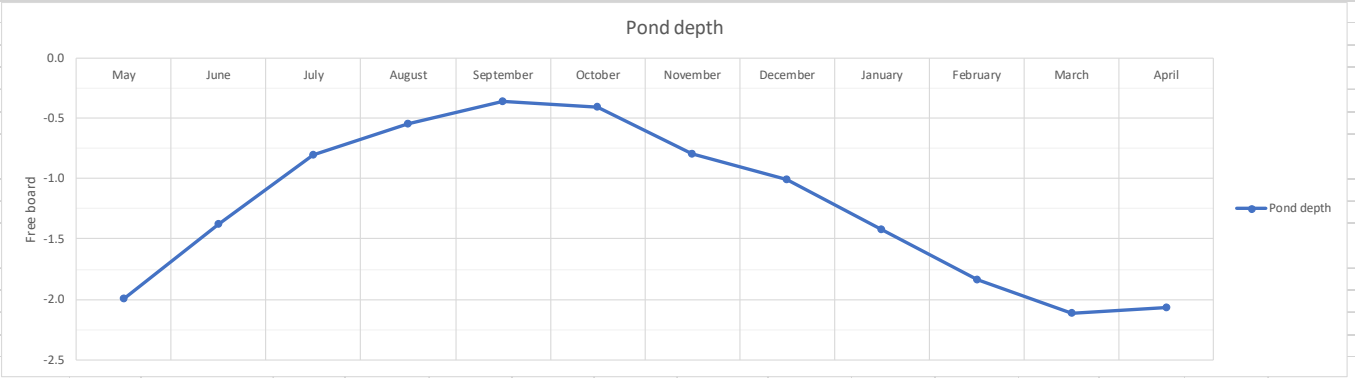
4.1.2 Effects on Surface Water Quality

The uncontrolled discharge of the leachate from compost piles and contaminated stormwater from the active site areas can have adverse effects on water quality, and associated instream flora, fauna and habitat. There are also potential effects on the amenity and cultural values of the waterway, and the suitability of the waterway for Mahinga Kai gathering and suitability of the water to drink.

Overloading of the irrigation areas can also result in discharge to waterways, via shallow groundwater, or overland flows. The applicant has undertaken a detailed investigation into the loading capacity of the soils (refer to Irrigation Block Management Plan in the Leachate and Stormwater Management Plan in **Appendix 'F'**, the frequency of application, and impact of major rain events. As a result of this investigation an irrigation model has been produced. Thirty-year Rainfall and evaporation data from a NIWA virtual Climate Station located near the site was used in the model. This model is used as a basis for irrigation and pond management for pads 1 and 3.

Table 9: Uruti Irrigation Model

Uruti Irrigation Model	Month	May	June	July	August	September	October	November	December	January	February	March	April
Evaporation mm	Average	31.12	21.41	25.43	39.04	57.48	85.05	109.32	126.01	134.46	107.97	88.65	52.65
Rainfall mm	Average	181.20	189.51	181.83	178.04	175.35	188.38	149.39	149.04	120.00	107.02	119.22	151.25
Rainfall onto pad 1/1mm rainfall	1.94	351.75	367.89	352.98	345.61	340.41	365.69	290.00	289.32	232.94	207.75	231.43	293.60
Rainfall onto pad 3/1mm rainfall	2.03	368.42	385.32	369.70	361.99	356.54	383.02	303.75	303.03	243.98	217.59	242.40	307.52
Rainfall onto pond/1mm rainfall	4.30	779.16	814.89	781.86	765.55	754.03	810.04	642.38	640.87	515.99	460.17	512.64	650.35
Liquid deliveries		187.50	187.50	187.50	187.50	187.50	187.50	187.50	187.50	187.50	187.50	187.50	187.50
Truck washwater		50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Total liquids entering the pond system		1,736.84	1,805.60	1,742.04	1,710.65	1,688.47	1,796.26	1,473.63	1,470.72	1,230.41	1,123.00	1,223.98	1,488.98
Evaporation from ponds	4.30	(133.8)	(92.1)	(109.3)	(167.9)	(247.2)	(365.7)	(470.1)	(541.9)	(578.2)	(464.3)	(381.2)	(226.4)
Balance to be irrigated		(1,603.0)	(1,713.5)	(1,632.7)	(1,542.8)	(1,441.3)	(1,430.5)	(1,003.5)	(928.9)	(652.2)	(658.7)	(842.8)	(1,262.6)
Irrigation vol M3		900.0	900.0	900.0	1,200.0	1,200.0	1,500.0	1,500.0	1,200.0	1,200.0	1,200.0	1,200.0	1,200.0
Hours irrigating per month		(30.0)	(30.0)	(30.0)	(40.0)	(40.0)	(50.0)	(50.0)	(40.0)	(40.0)	(40.0)	(40.0)	(40.0)
Surplus liquid		(703.0)	(813.5)	(732.7)	(342.8)	(241.3)	69.5	496.5	271.1	547.8	541.3	357.2	(62.6)
Pond vol at 1st day of month		3,300.0	2,597.0	1,783.4	1,050.7	707.9	466.6	536.1	1,032.6	1,303.7	1,851.5	2,392.8	2,749.9
Surplus liquid		(703.0)	(813.5)	(732.7)	(342.8)	(241.3)	69.5	496.5	271.1	547.8	541.3	357.2	(62.6)
Pond vol at end of month		2,597.0	1,783.4	1,050.7	707.9	466.6	536.1	1,032.6	1,303.7	1,851.5	2,392.8	2,749.9	2,687.4
Pond vol per metre		1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0	1,300.0
Pond depth		-2.0	-1.4	-0.8	-0.5	-0.4	-0.4	-0.8	-1.0	-1.4	-1.8	-2.1	-2.1

