

Waste Remediation Service Ltd  
Waikaikai Landfarm  
Monitoring Programme  
Annual Report  
2018-2019

Technical Report 2019-70

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## Executive summary

Waste Remediation Services Ltd (the Company) operates a drilling waste landfarm (Waikaikai Landfarm) located off Lower Manutahi Road at Manutahi, South Taranaki, in the Mangaroa catchment.

This report for the period July 2018 to June 2019 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds one resource consent, which includes a total of 32 conditions setting out the requirements that the Company must satisfy. The consent allows the Company it to discharge drilling waste from hydrocarbon exploration and production activities from well sites and contaminated soil onto and into land via landfarming.

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

The Council's monitoring programme for the year under review included seven inspections, 16 water samples and two soil samples collected for physicochemical analysis.

The monitoring showed that no petroleum related impacts were observed across the groundwater monitoring network this period. Groundwater sampling indicated that the no consent defined conditional values were exceeded in terms of total dissolved salt/solid concentrations, although one well, GND2282 was close to the conditional limit.

Significant land farmable material was received by the facility in the 2018-2019 monitoring period. Notifications, analysis and the annual report were provided by the Company this period.

Soil samples of the recently landfarmed area of W1810 were assessed and the associated analysis indicated values to allow for surrender of this area if required. The area was observed to be developing good pasture cover which will continue to be assessed in the upcoming monitoring period. One area, W1911 is currently being landfarmed and will be assessed through soil samples and inspections in the upcoming monitoring period.

Storage pit integrity testing was undertaken by the consent holder this period. Operational damage to two storage liners was reported and mitigated through a new storage liner in one case, while in the second case, a storage pit was decommissioned.

During the year, the Company demonstrated a high level of environmental and administrative performance with the resource consent.

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

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

This report includes recommendations for the 2019-2020 year.



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# 1 Introduction

## 1.1 Compliance monitoring programme reports and the Resource Management Act 1991

### 1.1.1 Introduction

This report is for the period July 2018 to June 2019 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Waste Remediation Services Ltd here after referred to as (WRS) or (the Company). The Company operates a landfarm situated on Lower Manutahi Road at Manutahi, South Taranaki, in the Mangaroa catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consent held by the Company, that relate to the discharges of drilling waste within the Mangaroa catchment, under the practice known as landfarming.

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

### 1.1.2 Structure of this report

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

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

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

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

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

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

### 1.1.3 The Resource Management Act 1991 and monitoring

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

- a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
- b. physical effects on the locality, including landscape, amenity and visual effects;
- c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

- d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
- e. risks to the neighbourhood or environment.

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

#### 1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

##### Environmental Performance

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

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

For example:

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



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

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

### Administrative performance

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

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

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

**Poor:** Material failings to meet the administrative requirements of the resource consents. Significant

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

## 1.2 Process description

### Drilling waste

Waste drilling material is produced during well drilling for hydrocarbon exploration. The primary components of this waste are drilling fluids (muds) and rock cuttings. Drilling fluids are engineered to perform several crucial tasks in the drilling of a hydrocarbon well. These include: transporting cuttings from the drill bit to the well surface for disposal; controlling hydrostatic pressure in the well; supporting the sides of the hole and preventing the ingress of formation fluids; and lubricating and cooling the drill bit and drill pipe in the hole.

### Drilling fluids

Oil and gas wells may be drilled with either synthetic based mud (SBM) or water based mud (WBM). As the names suggest, these are fluids with either water (fresh or saline) or synthetic oil as a base material, to which further compounds are added to modify the physical characteristics of the mud (for example mud weight or viscosity). More than one type of fluid may be used to drill an individual well. In the past, oil based muds

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

(OBM) (diesel/crude oil based) have also been used. Their use has declined since the 1980s due to their ecotoxicity; they have been replaced by SBM. SBM use olefins, paraffins or esters as a base material. While this is technically still a form of oil based fluid, these fluids have been engineered to remove polycyclic aromatic hydrocarbons, reduce the potential for bioaccumulation, and accelerate biodegradation compared with OBM.

Common constituents of WBM and SBM include weighting agents, viscosifiers, thinners, lost circulation materials (LCM), pH control additives, dispersants, corrosion inhibitors, bactericides, filtrate reducers, flocculants and lubricants. Of these, the naturally occurring clay mineral barite (barium sulphate) is generally the most common additive. It is added to most drilling muds as a wetting and weighting agent.

Drilling fluids may be intentionally discharged in bulk for changes to the drilling fluid programme or at the completion of drilling. Depending on operational requirements and fluid type and properties, fluids may be re-used in multiple wells.

### Cuttings

Cuttings are produced as the drill bit penetrates the underlying geological formations. They are brought to the surface in the drilling fluid where they pass over a shaker screen that separates the cuttings and drilling fluids. The drilling fluids are recycled for reuse within the drilling process, but small quantities of drilling fluids remain adhered to the cuttings. The cuttings and smaller particle material from the drill fluid treatment units drain into sumps. If sumps cannot be constructed corrals or special bins are used. During drilling this material is the only continuous discharge.

### Landfarming

The landfarming process has typically been used in the Taranaki region to assist the ultimate conversion of sandy coastal sites prone to erosion into productive pasture. Results of an independent research project conducted by AgKnowledge Ltd (2013) have indicated that the re-contoured sand dunes, after the inclusion of the drilling wastes (as per the consents), and with the addition of appropriate fertilisers and water (irrigation) are capable of producing high quality clover-based pastures and thus increasing the value of the land from about \$3-4,000/ha to \$30-40,000/ha (2013).

Landfarming uses natural and assisted bioremediation to reduce the concentration of petroleum compounds through degradation. The basic steps in the landfarming process are:

1. Drilling waste is transported from wellsites by truck (cuttings) or tanker (liquids). It may be discharged directly to land or placed in a dedicated storage pit.
2. The required area is prepared by scraping back and stockpiling existing pasture/topsoil and levelling out uneven ground.
3. Waste is transferred to the prepared area by excavator and truck and spread out with a bulldozer. Liquids may be discharged by tanker or a spray system.
4. Waste is allowed to dry sufficiently before being tilled into the soil to the required depth with a tractor and discs.
5. The disposal area is levelled with chains or harrows.
6. Stockpiled or brought in topsoil/clay is applied to aid stability and assist in grass establishment.
7. Fertiliser may be applied and the area is sown in crop or pasture at a suitable time of year.

The landfarming process utilised at the Waikaikai Landfarm site was initially undertaken on a single application basis. This means dedicated spreading areas receive only single applications of waste. When disposal is complete, the area will be reinstated and monitored until consent surrender criteria have been met.

In a previous monitoring period the consent was varied to allow for the re-application of impacted soils to an area which was initially utilised for landfarming in 2012. The consent holder undertook analysis to quantify the concentrations of specific parameters in the soil which stipulated the area of land was within surrender criteria. Thus the decision was undertaken to allow for the second application of material.

More recently the consent holder requested the surrender of the areas of site which had been re-utilised for the landfarming and as a result of the request additional soil sampling was undertaken by the Council.

### 1.3 Site location and description

The Company operates a drilling waste landfarm off Manutahi Road, Manutahi. The site is owned by P. F. and K. M. Wards, trading under the name Waikaikai Farms Ltd. The predominant land use was previously dairy farming. The site location is detailed in Figure 1. The predominant soil type has been identified as black loamy sand and vegetation growth consists mostly of pasture. Test pitting and the logging of boreholes on site indicated a relatively shallow water table. Test bores were augured to 10 m both around the waste holding pit area and to the south-western site boundary, revealing alternating layers of sand and clays. Bore construction also revealed localised peat layers within some augured cores (approximately 4–8 m below surface). Average annual rainfall for the site is 1,043 mm (taken from the nearby Patea monitoring station).

Origin Energy Ltd's Kauri D wellsite is situated in the eastern corner of the site, and there is a small coastal lake inland and to the northeast (up gradient) of the storage pit area. Both of these features are presented in Figure 1.



Figure 1 WRS Waikaikai Landfarm and regional insert

A summary of the site data is provided below:

Site data:	Waikaikai Landfarm
Location	
Word descriptor:	Lower Manutahi Road, Manutahi, Taranaki
Map reference:	E 1719720
(NZTM)	N 5605515
Mean annual rainfall:	1,043 m
Mean annual soil temperature:	15.1°C
Mean annual soil moisture:	32.9%
Elevation:	~45 m
Geomorphic position:	Dune back slope
Erosion / deposition:	Erosion
Vegetation:	Pasture, dune grasses
Parent material:	Aeolian/alluvial deposits
Drainage class:	Free/well-draining

## 1.4 Resource consents

The Company holds one resource consent, the details of which are summarised in the table below. Summaries of the conditions attached to the permit are set out in Section 3 of this report.

A copy of the consent issued by the Council is included Appendix I.

Table 1 Consent held by the Company

Consent number	Purpose	Granted	Review	Expires
<i>Discharges of waste to land</i>				
<b>5956-2.0</b>	To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites and contaminated soil onto and into land via landfarming	2017	2020	2034

## 1.5 Monitoring programme

### 1.5.1 Introduction

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

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

The monitoring programme for the Waikaikai site consisted of four primary components.

### 1.5.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements;

- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

### 1.5.3 Site inspections

The Waikaikai site was inspected on seven occasions during the monitoring period. Additional visits were also undertaken during compliance monitoring rounds. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### 1.5.4 Chemical sampling

#### Compliance Monitoring

Samples of soil and groundwater are collected annually to enable the Council to monitor the state of the landfarming process and the remediation programme with respect to possible surrender sampling.

Soil sampling is undertaken to monitor the quality of the landfarming in the first instance. It also serves as a marker for the degree of remediation achieved in the landfarming process at the time of sample collection.

The methodology utilised by the Council for collecting soil samples across the landfarmed area is adapted from the Guidelines for the Safe Application of Biosolids to land in New Zealand (2003).

To collect the sample, a soil corer is inserted to a depth of 400 mm +/- to encompass the zone of application. Ten soil cores are collected, spaced 10 meters apart. These ten soil cores are then composited to gain one representative soil sample of an application area. An example of an extracted soil core is provided in Photo 1.



Photo 1 An example of an extracted soil core



### Soil analysis parameters

- Total heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc);
- Calcium, chloride, conductivity, magnesium, potassium, sodium , total soluble salts and sodium adsorption ratio (SAR);
- Total petroleum hydrocarbons: C<sub>7</sub>-C<sub>9</sub>, C<sub>10</sub>-C<sub>14</sub>, C<sub>15</sub>-C<sub>36</sub> and C<sub>7</sub>-C<sub>36</sub>, poly-cyclic aromatic hydrocarbons and mono-cyclic aromatic hydrocarbons ; and
- Moisture factor, ammoniacal nitrogen and nitrate/nitrite nitrogen.

### Groundwater monitoring

Groundwater monitoring is also undertaken at this landfarm. The facility, as required by consent, contains an active groundwater monitoring network which is comprised of five groundwater monitoring wells.

Three of the five wells were sampled four times this monitoring year to account for seasonal fluctuation and to assess for any adverse effects resulting from the exercise of the consent. The remaining two wells were sampled on two occasions. The results are presented in Section 2.2.

The sampling was conducted through a peristaltic pump and field parameters are captured via a YSi flow through cell and a multi parameter probe. The samples are collected once field parameters have been stable within 8 % for three consecutive readings.

### Groundwater analysis parameters

- Barium (dissolved and acid soluble), chloride, conductivity (@ 25°C), sodium, total dissolved salts (TDS), pH; and
- Benzene, ethylbenzene, total petroleum hydrocarbons (speciated), toluene, meta-xylene, ortho-xylene.
- In-situ readings: pH, conductivity, dissolved oxygen (DO), oxidation and reduction potential (ORP) and temperature.

### 1.5.5 Review of consent holder data

In accordance with conditions 11 and 12 of the consent, the Company must provide the Council with an annual report. This report contains information relating to the receipt, handling, storage and disposal of wastes.

The annual report was provided by the consent holder for this period, it is attached in Appendix II.

## 2 Results

### 2.1 Inspections

#### 06 July 2018

During an inspection the following was observed. No objectionable odours or visible emissions were found during the inspection. The observed lined pits contained drilling wastes. At the time contractors were on-site emptying drilling muds from pit 1. On observation pit 2 appeared to contain liquid only with some surface crude oil noticeable. Both liners appeared in good state of repair.

A recent spreading had muds applied. This was stockpiled at the northern end of the current spreading area and was awaiting spreading. The historic application areas were then inspected. It was noted that the pasture cover was complete and all pasture appeared healthy. No muds were identified at the surface of the historical spreading areas.

#### 13 August 2018

During an inspection the following was observed. No objectionable odours or visible emissions were found during the inspection. No recent mud deliveries appeared to have occurred. The stormwater component of pit 2 had been recently applied to the current spreading area. At the southern extent of the recently bunded area, some ponded mud/water was present at the bund wall.

On observation some works had been undertaken to incorporate the muds which were observed in the previous inspection. The stockpiled topsoil was noted to appear stable. The storage pits were maintained below their capacity and the liners appeared in good state of repair. On observation crude and surface hydrocarbons were present in both storage pits. Some vegetation die-off was noted around the pit fringes due to the evaporating hydrocarbons.

