URUTI COMPOSTING & VERMICULTURE FACILITY

Groundwater Soil & Stream Monitoring Plan

Document No:RU-P-650-0600-A

Revision No: 1.3

Date: 27 September 2018

Version Control

Version	Date	Description	Prepared	Reviewed	Approved
V1.0	30-5-2018	Draft for review	C Kay		
V1.1	26-7-2018	Draft for review	C Kay		
V1.2	3-9-2018	Draft for review	C Kay		
V1.3	27-9-18	Draft for review	C Kay		

Table of Content

0.0 Terms and Definitions

xxx	yyy

1.0 Purpose of the Plan

The purpose of this plan is to provide the methodology and procedures to ensure the monitoring of the environment of the Uruti site is accurate, carried out in a timely manner, and provides assurance that the site is operated within consent conditions

2.0 General

Resource consent 5838-2.2 requires regular sampling of soil, ground water and surface water and the sampling results are to be forwarded to the TRC.

Sampling results are collated, and the sampling results documents are updated.

3.0 Groundwater

3.1 Resource Consent Conditions

Condition 14

Refer to Groundwater Soil & Stream Monitoring Plan

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

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

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

Condition 16 Any new groundwater monitoring wells required by condition 14 shall be installed to the following standards;

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

Condition 17 The consent holder shall undertake weekly groundwater level, temperature,

and conductivity readings from each well within a single eight-hour period using a method approved of by the TRC. Results shall be recorded in a cumulative spread sheet, a copy shall be forwarded to Council every three months, or upon request.

Condition 18 Groundwater samples shall be collected from all monitoring wells required under condition 14 at intervals not exceeding 6 months by a suitably qualified person and analysed for; total petroleum hydrocarbons, benzene, toluene, ethylene, xylene, lead and arsenic.

Condition 19 Groundwater samples shall be collected from all monitoring wells required under condition 14 at intervals not exceeding 3 months by a suitably qualified person and analysed for; chloride, sodium, magnesium, total soluble salts and conductivity

3.2 Ground water Sampling Plan

3.2.1 Quality Assurance

- Personnel collecting samples will be familiar with the sampling plan and have been certified as competent to collect samples by the QA Manger/Site Manager
- A list of certified samplers will be held by the QA Manager/Site Manager

3.2.2 Health and Safety

- Personnel collecting samples will be familiar with the Uruti Site Health & Safety Plan and are required to carry out procedures in the plan while carrying out the sampling
- Wear Hi vis vest during sampling
- Assure secure footing when sampling on slopes or near water

3.2.3 Equipment

- Sample containers supplied by the Laboratory
- Chain of custody form supplied by the Laboratory
- Water proof pen
- Field note book
- Sampling probe
- Recording Sheet