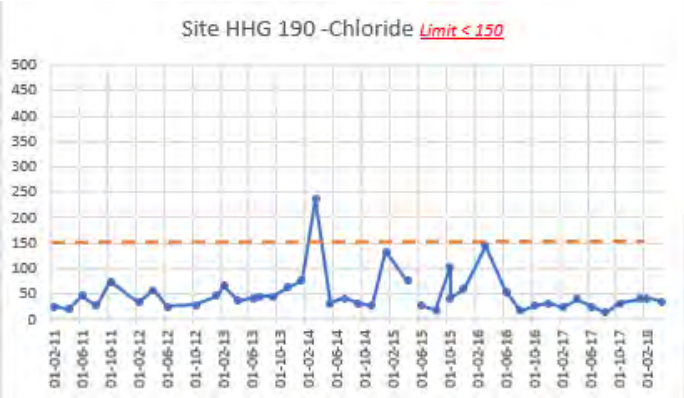


There has been considerable monitoring of the discharges from the site over the last 16 years. Data from the TRC site monitoring for the past 7 years have been tabulated and graphed and can be viewed in **Appendix 'X'**.

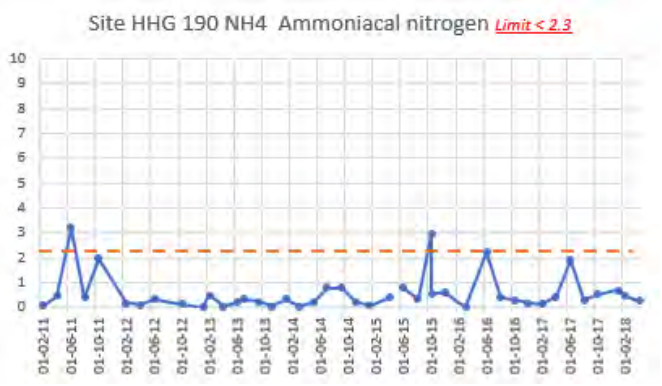
An important indicator to assess the effects of the site operation on the surface water quality is to compare the quality of the surface water entering the site with the surface water leaving the property. Using the sampling limit for Chloride as per consent condition 11 of 150 gm/m^3 and the National Objectives Framework for lakes and rivers bottom line for NH_4 of 2.3 gm/m^3 the sampling results for Chloride and NH_4 - Ammoniacal nitrogen are graphed in **Appendix 'X'**.

The results indicate that effects on the waterway are minor and within the sampling limits for the majority of the time, the exceptions being;

a) A spike in Chloride occurred on 13 March 2014 at site HHG - SH3 bridge (ground water leaving the site) resulting from the importation of drilling muds contaminated with seawater and a breach in the bund which allowed some contaminated liquids to flow into the Haehanga Stream. The bund was repaired and drilling muds from offshore drilling contaminated with sea water are no longer taken onto the site.



b) Two spikes in NH_4 occurred on 16 June 2011 and 13 October 2015 at site HHG – SH3 bridge. No corresponding spikes were recorded at the two sampling sites upstream from site HHG 190. This would suggest that the cause of the spikes is unknown and unlikely to be related to the composting operation.



c) On 28 February 2018 a breach in the bund at site HHG 106 resulted in a discharge of contaminated liquid into a tributary of the Haehanga Stream. The incident resulted in an infringement notice and an infringement fee from TRC. The bund was repaired, and the culvert was extended past the pad mixing area to prevent re-occurrence. The culvert was also increased in diameter from 500mm to 1,000mm to prevent any land overflow through to the irrigation pond.

d) Monitoring results at sits HHG 103, discharge from the wetland show spikes in ammoniacal nitrogen (NH_4) in April to June in the last 4 years. During Autumn, wetland plants experience

plant die-back which can reduce the treatment capability of the wetland system, which in turn may lead to higher ammonia levels in the discharge to the Wetland tributary stream.

This is a natural phenomenon experienced in wetland treatment systems and it is acknowledged in the existing Wetland Treatment System Plan.

Water quality results in the Haehanga have been examined (see **Appendix 'X'**), and indicate that effects on the waterway are less than minor for the majority of the time, the exception being, the spike in chloride levels in Site HHG 190 leaving the property on 13-3-2014. This exception has been analysed by the consent holder and Management practices developed to prevent the circumstances that caused this from occurring again. Water samples have been taken at the Mimitangiatua River both upstream and downstream of the confluence of the Haehanga Stream and Mimitangiatua River.

These results are shown in **Appendix 'W'** and show that at the time of sampling there was no contamination of the Mimitangiatua River resulting from the RNZ composting activity.

4.1.3 Effects on instream flora and fauna

Fish and Biomonitoring surveys of the Haehanga Stream have been undertaken on an annual basis by the TRC. A Fish Survey of the Haehanga Stream in December 2016 stated that '*In summary, the results of the current survey do not indicate that the composting activities and wastewater irrigation undertaken by Remediation NZ Ltd, alongside the Haehanga Stream, have had a deleterious impact on the fish communities of this stream'*

A biomonitoring survey conducted in December 2016 stated that '*… with the exception of site 1, all sites recorded MCI scores higher than their respective medians. Overall, this survey found that macroinvertebrate communities of the mainstream sites and two unnamed tributaries were of above average health. Undesirable heterotrophic growths were not recorded at any of the seven sites in this survey'*

The biomonitoring survey also sampled Taxa and stated '*In general, the communities in the Haehanga Stream had moderate proportions of sensitive taxa. Low numbers of sensitive taxa are expected in small, silty bottomed streams such as the Haehanga Stream and the number of taxa were generally similar to other lowland hill country streams surveyed at similar altitude'*

Both the Fish and Biomonitoring Survey are attached as **Appendix 'X'** .

The conclusions of the December 2016 survey would indicate that the instream flora and fauna in the Haehanga catchment are in average to above average condition when compared to similar sites in the area. The results also indicate that the effects of composting and vermiculture operations on the streams are minor.