#### 22 November 2018

During an inspection the following was observed. No objectionable odours or visible emissions were found during the inspection. The recent spreading area had been worked and pasture had been sown. The strike looked good across all areas with no mud identified at the surface. The historic spreading areas contained complete pasture cover which appeared healthy.

The pit liners appeared in good state of repair. At the time, one pit contained a red liquid while the second pit, which was partially emptied during the most recent spreading campaign, contained mainly muds. There were visible crude/hydrocarbons present in the pit.

#### 26 February 2019

During an inspection the following was observed. The inspection found that the historic spreading areas had good pasture cover which appeared healthy, no muds were identified at the surface. The storage pits were found to contain product. The associated pits liners appeared in good repair state of repair and storage capacity was available within the pits.

A drop test was being undertaken on one of the pits, but had to be abandoned due to product deliveries occurring. A new storage pit was being dug and a synthetic liner had been sourced.

A meeting was being held with contractors to assess the new area where disposal was to occur. It was discussed that the earth was to be contoured in the south west of the site, prior to having muds applied in the near future. No incidents were reported.

### 08 April 2019

During an inspection the following was observed. A new lined pit had been finished at the storage area, the pit was approximately 45 meters long by 15 meters wide. The liner was observed to be in good condition. At the time no muds had been introduced. The other two lined pits were quite full but had available capacity to cope with likely stormwater inputs. These liners appeared in good repair.

The recent landspreading area was inspected and found to be satisfactory. The muds were remaining within the designated area. The topsoil had been scraped to form a bund wall around the area. On observation the paddock appeared essentially level, though works were yet to occur to incorporate the muds.

The historic spreading areas were found to have complete pasture cover which appeared healthy.

### 06 May 2019

During an inspection the following was observed. No objectionable odours or visible emissions were found. The southern pit in the storage area was full, on observation there were very little surface hydrocarbons present. The eastern pit had been emptied onto the current spreading area and the liner had been removed. At the time a new liner was onsite awaiting installation.

The northern pit was yet to have any muds introduced. The spreading area was then inspected. There were muds noted to be drying out in this area and these broke apart easily in places. There were no ponded liquids present in this area. The historic spreading areas had good pasture cover which appeared healthy. No muds were identified at the site surface. No incidents were reported.

### 14 June 2019

During an inspection the following was observed. No objectionable odours or visible emissions were found during the inspection. The new pit liner had been installed and muds had been introduced. The southern pit had been lowered. It was outlined by the site management that the liner integrity is to be investigated and may need to be renewed. The northern lined pit was yet to have mud introduced.

The previous spreading area was yet to have works undertaken to incorporate the muds. A new area adjacent to the previous spreading area had been worked (approx. 3Ha). Muds had been applied, though there was no evidence of run-off beyond the spreading area. The previous spreading areas had good pasture cover which appeared healthy. There were no muds found at the surface.

## 2.2 Groundwater sampling

The Waikaikai Landfarm contains five purpose built groundwater monitoring wells. These wells, which were a consented obligation, are situated in two locations (Figure 2). Three wells are located down gradient from the lined storage cells (GND2290, 2291 and 2293). The intention of these wells is to assess the groundwater in the immediate vicinity of the storage cells. The remaining two wells (GND2294 and 2294) are situated on the south western boundary of the landfarm to assess for any potential of offsite contaminant migration.

In this monitoring period the monitoring wells situated in close proximity to the storage cells were monitored on four occasions to account for seasonal variation. The additional two monitoring wells situated to the south west of the storage cells were monitored on two occasions.

The rationale for the limited monitoring of these two monitoring wells was specifically related to surrounding landfarmed areas, which were recently found (2016-2017 monitoring period Technical Report 2017-41) to be compliant with the surrender soil condition. In the upcoming monitoring period the analysis will be expanded to all five monitoring wells quarterly, as landfarming has been recently undertaken in this area.

The results of the groundwater monitoring of Waikaikai Landfarm is provided in the following Tables 2-6.





Figure 2 WRS Waikaikai Landfarm groundwater monitoring well locations

Table 2 GND2290 2018-2019 monitoring period

	Site	GND2290	GND2290	GND2290	GND2290
Parameter	Unit/Date	11 Sep 2018	06 Nov 2018	30 Jan 2019	23 Apr 2019
Sample Temperature	°C	14.9	14.6	17.3	16.5
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	0.045	0.04	0.045	0.073
Electrical Conductivity (EC) 25°C	mS/m	48.1	39.8	45.9	59.9
pH	pH Units	6.6	6.9	6.8	6.6
Chloride	g/m <sup>3</sup>	60	23	23	40
Total Sodium	g/m <sup>3</sup>	27	24	25	29
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	320	280	320	480
C <sub>7</sub> -C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06	< 0.06	< 0.06
C <sub>10</sub> -C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2	< 0.2	< 0.2
C <sub>15</sub> -C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> -C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010

Table 3 GND2291 2018-2019 monitoring period

	Site	GND2291	GND2291	GND2291	GND2291
Parameter	Unit/Date	11 Sep 2018	06 Nov 2018	30 Jan 2019	23 Apr 2019
Sample Temperature	°C	15.5	15.9	16.9	16.1
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	0.013	0.012	0.011	0.011
Electrical Conductivity (EC) 25°C	mS/m	144.5	106.7	121.8	119.5
pH	pH Units	6.3	6.5	6.3	6.3
Chloride	g/m <sup>3</sup>	310	172	240	200
Total Sodium	g/m <sup>3</sup>	68	59	62	65
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	1,090	620	930	950
C <sub>7</sub> -C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06	< 0.06	< 0.06
C <sub>10</sub> -C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2	< 0.2	< 0.2
C <sub>15</sub> -C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> -C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010

Table 4 GND2292 2018-2019 monitoring period

	Site	GND2292	GND2292	GND2292	GND2292
Parameter	Unit/Date	11 Sep 2018	06 Nov 2018	30 Jan 2019	23 Apr 2019
Sample Temperature	°C	15.3	16	17.3	16.2
Acid Soluble Barium	g/m <sup>3</sup>	0.23	0.31	0.17	0.39
Dissolved Barium	g/m <sup>3</sup>	0.22	0.32	0.155	0.38
Electrical Conductivity (EC) 25°C	mS/m	225	267	173.4	312
pH	pH Units	6.2	6.3	6.5	6.3
Chloride	g/m <sup>3</sup>	590	750	400	840
Total Sodium	g/m <sup>3</sup>	270	300	192	250
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	1,410	1,670	1,120	2,400
C <sub>7</sub> -C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06	< 0.06	< 0.06
C <sub>10</sub> -C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2	< 0.2	< 0.2
C <sub>15</sub> -C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> -C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010

Table 5 GND2293 2018-2019 monitoring period

	Site	GND2293	GND2293
Parameter	Unit/Date	11 Sep 2018	06 Nov 2018
Sample Temperature	°C	15.2	15.7
Acid Soluble Barium	g/m <sup>3</sup>	0.28	0.15
Dissolved Barium	g/m <sup>3</sup>	0.26	0.24
Electrical Conductivity (EC) 25°C	mS/m	157.2	83
pH	pH Units	6.8	7
Chloride	g/m <sup>3</sup>	410	189
Total Sodium	g/m <sup>3</sup>	85	49
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	1,100	470
C <sub>7</sub> -C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06
C <sub>10</sub> -C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2
C <sub>15</sub> -C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> -C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010

Table 6 GND2294 2018-2019 monitoring period

	Site	GND2294	GND2294
Parameter	Unit/Date	11 Sep 2018	06 Nov 2018
Sample Temperature	°C	14.9	15.8
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	< 0.005	< 0.005
Electrical Conductivity (EC) 25°C	mS/m	36	35.2
pH	pH Units	7.8	7.8
Chloride	g/m <sup>3</sup>	51	46
Total Sodium	g/m <sup>3</sup>	33	30
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	230	220
C <sub>7</sub> -C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06
C <sub>10</sub> -C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2
C <sub>15</sub> -C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> -C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010

The reported analysis of the Waikaikai Landfarm groundwater monitoring network indicated the following:

- No petroleum hydrocarbon related results were recorded above the laboratory defined limit of detection (LOD) for all chains (C<sub>7</sub>-C<sub>9</sub>, C<sub>10</sub>-C<sub>14</sub>, C<sub>15</sub>-C<sub>36</sub>), across all five monitoring wells this monitoring period.

- No benzene, toluene, ethylbenzene and xylenes (collectively known as BTEX) results were recorded above the laboratory limit of detection.
- Groundwater temperature ranged 14.9°C (GND2290 and GND2294 September 2018) to 17.3 °C (GND2290 and GND2292 January 2019).
- Acid soluble barium analysis indicated a range of values, from below the LOD (GND2290, GND2291 and GND2294) to 0.39 g/m<sup>3</sup> (GND2293 range 0.17-0.39 g/m<sup>3</sup>).
- Dissolved barium analysis indicated values in four of five wells. GND2294 did not return any values above the LOD on the two rounds undertaken. The remaining wells ranged from 0.011 g/m<sup>3</sup> (GND2291 range 0.011 g/m<sup>3</sup> to 0.013 g/m<sup>3</sup>), through to 0.38 g/m<sup>3</sup> (GND2292, range 0.17 g/m<sup>3</sup> to 0.38 g/m<sup>3</sup>).
- pH values of the groundwater ranged from 6.2 pH (GND2292) through to 7.8 pH (GND2294).
- Chloride values within the groundwater ranged from 23 g/m<sup>3</sup> (GND2290, range 23 to 40 g/m<sup>3</sup>), through to 840 g/m<sup>3</sup> (GND2292, range 400 to 840 g/m<sup>3</sup>).
- Sodium concentrations followed similar suit to the chloride, the lowest concentration reported was 24 g/m<sup>3</sup> (GND2290, range 24 to 29 g/m<sup>3</sup>) and the most elevated 300 g/m<sup>3</sup> (GND2292, ranged 192 to 300 g/m<sup>3</sup>).
- Total dissolved salt/solid concentrations ranged from 220 g/m<sup>3</sup> (GND2294, ranged 220 to 230g/m<sup>3</sup>) through to 2,400 g/m<sup>3</sup> (GND2292, range 1,410 to 2,400 g/m<sup>3</sup>). Noting that the elevated value of 2,400 g/m<sup>3</sup>, recorded in the April 2019 monitoring round at GND2292, was close to the conditional limit of TDS < 2,500 g/m<sup>3</sup> (consent 5956-2.0, condition 23).
- Groundwater electrical conductivity values followed a similar theme to the TDS results with the lower reading 35.2 mS/m (GND2294, ranged 35.2 to 36 mS/m) through to 312 mS/m (GND2292, ranged 173.4 to 312 mS/m).

## 2.3 Soil sampling

The Council collected two composite soil samples this monitoring period from the landfarmed location W1810 (Figure 3). This location was landfarmed between the 01/04/2018 and 31/10/2018. This area (W1810) constituted the second most recently landfarmed area at the Waikaikai Landfarm. The most recently landfarmed (W1911) is yet to be completed but will be assessed in the upcoming monitoring period.



Figure 3 Soil sample transects 2018-2019 monitoring period

The results of the two composite soil samples are provided in the following Table 7.