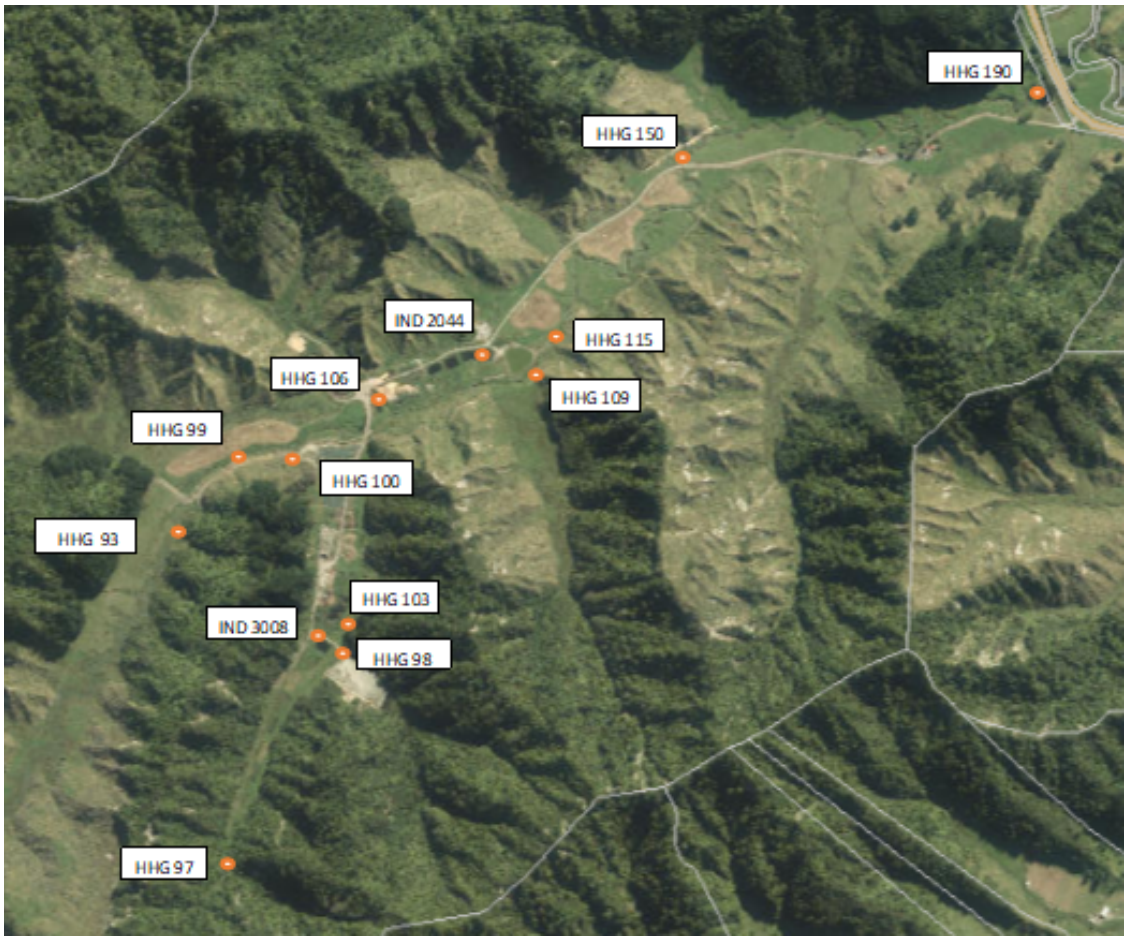
3.2.4 Method

3.2.4.1 Sampling Locations

The locations of the monitoring bores are listed in RU-D-650-0601-A

Groundwater Monitoring Sites

GND 3010	Above Irrigation area F
GND2188	Above Irrigation area G (old control)
GND2189	Below Irrigation area G (old Upper)
GND 3009	Above Irrigation area H
GND2190	Beside Irrigation area J (old Lower)
GNC 3008	Below Irrigation area E
GND 3007	Paddock next to State Highway 3



3.2.1.2 Timing & Frequency of sampling

Weekly – Hand held probe

- Groundwater level
- Temperature
- Chloride
- Conductivity
- pH

Monthly – Hand held probe

- NH_4
- NH_3
- NNN
- Total dissolved solids

3 – Monthly – Sampling carried out by TRC

- Chloride
- Sodium
- Magnesium
- Calcium
- Total soluble salts
- Conductivity

6 – Monthly – Sampling carried out by TRC

- Total petroleum hydrocarbons
- Benzene
- Toluene
- Xylene
- Lead
- Arsenic

3.2.1.3 Preparation

- Acquire sample containers from the Laboratory
  - Only if sample is to be sent to Laboratory for analysis
- Mark or attach labels to the containers
- Make an entry into the field note book
  - Location
  - Date
  - Time

3.2.1.4 Field sampling

- Remove the bore cap
- Secure the end of the sampling probe rope around wrist
- Drop the sampling probe down the bore into the ground water
- Jerk the probe up and down 5 times
- Lift the sampling probe out of the bore and rinse the sampling beaker
- Again, drop the probe down the bore and jerk the probe up and down 5 times
- Remove the probe from the bore and fill the sample beaker with the water collected in the probe
- Take sample measurements using the hand-held probe and record values
- Note any unusual conditions

3.2.1.5 Transport to Laboratory

Only applicable if samples are to be sent to the Laboratory

3.2.1.6 Reporting

- When sampling has been completed, transfer values into Formatted Spreadsheet held on the Uruti Site computer
- Forward results to GM - Operations

3.2.1.7

3.3 Monitoring Review and Actions

3.3.1 GM – Operations will review sampling results and action as required

3.3.2 s

4.0 Soils

4.1 Resource Consent Conditions

Condition 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.