4.1.4 Effects on Groundwater Quality

All pads have been constructed of a one metre deep layer of compacted papa. This construction was engineered to create an imperious barrier above the subsurface soil. See photograph 3.2 where this is visible.

It is highly unlikely that stormwater will percolate through the composting pad to groundwater at rates and with nutrient concentrations that will cause adverse effects on water quality beneath the site.

With the irrigation system the plant material and soil will filter and attenuate the majority of contaminants in the stormwater. Particulate material not retained in the settling pond, will be filtered by vegetation and will readily break down following resumption of dry (aerobic) conditions. The soil in the upper profile will also assist in this process. This is likely to remove the majority of organic material (i.e. BOD), especially suspended organic material. Other nutrients that may be potential contaminants will also be removed by similar attenuation processes. The efficiency of these systems at removing nutrients and contaminants is well documented.

Phosphorus, which is of concern for surface water quality, is strongly absorbed to soil particles and will be readily bound to soil exchange sites. The majority of phosphorus is likely to be retained in the top 5 cm of the soil, and hence will not percolate to shallow groundwater. Preventing sediment and soil discharges to water is the key method of preventing phosphorous entering the water environment and this is achieved with site bunding and appropriate application rates.

Nitrogen is also of concern for water quality. The form of nitrogen being discharged is likely to be organic or ammoniacal nitrogen, both forms of which are readily bound to the soil and less likely to leach to groundwater.

A study was commissioned (BTW Company, 2015) to review the operation of the site with recommendations to further develop soil and groundwater management plans. The recommendations from the study have been incorporated in the Leachate and Stormwater Management Plan (**Appendix 'F'**). The BTW study identified that existing irrigation areas had the potential to become overloaded, and as a result of this an application was made to the TRC to increase the irrigation areas. This has been granted and one new area (Area E on the plan in Appendix A) has been commissioned and is operation. A further irrigation area (Area F on the plan in Appendix A) is under construction and is expected to be in use by the summer of 2108/19. Once the new irrigation areas are commissioned remediation of the existing areas (Areas J and H on the plan in Appendix A) will be undertaken. The BTW study can be found **Appendix 'H'**.

4.1.5 Wetland Discharge

Discharge from the wetland is carried out immediately following heavy rain-events. During periods of low intensity rain there is little or no discharge from the final pond of the wetland.

Stormwater discharges from the final pond are likely to coincide with already high stream flows. Typically, during periods of high stream flows, the water quality is likely to have already deteriorated as a result of other runoffs, both up and downstream from the site (i.e. have elevated concentrations of nutrients and sediment). As the stream water level recedes, the discharge from the final pond will cease or reduce considerably.

During Autumn, wetland plants experience plant die-back which can reduce the treatment capability of the wetland system, which in turn may lead to higher ammonia levels in the discharge to the Wetland tributary stream. Monitoring results show spikes in ammoniacal nitrogen (NH_4) in April to June in the last 4 years. This is a natural phenomenon experienced in wetland treatment systems and it is acknowledged in the Wetland Treatment System Plan.

Photo 4.1.5 Wetland System

It is considered that the effects of contaminants discharged from the final pond of the wetland will not adversely affect the stream or shallow groundwater quality.

4.1.6 Proposed mitigation measures – discharges

The proposed site has been selected such that is, as far as is practicable, remotely located from neighbouring property owners.

The input of raw material is currently controlled in consent conditions the acceptance procedures are listed in the Waste Acceptance Plan, refer to **Appendix 'C'**.

RNZ has prepared a contingency plan should any spillage to waterways occur (see **Appendix 'Q'** – Uruti Environmental and Safety Management Plan).

The effects of the discharge of stormwater and leachate from the process to land, are mitigated as follows:

- Minimising the potential for leachate and stormwater effects is achieved by utilising a combination of the interception drains, capacity of the settling ponds, irrigation systems, attenuation action, wetlands and biological treatment.
- Fencing of the Haehanga stream and riparian planting is in progress, to enhance water quality and increase and diversity of the stream flora/fauna at the site. See photographs 4.1.6

5

Photos 4.1.6 Riparian Planting the banks of the Haehanga Stream

- Stormwater volumes are kept as low as possible by diverting all clean stormwater around the active site with bunding, diversions and cut of drains.
- The stormwater treatment system is designed to accommodate the maximum expected rainfall events. This is detailed in the report in **Appendix 'F'**.
- All potentially contaminated stormwater, and all leachate, is collected within the pond systems, treated and managed.
- There is no direct discharge to water, and all management plans are designed to achieve this even under high intensity rainfall events.
- Operations are undertaken in accordance with detailed Management plans which are discussed below.
- A dam is currently under construction in the east tributary of the Haehanga Stream and will be used to augment flows during dry/low flow conditions in the stream. (This is constructed within the permitted activity criteria and reviewed by the TRC).
- Repair and maintenance of the wetland is planned for Spring and Summer of 2018, with a mind to increasing the Wetlands utilisation and treatment performance. This work includes desludging the sediment retention pond and planting Raupo in the terrace ponds.

- Irrigation area E was commissioned in May 2018 and Area F will be commissioned in the Summer of 2018/2019. This increased area will allow the spelling of areas J and H which monitoring of ground water and soils are showing increasing levels of chloride and Sodium Adsorption Ratios.
- Address the build up of ammonia/other contaminants in water (during low stream flows) by diverting water from the dam into the stream to create flow.

With the mitigation measures above in place, it is considered that the discharges to land for which consent is sought are able to be avoided, remedied or mitigated so that the effects on the environment are no more than minor.