Table 7 WRS Waikaikai W1810 transect soil results 2018-2019

WRS Waikaikai soil sample W1810		Transect	Transect A	Transect B
Parameter	Unit/Date	Consent limit /date	25 Jun 2019	25 Jun 2019
Dry Matter (Env)	g/100g as rcvd		92	87
1-Methylnaphthalene	mg/kg dry wt		< 0.011	0.021
2-Methylnaphthalene	mg/kg dry wt		< 0.011	0.033
Acenaphthene	mg/kg dry wt		< 0.011	< 0.012
Acenaphthylene	mg/kg dry wt		< 0.011	< 0.012
Anthracene	mg/kg dry wt		< 0.011	< 0.012
Benzo[a]anthracene	mg/kg dry wt		< 0.011	0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.027	< 0.011	0.018
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt		< 0.03	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt		< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt		0.013	0.022
Benzo[e]pyrene	mg/kg dry wt		0.025	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt		< 0.011	< 0.012
Benzo[k]fluoranthene	mg/kg dry wt		< 0.011	< 0.012
Chrysene	mg/kg dry wt		< 0.011	< 0.012
Dibenzo[a,h]anthracene	mg/kg dry wt		< 0.011	< 0.012
Fluoranthene	mg/kg dry wt		< 0.011	0.017
Fluorene	mg/kg dry wt		< 0.011	0.017
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt		< 0.011	0.012
Naphthalene	mg/kg dry wt	7.2	< 0.06	< 0.06
Perylene	mg/kg dry wt		0.027	< 0.012
Phenanthrene	mg/kg dry wt		< 0.011	0.021
Pyrene	mg/kg dry wt	160	0.02	0.026
Total of Reported PAHs in Soil	mg/kg dry wt		< 0.3	< 0.3
Benzene	mg/kg dry wt	1.1	< 0.05	< 0.05
Toluene	mg/kg dry wt	82	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	59	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	59	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	59	< 0.05	< 0.05
C <sub>7</sub> -C <sub>9</sub>	mg/kg dry wt	210	< 8	< 8
C <sub>10</sub> -C <sub>14</sub>	mg/kg dry wt	150	< 20	< 20
C <sub>15</sub> -C <sub>36</sub>	mg/kg dry wt	1,300	480	175
Total hydrocarbons (C <sub>7</sub> -C <sub>36</sub> )	mg/kg dry wt		480	175
pH	pH Units		7.6	7.7
Chloride	mg/kg dry wt	700	18	183
Soluble Salts	g/100g dry wt	0.25	< 0.05	0.07
Conductivity from soluble salts	mS/cm		< 0.2	< 0.2
Total Recoverable Barium	mg/kg dry wt		370	250
Total Recoverable Calcium	mg/kg dry wt		4,800	4,900
Total Recoverable Potassium	mg/kg dry wt		490	550
Total Recoverable Magnesium	mg/kg dry wt		1,770	1,830
Total Recoverable Sodium	mg/kg dry wt	460	330	410

WRS Waikakai soil sample W1810		Transect	Transect A	Transect B
Parameter	Unit/Date	Consent limit /date	25 Jun 2019	25 Jun 2019
Sodium Absorption Ratio (SAR)		18	0.7	1.3
Total Recoverable Arsenic	mg/kg dry wt	17	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.8	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	600	12	13
Total Recoverable Copper	mg/kg dry wt	100	11	11
Total Recoverable Lead	mg/kg dry wt	160	2.5	6.7
Total Recoverable Mercury	mg/kg dry wt	1	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	60	6	6
Total Recoverable Zinc	mg/kg dry wt	300	47	58

The analysis of the two composite soil samples collected from landfarmed area W1810 indicated the following:

- Minimal polycyclic aromatic hydrocarbons (PAH) results were reported above the limit of detection (LOD) across the two transect samples. The reported results for PAH's were below the specific consent defined limits for surrender in the cases of the benzo (a) pyrene (0.027 mg/kg), naphthalene (7.2 mg/kg) and pyrene (160 mg/kg).
- Benzene, toluene, ethylbenzene and xylenes (m&p and O) (collectively known as BTEX) results were all below the LOD for all compounds tested.
- Petroleum hydrocarbon results indicated no results above the LOD for low or mid-range petroleum hydrocarbons, C<sub>7</sub>-C<sub>9</sub> and C<sub>10</sub>-C<sub>14</sub>.
  - Carbon chain C<sub>15</sub>-C<sub>36</sub> indicated low results in both transects (transect A, 480 mg/kg and transect B, 175 mg/kg), the limit for surrender is set at 1,300 mg/kg. These results were below that value.
- Soil pH indicated two values, 7.6 pH (transect A) and 7.7 pH (transect B).
- Soil chloride values were reported at 18 mg/kg (transect A) and 183 mg/kg (transect B), with the surrender concentration set at 700 mg/kg.
- Soluble salt values ranged from below the limit of detection in transect A, to 0.07 g/100g (this equates to 700 mg/kg). The surrender value is set at <2,500 mg/kg or <0.25 g/100g.
- Total recoverable (TR) barium ranged 250 to 370 mg/kg.
- TR calcium ranged 4,800 to 4,900 mg/kg.
- TR potassium ranged 490 to 550 mg/kg.
- TR magnesium ranged 1,770 to 1,830 mg/kg.
- TR sodium ranged 330 to 410 mg/kg.
- Sodium absorption ratio (SAR) values were well below the consent defined surrender criteria which is set at 18 SAR, with two values at low concentrations 0.7 and 1.3 SAR.
- Heavy metal analysis of the landfarmed area indicated the following:
  - TR arsenic results were both below the LOD.
  - TR cadmium results were also below the LOD in both samples.
  - TR chromium results indicated two values, 12 mg/kg (transect A) and 13 mg/kg (transect B). Noting the limit as defined by the consent (which should not be exceeded) is set at 600 mg/kg.
  - TR copper values were similarly low, with two values well below the consent defined limit, which is set at 100 mg/kg, both transect reported a value for copper of 11 mg/kg.
  - TR lead values were also well below the consent defined limit (160 mg/kg) with two values 2.5 mg/kg (transect A) and 6.7 mg/kg (transect B).



- TR mercury results were both below the LOD for this element, the LOD for this element was <0.10 mg/kg.
- TR nickel results were both reported at 6 mg/kg, with the consent defined limit set at 60 mg/kg.
- TR zinc results reported two values, 47 mg/kg (transect A) and 58 mg/kg (transect B). These results were below the consent defined limit of 300 mg/kg.

## 2.4 Provision of consent holder data

The Company provided an annual report as required by condition 12 of consent 5956-2.0. This report is appended in Appendix II of this report. This report contained consent required information including delivery information with respect to land farmable material quantities throughout the year.

The Company also provided e-mail notifications throughout the monitoring period to inform the Council of when material was to arrive, including requisite consent required analysis.

Material received in this monitoring period is defined in Table 8, with the landfarming locations presented in Table 9.

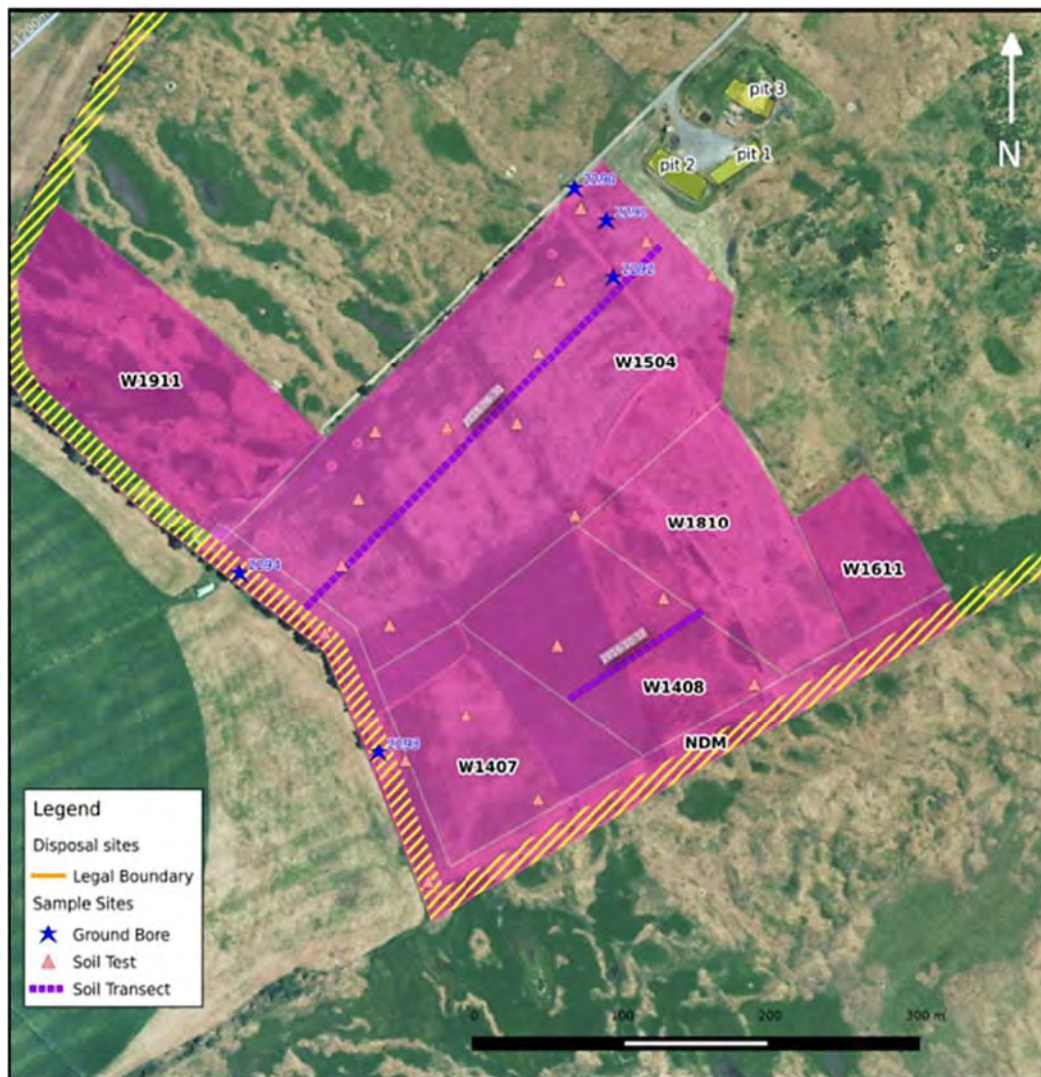
**Table 8 WRS Waikakai material delivery 2018-2019 monitoring period**

Origin of material and location	Quantity	Date
Westside Manutahi B2 well	480 m <sup>3</sup> of drilling muds and solids, in addition to the 443 m <sup>3</sup> , received at the tail end of the previous monitoring period.	July 2018
Westside Kauri E well site	43.5 m <sup>3</sup> of condensate impacted soil following well head repairs.	July 2018
Westside Kauri A wellsite	72 m <sup>3</sup> of production wastes (liquids and solids)	July 2018
Westside Manutahi A2 well	678 m <sup>3</sup> drilling muds and solids	July-August 2018
Kapuni Production Station	101 m <sup>3</sup> production station cleaning operations	During the monitoring year
Todd Energy Mangahewa (6) wells	3,557.1 m <sup>3</sup> of drilling waste liquid and lower hole solids	January through to June 2019 On-going

**Table 9 WRS Waikakai landfarming dates and location**

Material	Landfarm location and date
Westside: Manutahi B2 and A1 wells, Kauri E and Kauri A production facilities and Todd Energy: Kapuni Production Station material	Direct spreading area W1810 July to October 2018
Todd Energy: Mangahewa drilling programme MHW-25	January to June 2019 (on-going) W1911

Table 10 Company provided landfarming location map WRS Waikaikai Landfarm



## 2.5 Incidents, investigations, and interventions

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

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

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

In the 2018-2019 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.



## 3 Discussion

### 3.1 Discussion of site performance

In comparison to the previous monitoring period, in which impacted soil from the former BP Patea service station was landfarmed, there was a significant level of activity at the Waikaikai Landfarm during the 2018-2019 monitoring period. In this monitoring period, additional material from Westside's Manutahi A2 and B1 wells, as well as Kauri E and Kauri A production facilities were coupled with material from Todd Energy's Kapuni Production Station. These were landfarmed through direct spreading to area W1810, with the farming exercise completed in this area (W1810) in October of 2018. This area was then reseeded, with pasture strike observed by the Council's inspector during the November 2018 inspection.

The second landfarming activity undertaken in this monitoring period was in area W1911. This area was specifically prepared to farm material from Todd Energy's Mangahewa drilling programme, which in total comprised six wells, located at the Mangahewa G site. Due to the scale of the landfarming programme, the landfarming process was still on-going through to the end of the monitoring period. This area will likely be seeded in the coming months, once all material has been incorporated. The consent holder indicated in their annual report, that at the time it was drafted, the final material from the sixth well was being received on site. During both exercises, appropriate land stabilisation measures were undertaken to prevent wind and stormwater erosion.

In this monitoring period the consent holder assessed the integrity of the storage cell liners. This is a consent requirement that must be undertaken within a 24 month period. No repairs were required to be undertaken. However, during normal operations the liner of pit 1 was compromised, which resulted in a new liner being sourced and installed. Similarly, pit 2's liner was damaged during loading operations which resulted in the pit being decommissioned. This pit currently remains out of action until it is required in future, whereby a new storage liner will be sourced. Noting that all landfarms within the region are required to install fit for purpose synthetic liners or equivalents, which hold fluid without leakage.

Consent required notifications pertaining to land-farmable material deliveries, material origins, quantities, waste analysis and farming dates were provided by the consent holder throughout the year. This was also presented in the Company provided annual report which was delivered at the end of the monitoring period.

### 3.2 Environmental effects of exercise of consents

Minimal environmental effects were recorded at the Waikaikai Landfarm in the 2018-2019 monitoring period. Groundwater analysis did not record any petroleum related impacts. Total dissolved salt/solid concentrations within the groundwater were below the conditional limit of 2,500 g/m<sup>3</sup>. Though GND2292 did report a value of 2,400 g/m<sup>3</sup> in the final monitoring round of the period.

Soil sample analysis of the recently completed (October 2018) landfarming area W1810 did not report any values of concern. Both samples indicated compliance with surrender related concentrations which will negate any further testing for this area in future. Revegetation is on-going in this area with the inspecting officer reporting on good strike across this area.

Currently, landfarming in area W1911 is on-going, with three distinct portions of this area in the process of being landfarmed. One portion is close to being completed, while the other two remain actionable to further applications. The revegetation and sample results of these areas will be reported in the upcoming monitoring period.

Throughout the landfarming process the land has remained stable with minimal impacts of wind or stormwater erosion. On one occasion some ponding was noted close to a bund within one of the

developing landfarm areas, after the application of stormwater. Though this did not appear to last longer than one hour. Thus no non-compliance was reported.