Condition 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.

4.2 Soils sampling Plan

4.2.1 Quality Assurance

- Personnel collecting samples will be familiar with the sampling plan and have been certified as competent to collect samples by the QA Manger/Site Manager
- A list of certified samplers will be held by the QA Manager/Site Manager

4.2.2 Health and Safety

- Personnel collecting samples will be familiar with the Uruti Site Health & Safety Plan and are required to carry out procedures in the plan while carrying out the sampling
- Wear Hi vis vest during sampling
- Assure secure footing when sampling on slopes or near water

4.2.3 Equipment

- Sample containers supplied by the Laboratory (for external analysis)
- Soil auger
- Chain of custody form supplied by the Laboratory
- Water proof pen
- Field note book

4.2.4 Method

4.2.4.1 Sampling Locations

The locations of the monitoring sites in the irrigation areas are listed in Appendix ‘B’

4.2.1.2 Timing & Frequency of sampling

3 – Monthly – <u>Sampling carried out by TRC</u>

- Chloride
- Sodium
- Magnesium
- Calcium
- Potassium
- NH4
- NNN
- pH
- Total soluble salts
- Conductivity
- SAR

6 – Monthly – <u>Sampling carried out by TRC</u>

- Total petroleum hydrocarbons
- Benzene
- Toluene
- Xylene
- Lead
- Arsenic

4.2.1.3 Preparation

- Acquire sample containers from the Laboratory
- Mark or attach labels to the containers
- Make an entry into the field note book
    - Location
    - Date
    - Time

4.2.1.4 Field sampling

- Identify the sampling locations
- Soil auger
- Place the bottle into the courier bag provided by the Laboratory
- Complete Chain of Custody form
- Record present and previous weather conditions
- Photograph and note location of each sample collected. Note any unusual conditions

4.2.1.5 Transport to Laboratory

- Assure the Laboratory address is clearly written on the courier pack
- Deliver courier pack to the courier depot

4.2.1.6 Reporting

4.2.1.7

4.3 Monitoring Review and Actions

3.3.1 GM – Operations will review sampling results and action as required

3.3.2 s

5.0 Surface water

5.1 Resource Consent Conditions

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

a) A rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm-3,
b) A level of unionised ammonia greater than 0.0025 gm-3,
c) An increase in total recoverable hydrocarbons;
d) Chloride levels greater than 150g/m3
e) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
f) Any conspicuous change in the colour visual clarity;
g) Any emissions of objectionable odour;
h) The rendering of fresh water unsuitable for consumption by farm animals; and
i) Any significant adverse effects on aquatic life

5.2 Surface water Sampling Plan

5.2.1 Quality Assurance

- Personnel collecting samples will be familiar with the sampling plan and have been certified as competent to collect samples by the QA Manger/Site Manager
- A list of certified samplers will be held by the QA Manager/Site Manager

5.2.2 Health and Safety

- Personnel collecting samples will be familiar with the Uruti Site Health & Safety Plan and are required to carry out procedures in the plan while carrying out the sampling
- Wear Hi vis vest during sampling
- Assure secure footing when sampling on slopes or near water

5.2.3 Equipment

- Sample containers
- Water proof pen
- Field note book
- Measuring pole
- Recording Sheet

5.2.4 Method

5.2.4.1 Sampling Locations

The locations of surface water monitoring sites are listed in **Appendix 'C'**

Surface water Monitoring Sites:

HHG 093	Haehanga stream at culvert above irrigation area G
HHG 097	Above the Wetland on the Wetland tributary
HHG 098	Dam tributary before the junction with the Wetland tributary
HHG 099	Southern tributary before junction with Haehanga stream
HHG 100	Up stream of the worm beds on the Haehanga Stream
HHG 103	Downstream of wetland discharge point on the Wetland tributary
HHG 106	Above Pad 3 (Mud pad) on the Pad1 tributary
HHG 109	Abeam the duck pond on Haehanga Stream
HHG 115	25 m downstream of last pond on Haehanga Stream (Duck pond)
HHG 150	30 m downstream of RNZ irrigation area on Haehanga Stream (Crossing)
HHG 190	50 m upstream of SH3 bridge on Haehanga Stream

