Remediation (NZ) Limited

URUTI CONSENT RENEWAL APPLICATION 2017

URUTI COMPOSTING & VERMICULTURE FACILITY

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Taranaki Regional Council

Assessment of Environmental Effects

for the discharge of organic material and associated leachate and stormwater to land/waterway/air in conjunction with the Composting and Vermiculture production processes

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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 in operation since December 2001and holds six separate consents with the Taranaki Regional Council, comprising of approximately 90 conditions.

1.2 Consents Required

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). This activity is deemed a discretionary activity. Remediation (NZ) Ltd therefore seeks from the Taranaki Regional Council a land discharge permit to allow for "*the discharge organic material and associated leachate and stormwater to land in conjunction with its composting and vermicast production processes*".

A discharge permit is also required "*to discharge emissions into the air (odour or dust) from composting operations*".

The potential and / or likely environmental impacts arising from composting and vermicutlure production are considered to be both well anticipated and understood. Environmental effects which are relevant to the consent 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 application by Remediation (NZ) Ltd to the Taranaki Regional Council is for the following discharge permit to land:

The 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.

And to discharge emissions into the air ie

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.

This assessment of environmental effects (AEE) 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. Section 88 of the Resource Management Act requires that the AEE supporting any consent application:

"Shall be in such detail as corresponds with the scale and significance of the actual or potential effects that the activity may have on the environment..."

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.

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

1.3 Report Scope

This report provides the supporting material for the resource consents application, in particular an Assessment of Environmental Effects 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

2.0 SITE DESCRIPTION

2.1 Location

The site is located on State Highway 3 (1450 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 Mimi 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

2.2 Climate

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 10.0 minute intervals (overlapping) typical for this site. The closest relevant meteorological station to the Uruti site is Kaka Road, Uruti (see table 1).

2.3 Hydrology / Hydrogeology

The pre-composting facility is bounded by a constructed drain / stream on the Northeast that discharges to a larger river to the northwest. The Haehanga stream is 10m at the closest point to the composting pad and this area is 3500m from the Mimi 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 12 (2 July 2015 BTW Company).

Ground water is close to ground level, 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 Mimi River.

Rainfall is measured and recorded daily from a weather station situated at the site. Information has also been recorded from the Kaka Road TRC site. The top thirteen rain events over the past 6 years is tabulated below.

Rainfall data from the NIWA High Intensity Rainfall System V3 has also been produced for the Uruti site. This data can be found in Table 2.

Table 1: 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

Table 2: 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

ainfall 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

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.

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

2.4 Soil

Based on information provided by BTW the soils in the area are classified as Orthic brown soils from the Whangamona 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.

3.0 PROPOSED OPERATION

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.

3.1 Site Layout

A map of the current site is attached-see Appendix 1.

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 our wetland system. The lower section of Pad 2 is used for worm beds. The drill mud/composting pad adjacent to the liquid settling/hydrocarbon separation ponds is now known as Pad 3.

The anticipated effects that are likely to arise are expected to be less to those of the existing operation as we extend the irrigation areas and maintain continual monitoring of the Wetland system. The natural existing surrounding environs inhibit any public visibility, and the closest neighbour is more than 2 kilometres away.

3.2 Pad Construction

All pads have been constructed of a 1 metre deep compacted layer of papa and bunded on the parameter to contain organic material and stormwater. Exclusion drains have also been cut to divert

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

stormwater from the surrounding catchments. These exclusion drains run eventually into the Haehanga Stream.

3.3 Organic Material Inputs and Capacity

The worm is efficient at degrading any form of organic matter. Through experience and efficient techniques Remediation (NZ) Ltd has focused on specific sources of organic material that have created problems of disposal. These materials, shredded green waste, semi digested grass from stock (paunch), stock yard solids and buffering materials such as sawdust have provided the bulk of the material the worms are fed.

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

Organic streams currently used in the composting process are:

(a) *Paunch grass* (semi-digested grass from the rumen of stock). Current volume 8,000 tonnes annually, source Riverlands Eltham.

(b) *Shredded Green waste material.* Current volume 7,000m3 annually. Source Waste Management and Lawn mowing contractors.

(c) *Chicken mortalities (broilers, end of lay birds and hatchery waste).*Current volume 1500 tonne annually. Source Tegel and Ross poultry.