### 3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 11.

**Table 11 Summary of performance for consent 5956-2.0 2018-2019 monitoring period**

<b>Purpose: 5956-2.0 To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's and contaminated soil onto and into land via landfarming</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Definitions of material	N/A	Yes
2. Application area detailed on attached map	Landfarming occurred in specific area	Yes
3. Adoption of Best Practicable Option (BPO)	Inspections	Yes
4. Groundwater monitoring well installation	Inspections and sampling	Yes
5. Cell lined with fit for purpose liner	Inspections	Yes
6. Storage cell integrity check every 24 months	Cell integrity checks undertaken by consent holder in this monitoring period, communicated by consent holder in annual report. 10 May 2019.	Yes
7. Operation in accordance with management plan	Inspections/ annually reviewed management plan received September 2019	Yes
8. Notify TRC 48 hours prior to transfer of waste to disposal site	Notifications received	Yes
9. Notify TRC 48 hours prior to landfarming wastes	Notifications received	Yes
10. Representative waste sample from each source and each type of waste and have it analysed for the following: a) total petroleum hydrocarbons (C <sub>6</sub> -C <sub>9</sub> , C <sub>10</sub> -C <sub>14</sub> , C <sub>15</sub> -C <sub>36</sub> ); b) benzene, toluene, ethylbenzene, and xylenes; c) polycyclic aromatic hydrocarbons screening; d) barium, calcium, chloride, magnesium, sodium, potassium, sodium adsorption ratio, nitrogen and pH, and	Submitted	Yes

**Purpose: 5956-2.0 To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's and contaminated soil onto and into land via landfarming**

Condition requirement	Means of monitoring during period under review	Compliance achieved?
e) heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.		
11. Record keeping	Annual report provided and mud delivery log provided. All consent notifications provided by consent holder this period.	Yes
12. Annual Report	Report received	Yes
13. No discharge within 25 meters of surface water or property boundaries	Inspections	Yes
14. No hydraulic fracturing fluids	Record check	Yes
15. Contaminated soil may only be brought to site after it has been assessed by condition 10 of this consent and by the Chief Executive	Yes, contaminated soil assessed and agreed prior to being brought to site	Yes
16. All waste brought to site must be landfarmed as soon as practicable but no later than 24 months after delivery date	Inspections and liaison with Company	Yes
17. Application of drilling material thickness	Inspections and review of consent holder data	Yes
18. No ponding or overland flow after one hour of application	Inspections indicated that some ponding was noted pre-incorporation of material though not long lasting	Yes
19. As soon as practicable after landfarming shall mix with native topsoil with a minimum of 250 mm	Inspections	Yes
20. Maximum application rate of 20,000 mg/kg (TPH) at any point after incorporation	Inspections and sampling	Yes
21. Secondary application of material is permitted if the standards of condition 29 have been met and the Chief Executive has considered this analysis appropriate	Not required this period	Yes
22. Revegetation as soon as practicable	Achieved	Yes
23. Shall not exceed a value of 2,500 g/m <sup>3</sup> Total Dissolved Salts within any groundwater or surface water	Monitoring	Yes
24. Consent shall not lead or be liable to lead to contaminants entering a surface water body	Monitoring	Yes

Purpose: 5956-2.0 To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's and contaminated soil onto and into land via landfarming		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
25. Shall not result in any adverse impacts on groundwater and or surface water	Minor impacts in terms of salinity, though below consent conditions	Yes
26. Conductivity must be less than 400 mSm <sup>-1</sup> . If background soil has an conductivity greater than 400 mSm <sup>-1</sup> , then conductivity after disposal shall not exceed original conductivity by more than 100 mSm <sup>-1</sup>	Inspections and sampling	Yes
27. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Inspections and sampling	Yes
28. The concentration of metals and salts in the soil layer containing the discharge shall comply with certain criteria	Sampling	Yes
29. Prior to expiry/cancellation of consent these levels must not be exceeded: a) Conductivity, 290 mSm <sup>-1</sup> b) Chloride, 700 g/m <sup>3</sup> c) Total dissolved salts, 2,500 g/m <sup>3</sup> d) Sodium, 460 g/m <sup>3</sup> e) MAH's/PAH MfE 1999 CS NZ Table 4.12 f) TPH CCME 2008 Table 5.2 Ecological direct contact	No surrender sampling undertaken in this monitoring period	N/A
30. Consent cannot be surrendered until standards in condition 29 have been met	No consent surrender	N/A
31. Notification of discovery of archaeological remains	None this monitoring period	N/A
32. Review, amend, delete	Not required	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 12 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2011-2012	5956-1	-	-	-	1
2012-2013	5956-1	-	-	-	1
2013-2014	5956-1	-	-	1	-
Waste Remediation Services consent holder from 2014-2015 onwards					
2014-2015	5956-1.7	-	1	-	-
2016-2017	5956-2.0	-	1	-	-
2017-2018	5956-2.0	1	-	-	-
2018-2019	5956-2.0	1	-	-	-
Totals		2	2	1	2

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

### 3.4 Recommendations from the 2017-2018 Annual Report

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

1. It is proposed that for 2018-2019 monitoring period that the monitoring of consented activities at Waikaikai Landfarm continue at the same level as in 2017-2018 (or) unless the site continues to stockpile and landfarms additional areas, other than the one currently on-going. Whereby the option for additional soil samples (four additional) to be added to the programme will be exercised.
2. Groundwater analysis of monitoring wells GND2293 and GND2294 will be undertaken biannually until the final landfarmed area within this specific area is complete and surrendered.
3. THAT should there be issues with environmental or administrative performance in 2018-2019 period, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
4. THAT the option for a review of resource consent in June 2019, as set out in condition 32 of the consent not be exercised, on the grounds that the consent is fit for purpose.

Recommendation 1 was undertaken on the premise of the one landfarmed area. As such no additional soil samples were added to the programme.

Recommendation 2 was undertaken in this monitoring period, however in the upcoming monitoring period this will be reverted to quarterly for wells GND2293 and 2294. The reason for this is that an area has been landfarmed in close proximity.

Recommendation 3 and 4 were not required.

### 3.5 Alterations to monitoring programmes for 2019-2020

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

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

- reporting to the regional community.

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

It is proposed that for 2019-2020 monitoring period that the monitoring of the groundwater monitoring network be expanded from the current three wells quarterly and two wells biannually, to all five wells quarterly. This is due to the consent holder expanding landfarm operations at Waikaikai, specifically in area W1911, which is in the specific location of the biannually assessed wells.

Soil sampling will also be expanded from the currently proposed two composite soil samples, to four composite soil samples, to account for the newly landfarmed area.

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

### 3.6 Exercise of optional review of consent

Resource consent 5956-2.0 provides for an optional review of the consent in June 2020. Condition 32 allows the Council to review the consent, if there are grounds that require a review.

Based on the results of monitoring in the year under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued.

## 4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Waikaikai Landfarm in the 2019-2020 year be amended from that undertaken in 2018-2019, by expanding the current groundwater monitoring programme from three wells quarterly and two wells biannually, to all five wells quarterly.
2. Soil sampling will also be expanded from the currently proposed two composite soil samples, to four composite soil samples, to account for the newly landfarmed area.
3. THAT should there be issues with environmental or administrative performance in 2019-2020, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
4. THAT the option for a review of resource consent(s) in June 2020, as set out in condition 32 of the consent, not be exercised, on the grounds that it is currently fit for purpose.

## Glossary of common terms and abbreviations

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

As*	Arsenic.
Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in $\mu\text{S}/\text{cm}$ .
Cu*	Copper.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$\text{g}/\text{m}^2/\text{day}$	Grams/metre <sup>2</sup> /day.
$\text{g}/\text{m}^3$	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
$\text{m}^2$	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
MPN	Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample.
$\mu\text{S}/\text{cm}$	Microsiemens per centimetre.
$\text{NH}_4$	Ammonium, normally expressed in terms of the mass of nitrogen (N).
$\text{NH}_3$	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
$\text{NO}_3$	Nitrate, normally expressed in terms of the mass of nitrogen (N).



NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
Zn*	Zinc.

\*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

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

## Bibliography and references

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- Ministry for the Environment (1999) Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, (Revised 2011) Ministry for the Environment.
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- Taranaki Regional Council (2014): Waikaikai Farms Ltd Drilling Waste Disposal Monitoring Programme Biennial Report 2011-2013. Technical Report 2013-68.
- Taranaki Regional Council (2015): Waikaikai Farm Ltd Monitoring Programme Annual Report 2013-14. Technical Report 2014-77.
- Taranaki Regional Council (2015): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2014-15. Technical Report 2015-95.
- Taranaki Regional Council (2016): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2015-16. Technical Report 2016-91.
- Taranaki Regional Council (2017): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2016-2017. Technical Report 2017-41.
- Taranaki Regional Council (2018): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2017-2018 Technical Report 2018-63.

# Appendix I

## Resource consents held by Waste Remediation Services Ltd

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

Consent number	Purpose	Granted	Review	Expires
5956-2.0	To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's, and contaminated soil onto and into land via landfarming	19 April 2017	2019	1 June 20134

### Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

### Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

### Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

### Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

### Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

### Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

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

Name of  
Consent Holder: Waste Remediation Services Limited  
PO Box 7150  
New Plymouth 4341

Decision Date: 19 April 2017

Commencement Date: 19 April 2017

**Conditions of Consent**

Consent Granted: To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

Expiry Date: 1 June 2034

Review Date(s): Annually until June 2020 and then every three years thereafter

Site Location: Lower Manutahi Road, Manutahi  
(Property owner: Waikaikai Farms Limited)

Grid Reference (NZTM) 1720190E-5605380N

Catchment: Mangaroa

*For General, Standard and Special conditions  
pertaining to this consent please see reverse side of this document*

### **General condition**

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

### **Special conditions**

1. For the purposes of this consent the following definitions shall apply:
  - a) drilling wastes consist of; drilling fluids and cuttings from drilling operations with water based muds, and drilling fluids and cuttings from drilling operations with synthetic based muds;
  - b) oily wastes from wellsites consist of; sludge removed from tanks and separators, slops oil removed from well cellars, tank wax which builds up in separators and tanks, oily formation sand, contaminated ground material from leaks and spills;
  - c) contaminated soil refers specifically to the hydrocarbon contaminated soil;
  - d) storage means a discharge of wastes from vehicles, tanks, or other containers onto land for the purpose of temporary storage prior to landfarming, but without subsequently spreading onto, or incorporating the discharged material into the soil within 48 hours;
  - e) landfarming means the discharge of wastes onto land, subsequent spreading and incorporation into the soil, for the purpose of attenuation of hydrocarbon and/or other contaminants, and includes any stripping and relaying of topsoil.
2. This consent authorises the application of material to land only within the area indicated on the attached map.
3. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
4. Prior to the exercise of this consent, the consent holder shall after consultation with the Chief Executive, Taranaki Regional Council, install a minimum of three groundwater monitoring bores. The bores shall be at locations and to depths that enable monitoring to determine any change in groundwater quality resulting from the exercise of this consent. The bores shall be installed in accordance with NZS 4411:2001 and all associated costs shall be met by the consent holder. The bores shall be sampled prior to stockpiling or landfarming for baseline water quality parameters and concentrations of contaminants.
5. Any pits intended for the storage of solid or liquid wastes shall be lined with high-grade (fit for purpose) synthetic liners or equivalent so that they retain liquid without leakage through the base or side walls.
6. At intervals not exceeding 24 months the consent holder shall check the integrity of the pit liners, repair or replace liners as required and demonstrate to the Chief Executive, Taranaki Regional Council they retain liquid as required by condition 5.

7. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site will be managed to achieve compliance with the consent conditions of this consent and shall include as a minimum:
- a) control of site access;
  - b) procedures for notification to Council of disposal activities;
  - c) procedures for the receipt and stockpiling of drilling wastes onto the site;
  - d) procedures for the management of stormwater recovered from, or discharging from, the drilling waste stockpiling area;
  - e) procedures for demonstrating storage cell integrity;
  - f) methods used for the mixing and testing of different waste types;
  - g) procedures for landfarming drilling wastes and or contaminated soil (including means of transfer from stockpiling area, means of spreading, and incorporation into the soil);
  - h) contingency procedures;
  - i) sampling regime and methodology; and
  - j) post-landfarming management, monitoring and site reinstatement.

#### **Notification and sampling requirements**

8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, (by emailing [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz)) at least 48 hours prior to permitting wastes onto the site for storage. Notification shall include the following information:
- a) the consent number;
  - b) the name of the well and wellsite, or other source, from which the waste was generated;
  - c) the type of waste to be stored; and
  - d) the volume of waste to be stored.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, (by emailing [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz)) at least 48 hours prior to landfarming stored material, or material brought onto the site for landfarming within 48 hours. Notification shall include the following information:
- a) the consent number;
  - b) the name of the well(s)/or location from which the waste was generated;
  - c) the type(s) of waste to be landfarmed;
  - d) the volume and weight of the waste to be landfarmed;
  - e) the specific concentrations of Metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn), Salts (Barium, Calcium, Chloride, Magnesium, Sodium, Potassium) and Sodium Adsorption Ratio. Hydrocarbons (Total Petroleum Hydrocarbons, Mono Cyclic Aromatic Hydrocarbons and Poly Cyclic Aromatic Hydrocarbons) and Nitrogen in the waste prior application to land;
  - f) results of sampling undertaken in accordance with condition 8, including in a spreadsheet compatible format;
  - g) proposed loading rate and required area calculations showing compliance with condition 18; and
  - h) the specific location and area over which the waste will be landfarmed.