4.2 Discharges to air

4.2.1 Effects of Air Discharges

The process of composting organic wastes can create odour discharges and can be unpleasant when experienced at nearby dwellings, reducing the amenity and enjoyment of private properties. Complaints from, and consultation with, neighbours confirm that any odour emitted from the site has been noticeable from time to time. Cold air drainage phenomena has been identified as the main cause of these events. Bunding and tree planting has also been completed as a mitigating strategy to reduce cold air drainage out of the valley.

4.2.2 Odour and Dust mitigation

Remediation (NZ) Ltd has continued to develop, improve and enhance their management practices. Minimising the potential for odorous emissions to arise associated with compost production is achieved by ensuring aerobic conditions remain present at all times. However, as a contingency planning measure, should objectionable or offensive odours arise, one or more of the following procedure(s) can be immediately employed as a mitigation measure:

(a) Carbon primary compounds such as sawdust or aged compost will be used in a smothering effect to cover the waste lines. This has been successfully utilised at the RNZ New Plymouth site with neighbours in extremely close proximity.

(b) The use of compounds such as lime may be employed to increase the speed of breakdown of the organic components and increase microbial activity. While some air emissions are expected to arise with this type of facility, objectionable odours are not expected to arise at or beyond the property boundary. By carefully selecting and controlling the waste materials to be composted, Remediation (NZ) Ltd can control the likelihood for potential offensive or objectionable odours to arise at or beyond the property boundary. The nearest farming boundary is located approximately 2000 m from the operation and approximately 3500 m to the closest residential dwelling.

Odour emissions are controlled by maintaining aerobic “moist” conditions as this allows for minimal build up of nitrogen and sulphur based gases, such as ammonium and sulphide derivatives, which typically occur under anaerobic conditions. Regular turning of the windrows also further assists in maintaining aerobic conditions within the windrows (see **Appendix ‘R’**- Remediation (NZ) Ltd Organic Composting Protocols).

Discharges to air associated with storage, transfer, treatment and disposal of wastes are considered a controlled activity under the Taranaki Regional Air Quality Plan if objectionable or offensive odour or objectionable deposition of dust occurs at or beyond the property boundary. The site is operated with the intention that no objectionable or offensive odours or objectionable depositions of dust will occur at or beyond the property boundary.

As mentioned above, the applicant has identified that some types of waste, including cheese waste from dairy factories, causes an increase in odour on the site. The applicant ceased receiving this waste when it became apparent that odour effects were occurring, and this waste is no longer be accepted.

Dust is mitigated by wet suppression using a tractor drawn water tanker as appropriate during dry weather and ensuring that traffic speeds are kept low on the access roads. Dust has not typically been a concern on this site, with no dust complaints received.

Timing of operations – in particular turning the compost piles and removing sludge from the ponds – is also a key method of avoiding odour travelling offsite. Having regard to the prevailing wind conditions and undertaking this work when residential dwellings are not down wind is a standard mitigation technique. The applicant has invested in their own long-reach digger, so that they have more control over the timing of this work (i.e. do not have to rely on an independent contractor).

Air quality (odour and dust management) matters are also addressed in the Site Practices Plan attached as Appendix D.

With the mitigation measures above in place, it is considered that the effects of discharges to air are entirely contained within the site and can be avoided, remedied or mitigated to the extent that they are less than minor.

4.3 Vermin / Disease

Remediation (NZ) Ltd has well established operational sites within the Taranaki, Waikato and Bay of Plenty regions, with no evidenced effects or presence of vermin or disease located/transmitted. The material utilised does not attract vermin and the composting procedures do not allow conditions to cause pathogen or disease development.
Composting has become, over the past 20 years, one of the favoured methods for disposal of a variety of organic waste materials worldwide. As the temperature of the substrate in which micro-organisms/pathogens are located rises, the expected survival time drops rapidly. The maximum critical temperature above which pathogen destruction is very rapid is approximately 55ºC. Since the compost will be produced by thermophilic method i.e. temperatures of 60-70ºC, any residual micro-organism would be destroyed rapidly in the process. Fly larvae, pupae and adult phases would also be destroyed.

The thermophilic aerobic system provides a high level of assurance of destruction of bacterial and viral pathogen, and of eggs and larvae of insects and other pests. The concentration of pathogens in the rumen contents (paunch) will in any case be very low, in comparison with for example manure on the pasture or dairy shed effluent.

The Uruti facility will not present a hazard to animal or human health either directly or through disease vectors[3].

A report by URS NZ Ltd has stated (see Appendix 'I') that no cases of legionelosis have been reported from exposure in areas surrounding compost manufacturing sites.

4.4 Feral animals

Due to the nature of the surrounding area feral animals can be a nuisance. These are monitored and if numbers get to a stage where they cause problems i.e. feral goats walking over worm bed covers causing damage) culling is carried out.

4.5 Effects on Tangata Whenua

Discharges to land and water can impact on the cultural and spiritual values of waterways and whenua.

An Assessment of Cultural Effects has been prepared, and this is attached as **Appendix 'S'**. A number of matters were addressed by the applicant during the consultation process with Ngati Mutunga, and these are documented in the attached assessment. This assessment makes the following recommendations;

- A thorough site exit plan be developed for the site, to ensure there is no 'legacy' left behind for which Ngati Mutunga is left picking up the pieces.
- Involve Ngati Mutunga in the monitoring of the site.
- Develop a procedure for ensuring the Hapu received monitoring information and reports in a timely manner.
- Remove the biosolids from the 'acceptable wastes' list.

The applicant is agreeable to these recommendations, and for these to be implemented by way of conditions of consent as appropriate. Where appropriate these recommendations are also incorporated into the Site Practices Plan (see below).

The applicant has also identified (via the Ngati Mutunga Environmental Management Plan and consultation) that the correct name for the 'Mimi' River is Mimitangiatua. All documentation prepared by the applicant therefore reflects this name.

It is considered that with the identified measures and controls in place, effects on cultural and spiritual values can be avoided, remedied and mitigated to be less than minor.