(d) *Fish waste.* Current volume 150 tonnes annually. Source Egmont Seafoods and Ocean Pearl Fisheries.

(e) *Drilling Waste Solids.* Current volume 2,000 tonnes. Source GMP and Intergroup.

(f) *Drilling wastes liquid.* Current volume 3,000 m3. Sources GMP, Intergroup and Todd.

(g) *Sawdust.* Current volume 1,500 m3. Source Taranaki Sawmills.

(h) *Chicken Manure.* Current volume 1,000 tonnes. Source Tegal.

Organic waste streams potentially utilised by Remediation (NZ) Ltd short term include:

- *Pulp and paper* residue from the paper processing facilities.
- *Food scraps.*
- *Vegetable processing by-products.*

3.4 Composting Procedures

Pad 1-Organic

Pad 1 is 5,000 m3 in size, material received on this pad is blended with shredded greenwaste 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 mature. It is then screened and blended for use on the property.

Pad 2-Paunch

Pad 2 is 10,000 m3 in size. Paunch (partly digested grass from a cattle beasts 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.

Pad 3-Drilling Waste

Pad 3 is 5,000m2 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 the rowed up for composting, and finally it is processed through vermiculture. Liquid from this process passes through a series of ponds where any hydocarbons are separated (hydocarbons are skimmed off and removed from site), and is finally discharged (via a travelling irrigator) to one of the predefined irrigation areas (See BTW Mngt plan appendix 3).

4.0 CONTAMINATION MANAGEMENT

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.

4.1 Stormwater

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

The volume of runoff/Stormwater is dependent on the catchment size, moisture content of the site, runoff characteristic of the site and intensity of the rain. The majority of the contaminants contained in Stormwater 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.

4.1.1 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 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 0.7. Remediation (NZ) Ltd considers this coefficient to be a conservative runoff coefficient as the papa base provides a very high degree of impermeability.

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

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 325.8m3/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 5 year 10 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).

Pad 2 stormwater capacity

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 430m3/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 5 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 3 Stormwater Peak Flow Calculation

Stormwater Peak Flow and Volume Calculation, Revital Uruti Site

Pad 1 (Organic)	Run-off Coefficient, C=	0.7	impermeable surfaces,	
	2 year ARI, 60 min duration storm rainfall intensity, I=	28.8	mm/hr ie HIRDS v3 increased for climate change 2 degrees	
	Run-off Area, A=	0.8932	ha	
	Run-off flow Q=CIA=	0.0496	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	267.84	m3	pond volume required for Pad 1
	Run-off Coefficient, C=	0.7	impermeable surfaces,	
	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=	0.8932	ha	
	Run-off flow Q=CIA=	0.0746	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	402.84	m3	pond volume required for Pad 1
	Volume always available in settlement ponds is 1,000m3 therefore OK			
Pad 2 (Paunch)	Run-off Coefficient, C=	0.7	impermeable surfaces,	
	2 year ARI, 60 min duration storm rainfall intensity, I=	28.8	mm/hr ie HIRDS v3 increased for climate change 2 degrees	
	Run-off Area, A=	0.9534	ha	
	Run-off flow Q=CIA=	0.0529	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	285.66	m3	pond volume required for Pad 2
	Run-off Coefficient, C=	0.7	impermeable surfaces,	
	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=	0.9534	ha	
	Run-off flow Q=CIA=	0.0796	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	429.84	m3	pond volume required for Pad 2
	Volume always available in Pad 2 settlement pond is 1,000m3 therefore OK			
Pad 3 (Drill fluid) (Organic)	Run-off Coefficient, C=	0.7	impermeable surfaces,	
	2 year ARI, 60 min duration storm rainfall intensity, I=	28.8	mm/hr ie HIRDS v3 increased for climate change 2 degrees	
	Run-off Area, A=	0.4898	ha	
	Run-off flow Q=CIA=	0.0272	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	146.88	m3	pond volume required for Pad 3
	Volume available in irrigation settlement pond is 1,000m3 therefore OK			
	Run-off Coefficient, C=	0.7	impermeable surfaces,	
	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=	0.4898	ha	
	Run-off flow Q=CIA=	0.0409	m3/s	(from LMNO Engineering calc page www.LMNOeng.com)
	Equivalent volume required for duration time, V=1.5(Q) d	220.86	m3	pond volume required for Pad 3
	Volume available in settlement ponds is 1,000m3 therefore OK			

4.1.2 Discharge Characteristics

Pad 1 (Organic)

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 the site are likely to be either directly as a result of leachate from the composting material or Stormwater following a rain event.