10. The consent holder shall take a representative sample of each type of waste, from each individual source, and have it analysed for the following:
- a) total petroleum hydrocarbons (C<sub>6</sub>-C<sub>9</sub>, C<sub>10</sub>-C<sub>14</sub>, C<sub>15</sub>-C<sub>36</sub>);
  - b) benzene, toluene, ethylbenzene, and xylenes;
  - c) polycyclic aromatic hydrocarbons screening;
  - d) barium, calcium, chloride, magnesium, sodium, potassium, sodium adsorption ratio, nitrogen and pH, and
  - e) heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.

The consent holder shall record the data from these results onto a master spreadsheet to be supplied to the Taranaki Regional Council in accordance with conditions 8 and 9.

### **Monitoring and reporting**

11. The consent holder shall keep records of the following:
- a) wastes from each individual well/ source;
  - b) analytical composition of wastes;
  - c) stockpiling area(s);
  - d) volumes of material stockpiled;
  - e) landfarming area(s), including a map showing individual disposal areas with GPS co-ordinates and up-to-date GIS shapefiles;
  - f) volumes and weights of wastes landfarmed;
  - g) dates of commencement and completion of stockpiling and landfarming events;
  - h) dates of sowing landfarmed areas;
  - i) treatments applied; and
  - j) details of monitoring, including sampling locations, sampling methods and the results of analysis;
- and shall make the records available to the Chief Executive, Taranaki Regional Council.
12. The consent holder shall provide to the Chief Executive, Taranaki Regional Council:
- a) by 31 August of each year, a report on all records required to be kept in accordance with conditions 8, 9, 10 and 11 for the period of the previous 12 months, 1 July to 30 June;
  - b) monthly records of all movements of waste to the site in spreadsheet format, including source, material type, transporter, volumes and receiving storage pit.



### **Discharge Limits**

13. No discharge shall take place within 25 metres of surface water or property boundaries.
14. Waste brought to the site shall not contain any hydraulic fracturing fluids.
15. Contaminated soil may be brought to the site only after the Chief Executive, Taranaki Regional Council has assessed the analysis required by condition 10 and advised that the material is suitable for bioremediation.
16. All wastes must be landfarmed as soon as practicable, but no later than 24 months after being brought onto the site.
17. For the purposes of landfarming, solid wastes shall be applied to land in a layer not exceeding:
  - a) 100 mm thick for wastes with a hydrocarbon concentration less than 50,000 mg/kg dry weight; or
  - b) 50 mm thick for wastes with a hydrocarbon concentration equal to or greater than 50,000 mg/kg dry weight.
18. For the purposes of landfarming, liquid wastes shall be applied to land:
  - a) at a rate such that there is no overland flow of liquids; and
  - b) at a rate such that no ponded liquids remain after one hour, after application.
19. When landfarming, as soon as practicable following the application of solid wastes to land, the consent holder shall mix the wastes with, as a minimum, the top 250 mm of native soil.
20. The hydrocarbon concentration in the soil over the landfarming area shall not exceed 20,000 mg/kg dry weight at any point where:
  - a) liquid waste has been discharged; or
  - b) solid waste has been discharged and incorporated into the soil.
21. The secondary application of material to land may only occur if:
  - a) the areas of application meet the standards of surrender as shown in conditions 28 and 29 of this consent;
  - b) the Chief Executive, Taranaki Regional Council, having considered the appropriate soil analysis, has confirmed that the standards specific in a) above have been met.
22. As soon as practicable following landfarming, areas shall be sown into pasture (or into crop). The consent holder shall monitor revegetation and if adequate establishment is not achieved within two months of sowing, shall undertake appropriate land stabilisation measures to minimise wind and stormwater erosion.

### Receiving environmental limits for water

23. The exercise of this consent shall not result in a level of total dissolved salts within any surface or groundwater of more than 2,500 gm<sup>3</sup>.
24. The exercise of this consent, including the design, management and implementation of the discharge, shall not lead or be liable to lead to contaminants entering a surface water body.
25. The exercise of this consent shall not result in any adverse impacts on groundwater as a result of leaching, or on surface water including aquatic ecosystems, and/or result in a change to the suitability of use of the receiving water as determined by the Chief Executive, Taranaki Regional Council

### Receiving environmental limits for soil

26. The conductivity of the soil/waste layer after application shall be less than 400 mSm, or alternatively, if the background soil conductivity exceeds 400 mSm, the landfarming of waste shall not increase the soil conductivity by more than 100 mSm.
27. The application of waste shall not increase the sodium adsorption ratio (SAR) of the soil by more than 2.0 and in no case shall the SAR of the soil/waste layer exceed 18.0 after application.
28. The concentration of metals and salts in the soil layer containing the discharge shall comply with the following criteria:

Metal/ Salt	Maximum value (mg/kg)
Arsenic <sup>1</sup>	17
Barium – Barite <sup>2</sup>	10,000
Extractable Barium <sup>2</sup>	250
Cadmium <sup>1</sup>	0.8
Chromium <sup>3</sup>	600
Copper <sup>3</sup>	100
Lead <sup>1</sup>	160
Nickel <sup>3</sup>	60
Mercury	1
Zinc <sup>3</sup>	300
<sup>1</sup> SCS – Rural Residential MfE 2011b; <sup>2</sup> Alberta Environment 2009; <sup>3</sup> NZWWA 2003, lowest of protection of human health and ecological receptors. (Biosolids to land)	

29. From 1 March 2034 (three months prior to the consent expiry date), constituents in the soil at any depth less than 500 mm (below ground level) shall not exceed the standards shown in the following table:

Constituent	Standard
Conductivity	Not greater than 290 mS/m
Chloride	Not greater than 700 mg/kg
Sodium	Not greater than 460 mg/kg
Total Soluble Salts	Not greater than 2500 mg/kg
TPH Fraction	Guideline Value Agricultural Ecological Direct Soil Contact (Fine Sand) From table 5.2
F1 (C6-C10)	210
F2 (>C10-C16)	150
F3 (>C16-C34)	1300
F4 (>C34)	5600
Canadian Council of Ministers of the Environment (CCME), in the document Canada Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale, 2008. Table 5.2	
Soil Type/ Contaminant	Depth of contamination
	Surface (<1m) (mg/kg)
SANDY Silt	
MAHs	
Benzene	1.1
Toluene	82
Ethylbenzene	59
Xylene	59
PAHs	
Naphthalene	7.2
Non-carc (Pyrene)	160
Benzo(a)pyrene	0.027
Table 4.12 SANDY SILT Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE 1999)	

MAHs - benzene, toluene, ethylbenzene, xylenes

PAHs - naphthalene, non-carc. (pyrene), benzo(a)pyrene eq.

TPH - total petroleum hydrocarbons (C7-C9, C10-C14, C15-C36)

The requirement to meet these standards shall not apply if, before 1 March 2034, the consent holder applies for a new consent to replace this consent when it expires, and that application is not subsequently withdrawn.

30. This consent may not be surrendered unless the standards in condition 29 have been met.
31. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.

32. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June annually until 2020 and every three years thereafter, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 19 April 2017

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**

*The consent holder's attention is drawn to MPI's "Food safety and animal welfare guidance if spreading rocks and minerals from drilling oil and gas wells on land" (July 2015) which provides guidance to producers and processors of food, including farmers, on how ensure food safety and animal welfare if spreading rocks and minerals from drilling oil and gas wells on land. Should you require further information, please contact Mary Western (MPI, Wellington) or visit <https://www.mpi.govt.nz/document-vault/8698> for the report.*

Advice Note (included at the request of DITAG)

*The consent holder's attention is drawn to MPI's "New Zealand Code of Practice for the Design and Operation of Farm Dairies (NZCP1) which restricts:*

- The discharge of specified wastes to land used for grazing of milking animals; and*
- The use of feed from land which has had specified wastes applied to it.*

*Should you require further information, please contact a Dairy Industry Technical Advisory Group (DITAG) representative or visit <http://www.foodsafety.govt.nz/elibrary/industry/dairy-nzcp1-design-code-of-practice/amdt-2.pdf> (specifically section 6.4 Disposal of effluent and other wastes and section 7.8 Purchased Stock Food) or contact an operation dairy processing company regarding conditions of supply.*



Total consented area for Waikaikai Landfarm (in yellow) as authorised by consent 5956-2.0



## Appendix II

### WRS Waikaikai Annual Report 2018-2019







19 September 2019

Chief Executive  
Taranaki Regional Council  
Private Bag 713  
47 Cloten Road  
Stratford  
Attention Nathan Crook

Dear Nathan

**RE: Resource Consent 5956 -2.0 - Waikakai (Wards) – Waikakai Farms Ltd, 78 Lower Manutahi Road, RD 2, Patea**

As required under special condition 12 of resource consent 5956-2.0, please find all relevant information recorded from the operational period 1 July 2018 to 30 June 2019 relating to stockpiling and landspreading activities undertaken at Waste Remediation Services (WRS) Waikakai disposal site. This is the fourth report completed by WRS for this site, following the previous periods;

2014-15

2015-16

2016-17

2017-18

This report is designed to follow on from the previously submitted 2017-18 consent monitoring report and is as such focussed on activities, records and results from the 2018-19 period. This report is structured into 6 sections, as per the following:

1. Overview and Background
2. Wastes Received for Disposal
3. Disposal and Rehabilitation Operations (preparatory earthworks, landspreading/ incorporation and rehabilitation - comprising topsoil application, sowing, additional works)
4. Monitoring

5. Additional Consent Requirements
6. Summary

## **1. OVERVIEW AND BACKGROUND**

WRS began operating the Waikaikai disposal site in 2014, after the original disposal consent 5956-1 was transferred to them by the landowner at the site, following an unsuccessful attempt at operating the disposal site by a different third party operator. Between 2014 and the currently reported on year (2018-19), operations at the site have improved, as reflected in the TRC consent compliance ratings for these years. Similarly to WRS' other site (Manawapou, consent 7795-1) there have been intermittent periods of activity at the site, reflecting fluctuating levels of activity within the local drilling industry. During the 2016-17 period, consent 5956-1.7 was superseded by the current consent, 5956-2.0.

2018-19 has seen a reasonable level of activity at the Waikaikai site. At the beginning of the reporting period on 1 July 2018 the site had begun to receive drilling waste from Westside's Manutahi B2 well.

In 2018-19 drilling waste was received from two Westside wells during the 2018-19 period, and small quantities of production wastes were received from Westside's production facilities at Kauri E and Kauri A sites. Drilling waste was also received later in the operational period from five Todd Energy Mangahewa wells, with material from a sixth well scheduled for disposal in 2019-20. Further details are given in Section 2.

Disposal was undertaken in spreading areas W1810 and the new spreading area W1911, which remains an active disposal area at the time of reporting.

Monitoring of the site undertaken in the 2018-19 year by both the Taranaki Regional Council (TRC) and WRS management has shown the operations undertaken at Waikaikai to be compliant with consent conditions, and no incidents have been recorded against the site in 2018-19.

## **2. WASTES RECEIVED FOR DISPOSAL**

### **Waste Types and Volumes**

WRS' Waikaikai site is consented to dispose of a wider range of wastes than at the Manawapou site, including oily wastes. The following material was received for disposal in 2018-19:

480 m<sup>3</sup> of drilling muds and solids were received from Westside's Manutahi B2 well in July 2018, following the 443 m<sup>3</sup> that had already been received at the end of the previous operational period.

43.5 m<sup>3</sup> of impacted soil was received from Westside's Kauri E site, following works undertaken to repair wellhead pipework in July 2018.

A further 72 m<sup>3</sup> of production wastes (liquid and solid) was received from Westside's Kauri A site also in July 2018.

Westside drilled a new well Manutahi A2 in July-August 2018, with 678 m<sup>3</sup> being transported to the Waikaikai site.

101 m<sup>3</sup> of mostly liquid waste was received onsite from production station cleaning operations at Kapuni Production Station.

From 17 January to the end of June 2019, the Waikaikai site has received a total of 3,557.1 m<sup>3</sup> of drilling waste liquid and lower-hole solids from five Todd Energy Mangahewa wells.

Overall, the site received a total of 4,932 m<sup>3</sup> of drilling/production waste/impacted soil during the reporting period. Full details of these drilling/production waste and impacted soil deliveries can be found in the attached mud register, Appendix C.