[3] [1] The above information is supported by Professor Roger S Morris BVSc (hons) V/MVSc, PHD, FRSNZ, F Amer CE, FACNSc, Gilruth Prof of Animal Health, Director of Massey University EpiCentre, Advisor to EC on BSE and numerous international governments on epidermiology; and Dr Ian Andrew entomologist from Massey University.

4.6 Integrated Management System

A detailed Integrated Management System (IMS) has been prepared and is attached as **Appendix 'T'**. This IMS has incorporated all existing management plans prepared for the site and integrated these into one document which also includes compliance with consent conditions and waste receipting procedures.
A key part of the management plan is making sure it is complied with. In this regard the applicant proposes to;

- Monitoring of site to be responsibility of one person reporting to the General Manager - Operations
- Internal auditing process to be carried out on a regular basis
- External Audit to be carried out on an annual basis

Identified during consultation was the need for a thorough site exit plan to be in place for the facility, given that there will be a long 'run out' time until consents can be surrendered. The applicant has provided for this in the Management Plan – refer to Site Exit Plan **Appendix 'U'**, and the key principles of site exit will be:

- All compostable material completely composted
- Irrigation pond system cleaned out, ponds back filled
- Wetlands system decommissioned
- All pad areas returned to pasture

4.7 Alternative Location and Methods

Section 1 (b) of the Fourth Schedule of the Resource Section 1 (b) of the Fourth Schedule of the Resource Management Act, 1991 requires that *"where it is likely that an activity will result in significant adverse effect on the environment, that the applicant provide a description of any possible alternative locations or methods for undertaking the activity."*

4.7.1 Alternative Location

Improvements in the management practices employed at the Remediation (NZ) Ltd sites have continued to develop and improve demonstrating that well-managed and operated compost and vermiculture facilities can present a sustainable and environmentally acceptable method for managing a range of unwanted organic waste streams. The Resource Management Act, 1991 requires that *'where it is likely that an activity will result in significant adverse effect on the environment that the applicant provides a description of any possible alternative locations or methods for undertaking the activity".*

Effects associated with the operation of the Uruti facility are considered to be both well anticipated and understood. Well-managed and operated composting and vermiculture facilities have demonstrably resulted in effects that can be considered no more than minor in nature and for these reasons, it is not considered necessary to consider further alternate locations.

4.7.2 Alternative methods

The utilisation of organic waste streams for the production of compost and vermicast represents a simple, yet innovative method of reusing a waste stream that might otherwise require safe residual

methods, such as landfilling. Whilst methods such as landfilling represent an alternate method for dealing with a range of unwanted organic waste streams, the production of compost and vermicast represents a sound and desirable waste treatment, rather than waste disposal option.

4.8 Options Assessment

To discharge Stormwater from Composting and Vermicast pre-processing operations the following options have been considered by the applicant.

4.8.1 Total Containment with No Discharge

Large holding ponds could be constructed with contained water being irrigated back over the composting pads. Remediation (NZ) Ltd believes this to be impractical due to stormwater volumes that would need to be discharged.

4.8.2 Containment and Pre-treatment to Surface Discharge

Stormwater could be directed, contained and treated in a number of methods to remove potential contaminants including suspended and organic material. Options include the use of various settling ponds, irrigation, biological treatment and wetland development.

4.8.3 Recommended Option

It is recommended to continue to operate the wetland system for treatment of leachate and stormwater from Pad 2. Stormwater and leachate from Pad 1 and 3 will continue to be treated through the settling pond and irrigation system.

4.9 Summary of Effects

The likely or potential environmental impacts associated with the Uruti site are considered to be both well anticipated and understood.

- The calculated discharge from pad 1 and the mud ponds is 225L/s. This is likely to be a significant over estimate of actual discharge.
- The settling ponds have a capacity of 10,310m^3, the volume resulting from 17mm of rainfall over the composting area is 135m^3.
- The composting site is unlikely to produce high volumes of leachate if well managed.
- Liquid contamination from the composting pad is only likely after rain events i.e. stormwater will be contained within the settling ponds.
- During minor rain events there may not be any Stormwater discharged from the site.
- If stormwater volumes exceed the settling pond capacity, the concentration of contaminants will be reduced significantly by dilution and will be captured in the final pond for irrigation.
- Attenuation by vegetation and soil will significantly reduce any contaminants entering shallow groundwater.
- Contaminants discharge from the wetland's final pond will be at low concentrations at times of high groundwater flows.

- An integrated management system has been developed to address the materials received, anticipated flows and expected weather events. This documents how effects on the environment will be avoided, remedied and mitigated.

5 Relevant Rules and Policies

The Resource Management Act 1991 (RMA) provides a framework within which consents for various aspects of the operation must be obtained. It explicitly outlines the requirements of the applicant in lodging their application and the process by which the consent authority shall make a decision. The process is generally subject to Part II of the Act as outlined below. This section of the AEE for the project briefly outlines the statutory background to the consent process and details the planning documents, which, in combination with the RMA, assist in determining the consent requirements for the project.

5.1 Part II (Purpose & Principles) – Resource Management Act 1991

The purpose of the RMA is to promote the *sustainable management of natural and physical resources*. All policies, plans and resource consents are subject to this principle. The RMA defines sustainable management as:

" managing the use, development and protection of natural and physical resources in a way or at a rate, which enables people and communities to provide their social, economic and cultural wellbeing and for their health and safety while –

(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."

Whilst the effects of waste are dealt within the ambit of the RMA, the Act itself does not specifically deal with waste generation per se. This said, increasing public concern for the environment, coupled with a general recognition by regulators and the public for the need to incorporate where practicable, a waste management hierarchy based on reduce, reuse, recovery and recycling, means that there is a recognised need to promote and endorse a range of environmentally sound and acceptable methods for the management of solid and liquid wastes.