Wetland discharge
IND 3008

Irrigation pond
IND2044

5.2.1.2 Timing & Frequency of sampling

Weekly – <u>hand held monitoring probe</u>

- Biochemical oxygen demand
- Chloride
- Conductivity
- pH
- Temperature
- Observe and record presence of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials
- Observe and record any conspicuous changes in the colour or visual clarity
- Observe and record any emission of objectional odour
- Stream water level height
- Stream Flow (Low – Medium - High)
-

Monthly – <u>Sample bottle couriered to Hill Laboratories</u>

- Unionised ammonia – NH_3
- Ammoniacal nitrogen – NH_4
- Nitrite/Nitrate Nitrogen - NNN

5.2.1.3 Preparation

- Make an entry into the field note book

- Location
- Date
- Time

5.2.1.4 Field sampling

- Identify the sampling locations
- Walk upstream to the sampling site so not to disturb the stream bed at the sampling location
- Place the probes into the water…….
- Record readings on Sample Sheet
- Record current and recent weather conditions and the stream water level height
- Photograph and note location of each sample collected. Note any unusual conditions

5.2.1.4 Transport to Laboratory

Only applicable if samples are to be sent to the Laboratory

5.2.1.5 Reporting

- When sampling has been completed, transfer values into Formatted Spreadsheet held on the Uruti Site computer
- Forward results to GM - Operations

5.2.1.6

5.3 Monitoring Review and Actions

3.3.1 GM – Operations will review sampling results and action as required

3.3.2 s

6.0

7.0 Uruti Site Rainfall

A weather station is located next to the weighbridge office.

Local weather data is collected every 30 minutes.

This data is collated by…. On a monthly basis, formatted and entered into the weather data collection sheet.

8.0 Haehanga Stream Flow

9.0 Fish Survey

9.1 Resource Consent Conditions

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

a) A rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm-3,
b) A level of unionised ammonia greater than 0.0025 gm-3,

c) An increase in total recoverable hydrocarbons;
d) Chloride levels greater than 150g/m3
e) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
f) Any conspicuous change in the colour visual clarity;
g) Any emissions of objectionable odour;
h) The rendering of fresh water unsuitable for consumption by farm animals; and
i) Any significant adverse effects on aquatic life.

9.2 Methodology

The Fish Survey is carried out by TRC annually

10.0 Biomonitoring

10.1 Resource Consent Conditions

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

a) A rise in filtered carbonaceous biochemical oxygen demand of more than 2.00 gm-3,
b) A level of unionised ammonia greater than 0.0025 gm-3,
c) An increase in total recoverable hydrocarbons;
d) Chloride levels greater than 150g/m3
e) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
f) Any conspicuous change in the colour visual clarity;
g) Any emissions of objectionable odour;
h) The rendering of fresh water unsuitable for consumption by farm animals; and
i) Any significant adverse effects on aquatic life.

10.2 Methodology

The Biomonitoring Survey is carried out by TRC annually

11.0 List of Associated Documents

RU-D-650-0601-A	Locations of Monitoring Bores
Ru-D-650-0602-A	Locations of Soil Monitoring Sites
RU-D-650-0603-A	Locations of Surface Monitoring Sites
RU-F-650-0604-A	Recording sheet – Ground Water
RU-F-650-0605-A	Recording Sheet – Surface Water
RU-SWPI-650-0607-A	Groundwater Sampling
RU-SWPI-650-0608-A	Soil Sampling
RU-SWPI-650-0609-A	Surface Water Monitoring
RU-F-650-0610-A	Sampling Limits
RU-F-650-0611-A	Uruti Rainfall

RU-F-650-0612-A	Haehanga Stream Flow
RU-F-650-0613-A	Uruti Irrigation Model
RU-HP-640-001-B	Uruti Health & Safety Manual
RU-HP-640-002-B	Working alone protocol