### **Waste Characterisation**

Consent 5956-2.0 requires the site operator to sample and keep records of waste chemical composition. Composite samples are taken (generally by wellsite staff prior to transport) across each waste stream before materials leave the wellsite for delivery. WRS also takes pre-spreading samples from the pits prior to landspreading for further waste characterisation. All samples are sent to RJ Hill Laboratories for analyses. Results are forwarded directly by Hills Laboratories to TRC for their records and for cross referencing purposes. Results are kept and logged by WRS, and are used to calculate required spreading areas as per condition 17 of consent 5956-2.0 to ensure the hydrocarbon limit in condition 20 is adhered to. Additionally, consent 5956-2.0 condition 15 requires WRS to present predisposal results to the TRC for any contaminated soil intending for disposal, to assess for suitability on a case-by-case basis. PDF copies of all pre-disposal results are attached to this report as part of Appendix D.

## **3. DISPOSAL AND REHABILITATION OPERATIONS**

In the 2018-19 period there were two distinct campaigns of spreading and final disposal of waste material into areas W1810 and W1911, as indicated on the site map (Appendix B).

### **Campaign 1 – July to October 2018**

The waste material from Westside's Manutahi B2 and Manutahi A2 wells, Kauri E and Kauri A production facilities, and Todd Energy's Kapuni Production Station were disposed of primarily through direct spreading into area W1810.

During this time area W1810 (originally prepared for the Patea Allied Petroleum redevelopment) was expanded to accommodate all the above wastes using the normal process of topsoil stripping and stockpiling, levelling of the underlying sand horizons, incorporating the waste into the sands and levelling, followed by recovery and spreading of stockpiled topsoil and final seed bed preparation and planting – see Appendix A Field Photographs in the previous 2018 report.

## **Campaign 2 – January to June (ongoing) 2019**

In late 2018 WRS was engaged by Todd Energy to dispose of all drilling waste liquids and solids generated by their upcoming Mangahewa drilling programme comprising 6 wells located on the Mangahewa G site. The first Mangahewa drilling wastes were received at Waikaikai on 17 January 2019 from MHW-25 and as of the end of the monitoring period (30 June 2019) the drilling had progressed to the top hole of well MHW-29.

In preparation for receipt of the drilling waste WRS maximised pit storage capacities through the removal of all accumulated stormwater – this was disposed of in early January onto area W1810.

During the early drilling the defunct Pit 3 was backfilled with sufficient sand to allow the excavation and shaping of a second liquids storage pit. This was completed early March and after waiting several weeks for the new liner and suitable weather the pit 3 liner was installed on 4 April 2019.

Due to the size and duration of the programme and the progressive well completion programme there was up to 2 weeks delay between finishing a hole and walking the rig to the new cellar. During the entire campaign a balance was maintained between receipt of wastes and live storage capacity by spreading as required to maintain sufficient pit freeboard of approximately 5 days drilling waste. To do this area W1911 was opened up in mid-February at the southwest corner of the site, opposite area W1504 (Appendix B). The standard method of topsoil removal to windrows around the boundary of the area being prepared was undertaken, followed by cut and fill of the sand dune terrain to produce as near level area as could be achieved with the sand volumes available. This enabled intermittent campaigns of recovering both liquids and solid wastes from pits 1 and 2 and spreading upon the area.

This pattern of waste recovery from the pits and spreading while simultaneously discharging into pits continued successfully throughout the drilling programme.

The landspreading processes employed at this site are detailed further in the site management plan. WRS closely monitors spreading operations to ensure contractors are consistent with the procedures outlined in the management plan and to ensure application thickness and ponding consent conditions are adhered to. The inspection notices received from the TRC imply these processes were implemented satisfactorily during 2018-19. Photographs of spreading operations at the Waikaikai site are attached as Appendix A as further reference.

## **4. MONITORING**

### **Site Inspections - WRS**

WRS closely supervise site operations to ensure all contractors are following best practice as per the site operation management plan and conditions specified in consent 5956-2.0. Regular site inspections are also undertaken during periods of inactivity at the site.

### **Site Inspections – TRC**

WRS has received seven inspection notices from the TRC for the 2018-19 year. All notices indicated the TRC inspector was satisfied with the physical state of the site, and with operations being

undertaken around the time of inspection. Copies of the TRC inspection notices are attached as Appendix F.

### **Receiving Environment Sampling**

Composite soil sampling and groundwater sampling is now undertaken exclusively by TRC field staff, with all samples being sent to RJ Hill Laboratories for the full suite of analyses required under consent 5956-2.0. WRS have no supplementary receiving environment sample results to submit as part of this Annual Report.

Surrender sampling has been previously undertaken at all previous landspreading areas W1407-W1611 as identified in the site map, Appendix B.

## **5. ADDITIONAL CONSENT REQUIREMENTS**

As per condition 3 of consent 5956-2.0, the site management plan has been reviewed and updated and submitted to the TRC as Appendix E of this report. Operations at the Waikaikai landfarm are all undertaken generally in accordance with the WRS' Landfarm Management Plan that covers both the Manawapou and Waikaikai sites. It is a live document and is constantly reviewed and updated as necessary to reflect operational requirements and practices at both sites operated by WRS.

Consent 5956-2.0 condition 6 requires WRS to assess pit liner integrity at regular intervals. Falling head tests were underway in late April-May, however while recovering drilling solids from Pit 1 in early May the "deleted Pit 1" liner split opposite the discharge point. While this did not affect the removal operations the liner was not easily repairable as the split was too large. After assessment of the general liner condition it was decided that repairs were not practical and a decision was made to replace the Pit 1 liner as soon as practicable. Following cleaning out and reshaping of the pit a new liner was installed on the 10 May 2019 (photo attached in Appendix A).

In early May while discharging liquid cement waste to Pit 2 a large clump of hardened cement made direct contact with the upper liner and tore a sizeable hole. Temporary repairs were undertaken but these were not adequate for long term use. Use of Pit 2 ceased and Pit 3 became operative, receiving all future liquid waste. Pit 2 has since been decommissioned and residual liquid levels are being kept low until the liner is replaced when the pit is required again.

Pasture establishment and ongoing vegetation coverage are monitored by TRC and by WRS in partnership with the landowner at the Waikaikai site. If either the landowner or the TRC are not satisfied with vegetation coverage at the site, WRS and their contractors will work with the landowner to address any issues. In 2018-19 no significant coverage issues were identified.

## **6. SUMMARY**

As in the previous year, there was a reasonable level of activity at the Waikaikai site in 2018-19. Waste material from wells at Westside's Manutahi A and B wellsites, Kauri A and E production facilities and

Todd Energy's Kapuni Production Station and Mangahewa G wellsite was received onsite and disposed of via landspreading in areas W1810 and W1911. At the time of reporting, material from a sixth Mangahewa well is being received for disposal. Maintenance of storage pits and liner replacement of both operational pits has been undertaken at the site during the operational period. Historic spreading areas have met surrender criteria, and no incidents/significant issues have been identified at the site during 2018-19.

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## Appendix A Field Photographs



Photograph 1      Cleaning out of pit 1



Photograph 2      Spreading operations W1911





Photograph 3 Spread area W1911 post incorporation of waste



Photograph 4 Spreading area W1911 showing stockpiled topsoil bund





Photograph 5 Pit 1 new liner as installed



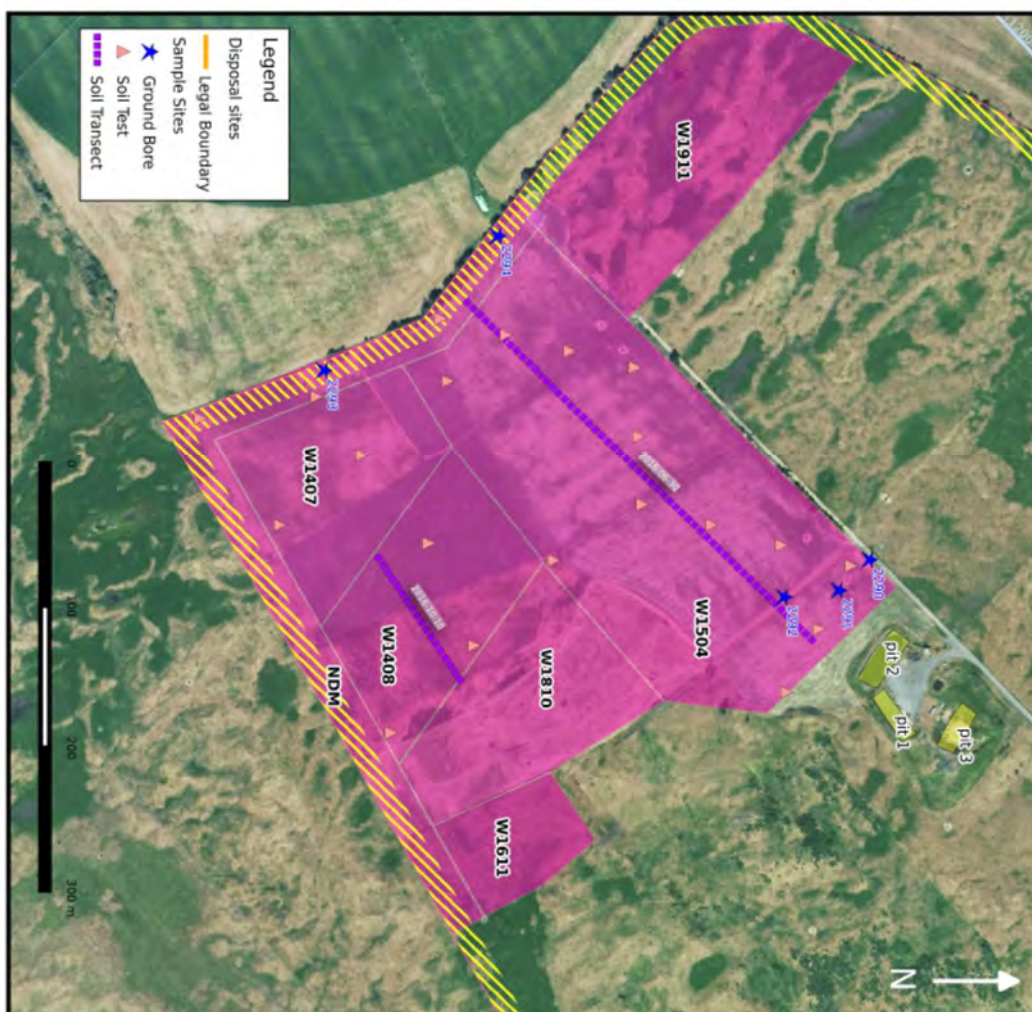
Photograph 6 Pit 1 in use post liner replacement



## Appendix B Waikakai Site Map

id	area (ha)	consent no	start date	end date	MUD
N0M4	1.73	5956.1	2014-06-02	2014-07-31	MA
W1407	2.28	5956.1	2014-08-01	2014-08-31	DUS
W1408	1.9	5956.1	2014-08-01	2014-08-31	DUS
W1504	5.7	5956.1.7	2015-01-14	2015-04-30	IS
W1611	0.63	5956.1	2016-01-17	2016-11-25	DUS
W1810	1.6	5956.2.0	2018-04-01	2018-10-31	SW/DUS/IS
W1911	2.24	5956.2.0	2019-02-01		DUS

Mud Type Codes  
SW=Stormwater  
DL/S = Drilling Liquids/Solids  
IS = Impacted Soils  
NA = Not available

[illegible]

## Appendix C Mud Register

MUD REGISTER ALL SOURCES 1 July 2018 - 30 June 2019					
Date	Source	Customer	Disposal Site m3		
			Waikaikai		
			Solid	Liquid	Total
July 2018	Manutahi-B2	Westside	207.0	273.0	480.0
July 2018	Kauri E	Westside	-	43.5	43.5
July 2018	Kauri A	Westside	-	72.0	72.0
July - Aug 2018	Manutahi-A2	Westside	191.0	487.5	678.5
		<b>2018-19 ANNUAL TOTAL m3</b>	<b>398.0</b>	<b>876.0</b>	<b>1,274.0</b>

27 Aug - 1 Sept 2018	Kapuni KA – 20	Todd	8.0	93.0	101.0
		<b>2018-19 ANNUAL TOTAL KAPUNI m3</b>	<b>8.0</b>	<b>93.0</b>	<b>101.0</b>

17-31 Jan 2019	Mangahewa MHW G-25	Todd	24.5	143.8	168.3
04-21 Feb 2019	Mangahewa MHW G-25	Todd	111.5	297.0	408.5
		<b>MHWG-25 TOTAL</b>	<b>136.0</b>	<b>440.8</b>	<b>576.8</b>
26-28 Feb 2019	Mangahewa MHW G-26	Todd	13.0	99.0	112.0
03-31 March 2019	Mangahewa MHW G-26	Todd	214.0	350.9	564.9
01-03 April 2019	Mangahewa MHW G-26	Todd	22.0	46.0	68.0
		<b>MHWG-26 TOTAL</b>	<b>249.0</b>	<b>495.9</b>	<b>744.9</b>
03-30 April 2019	Mangahewa MHW G-27	Todd	267.9	295.7	563.6
01-14 May 2019	Mangahewa MHW G-27	Todd	47.5	222.0	269.5
		<b>MHWG-27 TOTAL</b>	<b>315.4</b>	<b>517.7</b>	<b>833.1</b>
15-31 May 2019	Mangahewa MHW G-28	Todd	463.4	261.0	724.4
4-26 June 2019	Mangahewa MHW G-28	Todd	66.7	379.5	446.2
		<b>MHWG-28 TOTAL</b>	<b>530.1</b>	<b>640.5</b>	<b>1,170.6</b>
28-30 June 2019	Mangahewa MHW G-29	Todd	231.7	-	231.7
		<b>MHWG-29 TOTAL</b>	<b>231.7</b>	<b>-</b>	<b>231.7</b>
		<b>2018-19 ANNUAL TOTAL MANGAHEWA m3</b>	<b>1,462.2</b>	<b>2,094.9</b>	<b>3,557.1</b>

NB: This is a summary table, a full mud register with records of individual deliveries is available upon request.