Composting and Vermicast production and its necessary supporting activities (pre-composting) represents a simple, sustainable and innovative method for dealing with a range of unwanted organic waste streams that might otherwise require less desirable residual disposal methods, such as landfilling. This is considered a sustainable use of natural resources and a sustainable management method.

By ensuring the potential effects of the activities are avoided remedied and mitigated as presented in the AEE, it is considered that the activities are entirely consistent with the purposes and principles of the RMA.

The RMA also lists several matters of "National Importance" which must be recognised in decisions affecting the management, use, development and protection of natural and physical resources. Such matters include:

"(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, lakes and rivers… and the protection of them from inappropriate subdivision, use and developments;

(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and developments;

(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers;

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga."

In addition to the above, particular regard must be had for several other matters which include Kaitiakitanga, the intrinsic values of ecosystems, the heritage values of sites, buildings or places, the quality of the environment, the finite characteristics of resources and the Treaty of Waitangi. All of these matters must be considered during the decision making process, and all to varying degrees, the granting of the consent sought.

"Effects" that are likely to arise from granting of the consent are generally limited to the discharge of minor amounts of leachate and stormwater. The effects associated with these discharges are considered to be no more than minor in nature and are each addressed within the AEE presented. The design, management and operational practices utilised at the Uruti Site are detailed in the Site Management Plan and can be found in Appendix 'D'. Methods employed by Remediation (NZ) Ltd (including contingency measures) to further mitigate any potential effects that may arise are also discussed in this report.

5.2 Sections 104 – Matters to be considered

Section 104 sets out the matters to which the consent authority must have regard when considering an application for a resource consent. In summary, the following have to be taken into account:

- Any actual and potential effects on the environment.
- Any national or regional policy statements.
- Any objectives, policies or rules in any plan.

Regard must be had to the relevant statutory documents of the Taranaki Regional Council. In 2010 the Taranaki Regional Council adopted its Regional Policy Statement (RPS) for the Taranaki Region. An interim review of this RPS was carried out in June 2017. Remediation (NZ) Ltd was an external stakeholder participant in this review. In 2001 the Taranaki Regional Council also adopted a Regional Fresh Water Plan for the Taranaki Catchment. Both of these documents are relevant to the application under consideration. Each is now discussed further.

5.3 Objectives and policies of the Regional Policy Statement

Part B section 12 of the Regional Policy Statement for the Taranaki Region (RPS) sets out the objectives and policies for the region. It identifies the significant issues in relation to waste are -

WST - ISS 1 Minimising the volumes of waste generated and requiring disposal.

WST - ISS 2 Providing for the efficient and effective disposal of waste while avoiding, remedying or mitigating any adverse environmental effects associated with waste disposal.

The work that Remediation (NZ) Ltd carries out at the Uruti Site is entirely consistent with meeting the objective of waste minimisation and control.

In relation to discharges for which consent is sought, section 5.2 of the RPS discusses maintaining healthy soils, and HSO OBJECTIVE 1 is relevant to the activities:
To maintain soil health in the Taranaki region by maintaining soil nutrients at appropriate levels and avoiding or minimising soil compaction and soil contamination caused by inappropriate land management practices.

Carefully managed in accordance with the Site Management Plan, the applicant can ensure the health of the soil is maintained at the site. The compost itself can be used to enhance the soil condition on other sites.

Section 6.2 of the RPS addresses *maintaining and enhancing the quality of water in our rivers, streams, lakes, and wetlands.* The water quality issues identified relate to managing

the effects arising from point source, diffuse and cumulative discharges to the environment on freshwater resources. The activity is consistent with WQU OBJECTIVE 1, which is *to maintain and enhance surface water quality in Taranaki's rivers, streams, lakes and wetlands by avoiding, remedying or mitigating any adverse effects.*

Methods for avoiding, remedying and mitigating effects have bene presented in this report.

Section 7.1 relates to maintaining air quality in the region, and AQU OBJECTIVE 1
To maintain the existing high standard of ambient air quality in the Taranaki region, to improve air quality in those instances or areas where air quality is adversely affected, and to avoid, remedy or mitigate adverse effects on people and the environment resulting from discharges to air.

Remediation (NZ) has demonstrated how they proposed to ensure effects on air quality are avoided, remedied or mitigated.

5.4 Waste Management and Minimisation Strategy Taranaki

Section 6 of the Waste Management and Minimisation Strategy specifically identifies the objective of minimising organic wastes to be disposed of. A 2010 survey identified that 29.8% of waste going to landfill was organic.

6.1 ISSUE: Quantities of organic waste requiring disposal

Issue 6.1 deals with reduction in volume of organic waste being disposed of within the Taranaki region and increase the quantity of solid waste being recycled and re-used or recovered. Composting and vermiculture utilises the recycling of organic matter and associated nutrients to produce a marketable biological fertiliser and soil conditioner.

Incorporated into discussion of this latter identified issue, is the recognition that many waste materials can be used as raw materials for producing other goods. Well operated compost and vermiculture production represents one such example of an environmentally sound method for reusing a waste stream as a valuable input for another production or manufacturing process. Thus, whilst the composting and vermiculture site provides an environmentally acceptable alternative waste disposal opportunity to many waste generators within the region, the reuse of these waste streams is aligned to waste stream reuse or recycling, rather than waste disposal.

To address the above described issues the policies and objectives are summated above with methods of implementation noted below.

6.2 Objective

'To minimise organic waste disposal of, in order to protect the environment and public from harm and to provide economic, social, cultural and environmental benefits'

Implementing wider adoption of the waste management hierarchy (based on reduce, reuse, recovery and recycling) necessitates promoting and encouraging of a range of environmentally sound and acceptable methods for the management of solid and liquid wastes.

With oil exploration being a major contributor to the Taranaki economy, the sustainable conversion of drilling cuttings and subsidiary fluids, promotes the above, and further develops the technology required to reuse a potential waste line. The inclusion of synthetic drilling muds requires this technology update to guarantee the appropriate disposal/conversion options, which are also a high priority within the companies directly involved with oil exploration.