Table 4 Stormwater discharge characteristics Pad 1

Analyte	Units	Remediation (NZ) Ltd sample	Dairy Shed pond #1	Diary shed pond #2
BOD5	gm^{-3}	200	90	83
NH^3	gm^{-3}	50	63	69
Temp	ºC	15	13.4	16.0
Conductivity	mSm^{-1}	13.8	178	171
Turbidity	NTU	7.5		

Table 4 is referenced from an actual sample from the runoff from Pad 1 and compares this to discharge characteristics from the average New Zealand dairy shed.

Pad 2 (Paunch)

The material to be pre composted on Pad 2 is Paunch only, and the stormwater and leachate is processed through our wetland system. Based on a pad size of 9,000m3 and using the equation in Table 3 the total volume of stormwater/leachate would be 430m3. The catchment pond on pad 2 has a capacity of 1,000m3.

Table 5 Stormwater discharge characteristics Pad 2

Analyyte	Units	Remediation sample	Dairy Shed pond # 1	Dairy Shed pond# 2
BOD5	gm3	180	90	83
NH3	gm3	5	63	69
Temp	oC	18	13.4	16
Conductivity	mSm-1		178	171
NH4-1	gm3	196		

Table 5 is referenced from an actual sample from the runoff from Pad 2 take by the TRC on the 2nd of October 2008 (see appendix 11) and compares this to discharge characteristics from the average New Zealand dairy shed.

Pad 3 (Drilling Mud/Organic)

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.

4.2 Option Assessment

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

4.2.1 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 need to be discharged.

4.2.2 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

4.2.3 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.

4.3 Stormwater Treatment Design

4.3.1 Assumptions

The following assumptions are made for appropriate design of the site and treatment method.

The maximum rainfall expected will not exceed 43mm/hr

Runoff coefficient of 0.70. This allows some retention by the composting pads.

Design of Site

Site layout is detailed in the Consent Compliance Management Plan. See appendix 'C'

Water Exclusion

For effective Stormwater treatment, it is essential to exclude water from outside the composting areas. The natural fall of the site being crowned will enable excess rainfall to divert in to the existing drains on both sides of the composting pad. Bunding has also been placed around the composting pads to promote this diversion and exclude water from the outside and confine stormwater within the composting areas.

4.4 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 also 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.

4.4.1 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.

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 section 5. The design, management and operational practices utilised at the Uruti Site are detail in the Consent Compliance Management Plan and can be found in appendix 3. Methods employed by Remediation (NZ) Ltd (including contingency measures) to further mitigate any potential effects that may arise are also discussed in this report.

4.4.2 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.

4.4.3 Objectives and policies of the Regional Policy Statement

Part B section 12 of the Regional Policy Statement for the Taranaki Region sets out the objective 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 meting the objective of waste minimisation and control.

4.4.4 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 Taranakif region.

4.4.4 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, 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 discharge of leachate into land would be considered a permitted activity under

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.

4.4.5 Objectives & policies of the TRC Region 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 table3. 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 storm water are detailed in section 5.0, 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.

4.4 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 Compliance Management Plan (Appendix 3)

5.0 ASSESSMENT OF ENVIRONMENTAL EFFECTS

5.1 Receiving Environment

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.

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 under the premise that no objectionable odours or objectionable depositions of dust will occur at or beyond the property boundary.

5.1.1 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.

Remediation (NZ) Ltd believes any potential contaminant issue and receptor pathway is the effects of nutrient contamination of Stormwater. Contamination of shallow groundwater directly beneath the site is not considered to be of concern due to the site structure, layout and distance from waterways, as previously discussed.

5.2 Effects on Surface Water Quality

Pad 1 (organic) and Pad 3 Drilling Mud ponds

Stormwater leaving this catchment area is to be channelled and directed to a single discharge point. This potentially results in a more concentrated discharge compared to no-point source discharges, and it allows for the potential discharge water to be treated prior to discharge as has been proposed using the settling pond, irrigation and wetland systems.

The calculated flow rate of water leaving the catchment area is approximately 184L/s. This is a very conservative value and will only be observed in 1 in 5 year 10 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.