## **Appendix D RJ Hill Laboratories Chemical Results**

All results from early 2018 from both WRS landfarms have been reported directly to the TRC at the same time as WRS receives these. This provides the TRC with transparent and timely receipt of laboratory results identical to that provided to WRS. Additional copies will be provided upon request

## **Appendix E WRS Landfarm Management Plan 2019-20**



Waste Remediation Services Ltd (WRS)

Waikaikai (Wards)

&

Manawapou (Symes)

Landfarm Management Plan

2019 - 2020

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Rev	Date	Reason for Issue	Prepared	Checked	Approved
A	May 2014	Issued for review	KMB		
B	Aug 2015		KMB		
C	Aug 2016		KMB		
D	Jun 2017		KMB		
E	Aug 2018		KMB		
F	Jul 2019		KMB		

This Landfarm Operations Management Plan (OMP) describes the process and procedures/requirements for disposal by land farming of drilling muds and cuttings and production station wastes in accordance with the Taranaki Regional (TRC) and South Taranaki District Councils (STDC) resource and landuse consent conditions and relevant New Zealand guidelines.

## 1. Safety

Waste Remediation Services Ltd will comply with all current Occupational Safety and Health Legislation in operating the landfarm sites at Waikaikai and Manawapou. The company has the services of an in-house Symons Group dedicated HSEQ Manager and HSEQ Advisor who provide regular input and advice on all site and operational safety matters to identify risks and hazards, record and manage these through site visits and conduct safety meetings with site personnel, contractors and staff and undertake group wide Safety Audits. All visitors to the landfarm sites irrespective of the purpose of their visit are required to sign the visitors log in and out of the site, and comply with all directions and notices displayed at the site. The Operations Manager's contact telephone number is clearly signposted at both landfarm sites should any queries arise

## 2. Scope

This Landfarm Operations Management Plan sets out the location, parties involved, safety practices and methodologies adopted by the operator to meet all legal requirements, and to minimise the risks and effects of the disposal of oil and gas exploration, production and workover drilling and production station wastes to land.

Management of the landfarm sites involves liaison by Waste Remediation Services Ltd (the Operator) with the landowners (P and K Wards at Waikaikai and A Symes at Manawapou), the Taranaki Regional Council and South Taranaki District Councils (as the consenting authorities), offsite service providers and agents ( laboratories, surveyors, couriers..), the exploration/drilling/production station companies supplying the wastes, and contractors involved with the delivery and landfarming of the wastes from time to time.

This liaison particularly with the TRC along with regular site and operations supervision and the keeping of comprehensive and timely records are key components of site management.

The landfarm and each delivery of waste through to disposal needs to be managed to ensure compliance with resource consent conditions and both regional and national guidelines viz the New Zealand guidelines for the safe application of bio solids to land (NZWWA, 2003), guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand (MfE, 1999) and the TRC's guidelines for disposal of oilfield wastes by landfarming, and the consents specific to each site viz **Waikaikai 5956-2.0 , Manawapou 7795-1**

### Storage Pit Capacities

At July 2019 the following storage capacities currently exist at the two WRS operated facilities

- |              |                           |         |
|--------------|---------------------------|---------|
| 1. Waikaikai | 3 pits, combined capacity | 1,200m3 |
|--------------|---------------------------|---------|



2. Manawapou      3 pits, combined capacity      1,100m<sup>3</sup>

**Total available storage      2,300m<sup>3</sup>**

### 3. Consents

The site is authorised and operated under the following consents;

#### A) Waikaikai ( Wards)

1. TRC: Consent number 5956-2.0 - Issued 19 April 2017, Expiry 1 June 2034
2. STDC: Landuse Consent RM 010155 Issued 9 January 2002.

#### B) Manawapou (Symes)

1. TRC : Consent number 7796-1 - Issued 01 May 2012, Expiry 1 June 2028
2. STDC : STDC : Landuse Consent RM

### 4. Abbreviations

WBM	Water based (drilling) mud
SBM	Synthetic based (drilling) mud
TRC	Taranaki Regional Council
MfE	Ministry for the Environment
NZWWA	New Zealand Water and Wastes Association
STDC	South Taranaki District Council

### 5. Landfarming Process

Landfarming is the practice of disposing of drilling and production station wastes to land. It comprises collection and delivery to site, storage to allow natural (solar and atmospheric) degradation to occur, and to enable a volume of wastes to accumulate to make ground preparation and spreading practical on a campaign basis, viz > 500 m<sup>3</sup>.

WRS undertakes this with four distinct earthmoving and agricultural phases resulting in up to the equivalent of 15 machinery ground passes;

- a) **Dewatering** – removal of any storm water from the pits and discharge onto any consented area by vacuum tank removal and discharge spraying. Stormwater is determined as the “slab” of largely undisturbed, unmixed water overlying the mud in the storage pits.

- b) **Ground Preparation** - stripping existing organic soil horizons and placing this in windrows around the designated spread area, followed by cut and fill earthworks to provide a rolling contour over the spread area/s.
- c) **Waste Spreading** - the waste is then discharged onto land, allowed to dry, spread across the prepared area, incorporated into the soil by tilling and deep ripping down to > 1m depth to remove any likelihood of ponding and to maximize dilution and incorporation into the underlying sand horizons.
- d) **Rehabilitation** - the stripped topsoil is recovered from storage and spread over the entire spread area. This is levelled and further tilled if required. The final rehabilitation step involves final levelling, then cultivating and re-sowing the area to pasture or crop to facilitate natural soil processes to effectively biodegrade, transform and assimilate the waste. This process results in improved soil properties particularly on light, free draining sandy soils resulting in dry matter pasture yields being increased several fold, and the elimination of sand blow holes developing and spreading that result from the persistent prevailing winds very typical of this coastal area in South Taranaki

The overall process involves the following broad steps:

1. Notification to the Taranaki Regional Council (TRC) prior to removal from the wellsite of landfarm site discharge consent number, well site name and well number, waste source, type and volumes, sampling (for hydrocarbon characterization) and assessment of the wastes to be disposed of.
2. Collection of fluids and cuttings from the wellsite and transport to the disposal site in purpose built, sealed units. Fluids are pumped into tankers (also known as "tubes"), and solids are transported by sealed well-side trucks using an excavator to load the material at the wellsite from both in/above ground sumps, cellars and mud tanks.
3. Discharge at the landfarm site of water based muds (WBM) cuttings and fluids, synthetic based mud (SBM) cuttings and fluids, and oily wastes, from transport vehicles to in-ground FPE lined storage pits to allow firstly natural atmospheric degradation and dilution, and until storage volumes are sufficient to allow campaigned final disposal.
4. Preparation of spreading areas by removal and stockpiling of topsoil (A soil horizon) usually into perimeter windrows/stockpiles, re-contouring and levelling the spreading area to improve uniformity, eliminate mud flow/ponding as much as practicable and control of waste application rates. Establishment of spread area margin bunding if required may also occur.
5. Spreading of the cuttings (solids) and thick slurry materials over land at the consented rates using tractor and trailers, digger and/or bulldozer, motor scraper or spray systems (depending on the fluid content of the mud). Fluids are usually distributed onto the disposal area using a tractor drawn effluent vacuum tank with a spray irrigation discharge system.
6. Allowing the cuttings and fluid to dry and degrade sufficiently to enable effective working into the sub-soils (B horizon) to required depths.
7. Levelling the soil surface with a levelling bar or similar to provide an easy grade workable field surface.

8. Replacement of the stockpiled A horizon clay/topsoil to aid stability and assist in grass establishment.
9. Fertilising and sowing either in crop or pasture in consultation with the landowner.
10. Application of fertilizer with or just after seed sowing and again within one year to assist establishment of good ground cover vegetation

## 6. Wastes Consented for Landfarming

There are only three types of waste able to be disposed of at the Waikaikai Landfarm from exploration and production activities

1. Water Based Mud (WBM) drill cuttings and fluids,
2. Synthetic Based Mud (SBM) drill cuttings and fluids
3. Oily Wastes from wellsites and production facilities .

But only two at the Manawapou Landfarm from exploration and production activities

1. Water Based Mud (WBM) drill cuttings and fluids
2. Synthetic Based Mud (SBM) drill cuttings and fluids

**NOTE** Unlike some other drilling mud disposal sites in the region both land farms operated by WRS are unable to accept for on-site disposal to ground Produced Water which may have high mineral or salt content associated with the production of oil and gas from reservoirs. This produced water may include water, water that has been injected into the reservoir and any chemicals added during the production/treatment/enhancement process, including hydraulic fracturing.

Produced water can contain residual chemicals from treatment and enhancement; however the definition does not extend to any “flush fluid and/or fluid containing proppant”.

There does not however appear to be any restriction upon WRS from processing stimulation returns on site for onward transport to approved disposal sites.

## 7. Landfarm Management Process/Activities

This management plan includes, as a minimum:

1. Notification to TRC of receipt of wastes for storage/disposal;
2. Procedures for the receipt and stockpiling of wastes onto the site;
3. Provision to the TRC of each waste types characteristics prior to spreading during each landfarming campaign
4. Methodology for the stripping and recontouring/levelling of area to be land farmed;
5. Methodology for landfarming drilling wastes (including methods of transfer to and from stockpile area/s, methods of spreading, and incorporation into the soil);
6. Methodology for sowing land farmed areas;
7. Contingency procedures;
8. Sampling regime and methodology;
9. Post-landfarming management, monitoring and site reinstatement;
10. Record keeping; and
11. Control of site access and records.

## 8. Landfarm Management Responsibilities

The following table provides a step-by-step process of landfarm site management.

Table 1 Overview of site management process

Step	What	Who
1	<p>Contact WRS Operations Manager ( Ops Mngr) to discuss waste type/volume/sampling/timing of delivery to site</p> <p>Provide WRS Ops. Manager with written notification of source, delivery date, waste type, volume and transporting company.</p> <p>Receive the OK for delivery/disposal of material from WRS Ops Mngr</p>	<p>Client production supervisors/ drilling supervisors/ well services supervisors/mud engineers</p>
2	<p>Receive notification in regard to waste for disposal;</p> <ul style="list-style-type: none"> <li>Receive notification of well exploration activities and programme for collection and delivery of waste to land farm site</li> <li>Ensure all information required by consent is provided by the client ;</li> <li>Confirm delivery and sample collected point and by who</li> <li>Record all collection details on WRS/Symons Transport waybills. Assign each 'parcel' of waste a number ( Waste Transfer Docket number ) to ensure source, transport and storage location are recorded</li> <li>Collect and submit pre-disposal sample for analysis.</li> </ul>	<p>WRS Operations Manager, transporting companies management and truck drivers, clients drilling supervisor</p>
	<p>TRC Notification (delivery for storage):</p> <ul style="list-style-type: none"> <li>48 hours prior to delivery for stockpiling on site; including</li> <li>consent number, name of well/site, type of waste, volume of waste.</li> </ul> <p>Planning for delivery/stockpiling:</p> <ul style="list-style-type: none"> <li>Arrange and assign storage pit into which the waste consignment is to be discharged taking into account mud type, characteristics and storage volumes available</li> <li>Ensure delivery driver completes delivery details into WRS Site Delivery Record (used to compile the electronic Mud Register) located in the disposal site shack.</li> </ul>	<p>WRS Operations Manager/client's drilling engineer / mud engineer</p> <p>WRS Operations Manager</p>
	<p>Delivery:</p> <ul style="list-style-type: none"> <li>Once location for stockpiling at landfarm has been arranged liaise with delivery contractor</li> <li>Notify WRS of all deliveries to site, providing as much notice as practicable.</li> </ul>	<p>Client production supervisors/drilling supervisors/well services supervisors/ mud engineer/ transport companies Dispatch Manager</p>

Step	What	Who
	<b>Managing Stockpiles:</b> <ul style="list-style-type: none"> <li>Maintain a record of volumes of wastes in storage pits and ensure freeboard and storage capacities are commensurate with drilling waste volumes as far as is practicable.</li> <li>If heavy rainfall reduces pit capacity and freeboard removal of excess rainwater by vacuum tanker to suitable land farming areas until land spreading of mud and solids is practical</li> </ul>	WRS Operations Manager
	<b>Planning for spreading:</b> <ul style="list-style-type: none"> <li>Identify volumes delivered and to be spread</li> <li>Take sample for analysis, dispatch to lab. and provide results to TRC;</li> <li>Consider mixing similar waste to provide the appropriate and /or practical soil improvement properties sought by the landowner</li> </ul>	WRS Operations Manager
	<b>Resample for pre-disposal results</b> <ul style="list-style-type: none"> <li>Calculate loading, area required and spreading rate calculations according to the consent; and</li> <li>Identify location for disposal site based on area required and separation distances (at least 25 metres away from waterways and un-consented property boundaries, 6m from existing gas pipelines, and 2m from other disposal sites).</li> </ul>	WRS Operations Manager
	<b>TRC Notification (spreading):</b> 48 hours prior to spreading advise TRC of date; consent number; well/site; type of waste; volume and location/area it will be spread upon Send sample to laboratory to establish ; concentrations of chloride, nitrogen and TPH.	WRS Operations Manager

## 9. Pre-Delivery and Storage Waste Characterisation

The consent requires that a representative samples are taken from each type of waste to be delivered to the landfarm for either storage or direct spreading. WRS requires that this is taken at source by the well owner or drilling contractor or other suitably qualified person and forwarded to WRS without delay for analysis or a representative sample is taken from by WRS staff at the point of discharge to storage

The sample containers depend upon the waste type sampled – where practical WRS will make all reasonable endeavors to stipulate and provide the correct sample containers.