For each of the above-described reasons, the applicant therefore considers the proposed activity is consistent with and enforces the policies and objectives of the Regional Policy Statement and the Waste Management and Minimisation Strategy for the Taranaki region.

5.5 Section 105 – Resource Management Act

Section 105 defines the power of the consent authority to grant a resource consent to various classes of activity. Once the class of activity has been established, section 105 governs whether a consent can, must or may be granted and sets out particular restrictions, which apply to the various classes of activity under the Act.

Under the Regional Fresh Water Plan for Taranaki (RFWP) the activity of application/discharge of exploration cuttings would be considered a discretionary activity. Under the RMA 1991, a discretionary activity means an activity which:

"(a) is provided for as a discretionary activity by a rule in a plan or proposed plan; and

(b) which is allowed only if a resource consent is obtained in respect of that activity; and

(c) which may have standards and terms specified in a plan or proposed plan; and

(d) in respect of which the consent authority may restrict the exercises of its discretion to those matters specified in a plan or proposed plan for that activity."

The RMA 1991, a permitted activity means an activity which:

"is allowed by a plan without a resource consent if it complies in all respects with any conditions (including any conditions in relation to any matter described in section 108 or section 220) specified in the plan".

The discharge of Stormwater into and onto land would be considered a controlled activity under the RMA 1991, a controlled activity means an activity which:

'(a) is provided for as a controlled activity by a rule in a plan or proposed plan; and

(b) complies with standards and terms specified in a plan or proposed plan for such activities; and

(c) is assessed according to matters the consent authority has reserved control over in the plan or proposed plan; and

(d) is allowed only if a resource consent is obtained in respect of the activity".

The 'effects' of the existing Uruti facility are discussed more fully in section 4 of this document. 'Effects' relevant to this application includes the discharge of drilling cuttings and combined fluids. The anticipated quality of the leachate and storm water from composting operations discharged to land are significantly less than that which could be expected to arise from treated aerobic sewage.

Minimisation of potential contaminants is a recognised priority as the resultant Vermicast fertiliser is required to, and constantly achieves, the stringent Biogro New Zealand and Agriquality New Zealand Organic standards.

5.6 Objectives & policies of the TRC Regional Fresh Water Plan

Under this plan the proposed activity of the application of drill cuttings liquid and compost leachate would be classified as a discretionary activity (Rule 44). Rule 44 states:

> *Discharge of contaminants onto or into land restricted by s15(1)(b) (where contaminants may reach water) and s15(1)(d) (where the discharge is from industrial or trade premised) of the Resource Management Act 1991 which is not expressly provided for in Rules 21-37 or which is provided for but does not meet the standards, term or conditions and any other discharge of contaminants to land which is provided for in Rules 21-37 but which does not meet the standards, terms or conditions of those rules (irrespective of whether the discharges are from industrial or trade premises or are likely to reach water).*

Specifically, it is relevant to mention the buffering organic material as a potential, however limited source, of nutrient leachate and how they relate to permitted and controlled activities. Whilst some of the performance standards for the permitted or controlled activities for discharges to land are not directly relevant to the application, those that can be considered relevant are in general easily complied with.

The discharge of leachate onto and into land would be classified a permitted activity (Rule 29). Rule 29 States:

> *Discharge of contaminants from industrial and trade premises onto or into land, excluding those provided for by Rules 22, 23 and 27.*

The potential leachate generated directly from the windrows is analysed in detail in section 4.1.2 table 3. As stated there is no direct discharge of any leachate contaminant into the surface water body and no bore well within 50m of any of the production sites. Additionally, there is no ponding or runoff of contaminant into a surface water, with any potential

minimal volumes being utilised on site via nutrient uptake/utilisation, and so meeting the required standards for Rule 25, a permitted activity.

The discharge of Stormwater onto and into land would be classified a controlled activity (Rule 24). Rule 24 States:

> *Discharge of Stormwater into or onto land or into water (excluding those wetlands listed in Appendix II) that is not provided for by Rules 25 – 27 and that does not come within or comply with the conditions of Rule 23.*

Details for management of stormwater are detailed in the AEE, again indicating no adverse effect on the environment. Remediation (NZ) Ltd will at all times adopt the best option to prevent any potential for environmental impact relating to discharge and control of storm water to any water body.

OBJ 6.2.1 of the RFWP is *to maintain and enhance the quality of the surface water resources of Taranaki by avoiding, remedying or mitigating the adverse effects of contaminants discharged to land and water from point-sources.*

POL6.2.2 Requires that *discharges of contaminants or water to land or water from point sources should:*

(a) be carried out in a way that avoids, remedies or mitigates significant adverse effects on aquatic ecosystems;

(b) maintain or enhance, after reasonable mixing, water quality of a standard that allows existing community use of that water for contact recreation, and water supply purposes, and maintains or enhances aquatic ecosystems;

(c) be of a quality that ensures that the size or location of the zone required for reasonable mixing does not have a significant adverse effect on community use of fresh water or the life supporting capacity of water and aquatic ecosystems.

OBJ 6.3.1 is *to maintain and enhance the quality of the surface water resources of Taranaki by avoiding, remedying or mitigating the adverse effects of contaminants discharged to water from diffuse sources.*

POL 6.3.1 states that *Land use practices which avoid, remedy or mitigate adverse effects on water quality will be encouraged and promoted including, (f) land management practices, including the discharge of contaminants to land, that avoid or reduce contamination of surface water.*

OBJ 6.3.2 is *To maintain and enhance the riparian margins of surface waterbodies in order to avoid, remedy, or mitigate the adverse effects of activities on water quality, and aquatic and instream habitat.*

The AEE provided has shown that the proposed activities are able to occur in a manner that is consistent with the relevant policies in the RFWP.