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 (4,000m3 capacity) it can be irrigated to a land area of 6 hectares.

Pad 2

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 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 1,000m3 capacity pond before discharge to an un-named tributary of the Haehanga Stream.

5.3 Effects on Groundwater Quality

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 up to 99% of organic material (i.e. BOD), especially suspended organic material. Other nutrient that may be potential contaminates 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.

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.

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 Uruti Consent Compliance Management Plan. 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 new irrigation areas are under construction. Once the new irrigation areas are commissioned remediation of the existing areas will be undertaken. The BTW study can be found Appendix 'H'.

5.4 Wetland Discharge

Discharge from the wetland is carried out immediately following heavy rain-events. It is anticipated that during low intensity rain there will be little or no discharge from the final pond.

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 down stream 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.

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

5.5 Summation 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 10,310m3, the volume resulting from 17mm of rainfall over the composting area is 135m3
- 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.

`5.6 Odour

Whilst 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 metres from the proposed operation and approximately 3500m 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 'F'- Remediation (NZ) Ltd Organic Composting Protocols).

5.7 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 proposed 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 manure in 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[2].

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.

5.8 Stream Monitoring

Fish surveys of the Haehanga Stream have been undertaken on an annual basis by the TRC. 'Fish Survey of the Haehanga Stream in relation to discharges from the Remediation (NZ) Ltd composting site at Uruti, Dec 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 similar report has been completed for biomonitoring with this reporting stating there had been an improvement compared to previous years, and that the community was in average health.

Both the Fish and Biomonitoring Survey are attached as Appendix 'L'

5.9 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."*

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[2] [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.

5.9.1 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.

5.9.2 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.

6.0 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.

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

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

7.0 MITIGATION OF EFFECTS

7.1 General

Section 1(g) of the Fourth Schedule of the RMA, 1991 requires a description of the mitigation measures that will be undertaken to help prevent or reduce actual or potential effects.

Mitigation measures associated with the proposal are identified as including:

- The selection of a remotely located site.
- Imposing limits on the raw materials.
- Contingency planning measures.
- A management plan prepared and adhered to.

Each of these mitigation measures is now discussed further below.

7.1.1 Remote Location

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

7.1.2 Imposing Limits on Raw Materials

The input of raw material is currently controlled in consent conditions. The current inputs are detailed in 3.3 of this document

7.1.3 Contingency Planning

RNZ has prepared a contingency plan should any spillage to waterways occur (see Appendix 'E' –Environmental/Safety Management Plan Interface).

7.1.4 Management Plan

A Uruti Site Compliance Management Plan has been prepared. This plan is reviewed annually. A copy of the plan is attached-see Appendix 'D'. Sitting as part of this plan is the Environmental/Safety Management Plan Interface procedure which specifically details spill response methodology (see Appendix 'E').

7.2 Stormwater

Minimising the potential for leachate and stormwater effects will be achieved by utilising a combination of the interception drains, capacity of the settling ponds, irrigation systems, attenuation action, wetlands and biological treatment.

The Haehanga stream is fenced and riparian planting completed to enhance water quality and increase and diversity of the stream flora/fauna at the site.

7.3 Odour

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 immediate 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 in New Plymouth 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.

The procedures above are further developed on in the Site Compliance Management Plan (see Appendix 'C'-Uruti Site Compliance Management Plan).

Appendices

Appendix 'A'-Site Drawings/copy of Title

Appendix 'B'- Existing Consents Held

Appendix 'C'-Uruti Site Compliance Management Plan

Appendix 'D'-Uruti Composting Facility Review and Plan (BTW Ltd) 26/11/2017

Appendix 'E'-Uruti Environmental/Safety Management Plan Interface (P-751-20-D)

Appendix 'F'-Remediation (NZ) Ltd Organic Composting Protocols

Appendix 'G'-Uruti Wetland Management System

Appendix 'H'-Haehanga Catchment-Preliminary Groundwater Investigation (BTW Ltd)

Appendix 'I'-URS Summary of Bio-aerosol Issues

Appendix 'J'-Consultation Records

Appendix 'K'-Copy of Resource Consent Application Forms

Appendix 'L'-Fish Survey and Biomonitoring Report TRC Dec 2016

Append 'L' TRC Report.