Assessment of the activity against the TRC policies for Tangata Whenua, their cultural relationships with land and water are described in the CIA in **Appendix 'S'**.

5.7 Regional Air Quality Plan for Taranaki

Under the proposed activity there is the potential to discharge contaminants into the air (namely odour and dust).

Rule 55 of the plan states that discharges to air that cannot comply with Rules 1-54 is a

Any discharge of contaminants to the air from any industrial or trade premises not listed in any other rule or where the activity is listed in a rule but the conditions for that rule cannot be met ***OR***
any discharge from production land, waste management processes, site development, earthworks, the application of soil conditioners, aquaculture or intensive farming processes where the activity is listed in a rule but the conditions for that rule cannot be met.

Details for the management of odour and dust are covered in the Uruti Site Practices Plan (Appendix 'D').

The Regional Air Quality plan for Taranaki (RAQP) has the following relevant policies.

Policy 1.2: Odour *Ensure that, (to the fullest extent practicable), any discharges to air of odorous contaminants do not cause odours beyond the boundary of the property of the discharger that are offensive or objectionable.*

Policy 1.3: Smoke, dust and other particulate matter *Ensure that any discharge to air of dust, smoke and other particulate matter beyond the boundary of the property, and on the electricity transmission network, does not occur at a volume, concentration, or rate or in a manner that causes or is likely to cause a hazardous, noxious, dangerous, offensive or objectionable effect, including the significant restriction of visibility or the soiling of property, to the extent that the restriction of visibility or the soiling of property causes or is likely to cause the above effects.*

The AEE presented shows that the proposed activities are consistent with these policies.

6 CONSULTATION

6.1 Identification of Interested Parties

Section 1(h) of the Fourth Schedule of the RMA, 1991 requires *"an identification of those persons interested in or affected by the proposal, the consultation undertaken, and any response to the views of those concerned".*

Remediation (NZ) Ltd has consulted with local Iwi-namely Ngati Mutunga and property neighbours.

Consultation with Ngati Mutunga commenced with a site visit and discussion on the 28th September 2017. RNZ consultants Kathryn Hooper and Colin Kay met Paul, Marlene and Anne-Marie on 18 April 2018 and 17 May 2018 to discuss progress with the consent application and the CIA. Ngati Mutunga representatives visited the site on 8 June 2018.

Meetings and discussion with all immediate neighbours commenced October 12th 2017. A copy of a letter given to all neighbours is attached –see **Appendix 'V'**.

At the time of submitting this application consultation was still underway.

7 SOCIAL AND ECONOMIC ANALYSIS and VALUE OF EXISTING INVESTMENT.

The Uruti site employs 3 full time staff, and a number of contractors as required.

To replace the site infrastructure today would cost in the vicinity of $3.5 to $5m dollars.

Over the years Remediation has invested significantly in the site and continues to work on enhancing the local ecosystem with riparian planting along the Haehanga Stream boundaries and the planting of Manuka.

8 SUMMARY

Remediation (NZ) has operated the Uruti facility for a number of years and continues to refine and develop their practices onsite.

The Uruti facility accepts approximately 30,000 tonnes of waste products per year which is converted into a soil conditioner and organic fertiliser. That equates to 480,000 tonnes over the last 16 years that would otherwise have been sent to landfills.

As previously discussed in section 5.4, the Uruti facility represents an example of an environmentally sound method for reusing a waste stream as a valuable input for another production process.

The extensive monitoring of the streams, ground water and soils have shown that the composting and vermiculture operation is having minimal impact on the environment.

In summary, this assessment of effects has demonstrated that with the mitigation measures and mitigating factors identified, the effects of the discharges for which consent is sought can be avoided remedied and mitigated to the extent where they are no more than minor and contained to within the site boundaries. Effects on adjoining properties are able to be avoided, remedied and mitigated to the extent that they are less than minor.

9 Appendices

Appendix 'A'-Copy of title and a property map.

Appendix 'B'- Existing Consents Held

Appendix 'C'- Uruti Waste Acceptance Plan

Appendix 'D'- Uruti Site Practices Plan

Appendix 'E' – Uruti Wetlands Treatment System Management Plan
-Stormwater Channels

Appendix 'F' – Uruti Leachate & Stormwater Management Plan
-Stormwater Channels
-Irrigation Block Management Plan
-Irrigation Model

Appendix 'G' – Uruti Release of Final Product Protocols

Appendix 'H' – Uruti Results of testing of final product
-Hill Laboratories Report No: 1963135

-Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand -
Ministry for the Environment – August 1999

Appendix 'I' – Haehanga Catchment Preliminary Groundwater Investigation - BTW company June 2015
-BTW company Report June 2015

Appendix 'J' – Uruti Composting Facility Management Plan – BTW company undated
-BTW company Report undated

Appendix K – Groundwater Soil & Stream Monitoring Plan

Appendix L – Landscaping Plan
-Riparian Planting Plan

Appendix M – Uruti Site Photo

Appendix N – Uruti Process Diagram

Appendix O – Drilling Mud Sample Results

Appendix 'Q' – Uruti Environmental & Safety Management Plan

Appendix 'R' – Remediation NZ Ltd Organic Composting Protocols

Appendix 'S' – Assessment of Cultural Effects

Appendix 'T' – Uruti Integrated Management System (IMS)

Appendix 'U'– Uruti Site Reinstatement (Exit) Plan

Appendix 'V'– Consultation Records

Appendix 'W'-Haehanga-Mimitangiatua confluence test results

Appendix 'X'-Sampling Data/Graphs
– Uruti Surface water sampling results
– Uruti Ground water sampling results
– Uruti Soil sampling results
– Fish Survey and Biomonitoring Report TRC Dec 2016
– Uruti Fish monitoring results
– Uruti Biomonitoring results