## 10. Pre-Disposal Testing of Wastes

There are no specific numeric limits specified in the consent for any waste type or consignment received for storage, but spreading rates are determined by TPH concentrations and upper limits for heavy metals in the soils after spreading viz

The concentration of heavy metals in the soil over the disposal area shall at all times comply with the MfE NZ Water and Wastes Association Guidelines for the application of Bio solids to land NZ (2003) and the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011*, as shown in the following table.

These limits in effect act only as a guide to attaining the required dilution and dispersal to meet heavy metal limits via the spreading rates and mixing/ dilution activities

Similarly, the surrender limits for constituents specified in consent 05956-2.0 Condition 29. below provides guidance for pre-spreading calculation/rates.

Table 1 Pre-surrender analytes and limits – see Condition 29. Consent 05956-2.0

Parameter	Consent Limit (mg/kg unless otherwise stated)	Minimum pre-disposal analysis required
Conductivity	290mS/m (guideline)	
Chloride	700 mg/kg (guideline)	
Sodium	460 mg/kg (guideline)	
Total Soluble Salts	2500mg/kg	
TPH Fraction	Guideline Value Agricultural Ecological Direct Soil Contact (Fine Sand) From table5.2	
F1 (C6-C10)	210	
F2 (>C10-C16)	150	
F3 (>C16-C34)	1300	
F4 (>C34 )	5600	
Canadian Council of Ministers of the Environment (CCME), in the document Canada Wide Standard for Petroleum (PHC) in Soil: Scientific Rationale,2008.Table 5.2		
Soil Type Contaminant	Depth of contamination Surface (<1m) (mg/kg)	
Sand Silt MAHs	1.1	i
Benzene	82	
Toluene	59	
Ethylbenzene		
Xylenes	59	

PAH ( Polycyclic Aromatic Hydrocarbons )	7.2	
Naphthalene	160	
Pyrene non-carc	0.027	
Benzo(a)pyrene eq.		
Table 4.12 SANDY SILT Guidelines for Assessing and Managing Petroleum Hydrocarbon Contamination Sites in NZ ( MfE 1999)		

## 11. Mixing Waste

It is not practical or necessary to maintain separation of waste types by providing separate sealed pits as during spreading waste types are generally mixed by the spreading and soil incorporation processes. Actual discharge of wastes into the available sealed pits at the site is generally solids into Pit 1 and liquids into Pit 2, 3 and 4, but if capacities are limited spreading of all waste types occurs on the basis of maintaining the maximum free board possible across all pits.

Predisposal assessment of waste will be carried out for each storage pit prior to any decision to spread. Both the combined product volumes and species concentrations of the resultant aggregated waste will be assessed to guide and provide a check on spreading rates prior to spreading occurring.

## 12. Calculating spreading areas and depth requirements from pre-disposal sample results

The pre-disposal sample results are used for pre-planning of each waste disposal. The consents restrict the thickness that waste can be spread as follows:

- 100mm for wastes with hydrocarbon content less than 50,000mg/kg dry wgt;
- 50mm for wastes with hydrocarbon content greater than 50,000mg/kg dry wgt

Application must be at a rate such that there is no overland flow of liquids; and at a rate such that no ponded liquids remain one hour, after application

To ensure these limits can be met, calculations are based upon results of the pre-disposal sample.

To obtain the minimum area for spreading the calculation is:

a) for TPH < 50,000mg/kg)  
 $\text{volume (m}^3\text{)} / \text{depth allowed (0.10m)} = \text{area m}^2$

b) for TPH > 50,000 mg/kg

volume (m<sup>3</sup>)/ depth allowed (0.05m) = area m<sup>2</sup>

e.g. Volume to be spread is 200 m<sup>3</sup>

Spread Area= 200/0.05 = 4,000 sq. = 0.4Ha

## **13. Monitoring**

### **13.1. Site Inspections**

Regular monitoring inspections of the landfarm sites will be undertaken monthly on average as a minimum when sites are inactive, and weekly or more often the site is active to check for:

- Housekeeping of site (rubbish, access tracks, site layout, safety, security, hazards)
- Status of storage pits (volume, contamination, stability, wastes) and signage (wellsite and waste type)
- Land farming (progress, application, depth/area, slopes, separation, reinstatement), and
- Environmental (boundary distances, discharges/spills, water bodies).

### **13.2. Soil Sampling**

TRC has developed a set of guidelines for the disposal of drilling wastes onto and into land that are reflected in the conditions of resource consents.

These guidelines, along with MFE and NZWWA guidelines, set target concentrations of metals, salts and hydrocarbons at all times, and subsequently the levels of hydrocarbons and other species and physical parameters at surrender.

Although there is no specific condition setting consent holder soil sampling frequencies, consent surrender criteria levels form the basis for the type and frequency of monitoring that will be undertaken at the site for specific purposes.

The suite of analytes that are monitored through periodic sampling of the landfarm spreading areas are determined by sampling purpose e.g. if surrender of land farmed areas is to be applied for.

Soil sampling type, methodology and frequency undertaken by WRS also depends upon two key drivers

- 1) Animal Health and Welfare/ Food Security
- 2) Decision/s to Surrender all or any part of the Consent Area

The sampling requirements and reasons are:

1. Pre-spreading - representative sample/s of the wastes to ascertain levels of hydrocarbons to calculate loadings and rates.
2. Heavy Metals - composite, representative soil samples of each disposal area following spreading at approx. one month after spreading, and then periodically, but not more than



annually, until consent levels cited in conditions in 5659-2.0 and /or 7795-1.0 are attained;  
and

3. Surrender -full testing undertaken on part or all disposal areas prior to lodging an application to surrender part of or close the site.

Analyses are normally conducted on a composite sample fraction. The composite is collected from a surveyed transect or representative “W” across the disposal area. Three to five soil cores are taken at each nominated sample points at depths determined by the objective for sampling from 75mm ( for annual health and welfare criteria) to 400mm ( for environmental sampling required for surrender assessment) From this bulk sample a representative fraction is submitted for analysis. The sampling methodology provides material from the zone of interest eg exposure of livestock (nominally < 75mm) to the depth the material was applied, plus an additional margin to the depth tilling may have occurred to ( nominally 400mm).

All analysis will be provided by R J Hill Laboratories in Hamilton and copies of these analysis results are provided to the TRC by direct electronic transfer simultaneously with receipt by WRS.

Not all parameters are tested at every sample due to cost and practicality – generally a surrogate analytical suite is established in consultation with R J Hills Labs and agreed with the TRC.

Before any consent can be surrendered all parameters will be analysed. The consent cannot be surrendered and the site closed to land farming activities until all species specified in the consent meet the surrender criteria as below for consent 7795-1.0 (Manawapou), or as in Table 1 above for consent 5956-2.0 (Waikaikai).

Table 2 Sampling requirements and consent limits

Parameter	Consent Limit (mg/kg unless otherwise stated)	Typical Sampling requirements for WBM/SBM/Oily Wastes		
		1 month after*	6 months after*	Annual *
Chloride	700 mg/kg (expiry)	/	/	
Sodium (Na)	460 (expiry)			
Conductivity	290 mSm (expiry)			
Sodium Absorption Ratio	18 (post-app)			
Total soluble salts (g/100g)	2500 (expiry)			i

Parameter	Consent Limit (mg/kg unless otherwise stated)	Typical Sampling requirements for WBM/SBM/Oily Wastes		
BTEX	Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in [New Zealand MfE 1999]. Tables 4.12 and 4.15, for soil type sand.	/	/	/
Benzene				
Toluene				
Ethylbenzene				
Xylenes				
PAH				
Naphthalene				
Pyrene				
Benzo(a)pyrene				
TPH				
C6-C9				
C10-C14				

### 13.3. Pasture/Vegetation Monitoring

Pasture/vegetation monitoring will be carried out on a monthly basis in consultation with the landowner/farmer.

Any remedial action will be by agreement with the operator /landowner to enable return to the desired use as soon as practical.

### 13.4. Photographic Records

Representative photos of the site will be taken before spreading, after spreading and then approx.. 1- 2 months and 12 months post spreading. These will be held by the operator for 5 years and made available to the landowner and TRC upon request.

## 14. Contingency Procedures - Transport Spills

The primary transport contractor maintains a spill plan that will be implemented should a spill occur during transport of wastes from the rig to the land farm site. A request for a copy of this plan should be made directly to the transporting company –Symons Transport Ltd or any other carrier used by the client from time to time.

## 15. Site Reinstatement and Closure

When the area consented for landfarming at a particular site has been completed, stockpiling of material on the site will cease and the storage pits and discharge platform area will be reinstated to a standard and conformation compatible with the adjacent land farmed areas.

Monitoring of the site will continue until all spread areas within the site have met consent surrender conditions and guidelines. Typically under the current landfarming methodology this is achieved anywhere from 9-18 months after final rehabilitation

A final campaign of compliance sampling results are required before consents can be surrendered. The final round of sampling will be taken at 100m intervals along parallel transect lines (100m apart) crossing the entire site. This method will treat the site as a whole and provide an overview of waste remediation spatially across the landfarm. This method mirrors the process that the TRC uses to monitor the site on an annual basis.

## 16. Record Keeping

Records are kept of the following, and provided to the Taranaki Regional Council as required by consent conditions:

- Notifications to TRC for disposal delivery and landfarming; trucking contractor and delivery volumes;
- Wastes from each individual well, including records of additives (only if the client/drilling contractor is able or willing to provide these) used at the wellsite during the drilling process;
- Source descriptors (date collected, waste description, volume, any peculiarities in wastes for example: waxy, high percentage water, stony/sandy etc., cement returns);
- Stockpiling (area, volumes stockpiled, dates and times of commencement and completion);
- Disposal (area (including a survey map and GPS co-ordinates), volumes, dates and times of commencement and completion);
- Composition of material (including conductivity, concentrations of , chloride, sodium, total soluble salts and total hydrocarbons, and C6-C9, C10-C14 and C15-C36 fractions);
- Treatments applied (e.g. fertilisers);
- Site Inspections; and
- Sampling, analysis, and results of monitoring.

Records that are to be kept for 5 years from the date of closure include copies of the TRC monitoring programs, inspection notices, sample forms, sample results and notifications. These will be held on disc and/or in hard copy, all of which are managed by Waste Remediation Services Ltd's Operations Manager.

## 17. Accountabilities/Responsibilities On and Off Site

These personnel are responsible for the following activities:

Operations Manager	Implementation of this plan, maintaining records of all wastes approved for disposal via land farming, manage landfarm sites, provide notifications and reports to TRC as required by resource consent conditions.
Operations Manager	Liaison with landowners for all land farming matters
Client production supervisors, drilling supervisors, well services supervisors, mud engineers	Provide notification and information on source, nature and volume of wastes to WRS's Operations Manager. Collect sample at source and forward to WRS's Operations Manager Organise transport to the landfarm site.

Civil/Earthworks/Spreading Contractor	Undertake spreading of wastes as instructed by WRS's Operations Manager, and in accordance with TRC consent conditions.
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## 18. Reference Documents

Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment, 1999.

Disposal of Hydrocarbon Drilling Wastes near Geary Road, Taranaki Regional Council Report, June 2000.

Public Health Guidelines for the safe use of Sewage Effluent and Sewage Sludge on Land, Department of Health.

Guidelines for the control of disposal of drilling wastes onto and into land, Taranaki Regional Council, July 2003, 2005 and 2013.

Review of typical TRC consent conditions to discharge drilling wastes and oily wastes via landfarming

Alberta Energy Et Utilities Board Guide 50: Drilling Waste Management, October 1996  
Resource Consents

Consent Monitoring and Compliance Programmes

New Zealand Water and Wastes Association (2003): New Zealand guidelines such as Guidelines for the safe application of bio solids to land.

KMB August 2019

END

## Appendix F TRC Inspection Notices

.....END

## Inspection Notice

Under section 332 of the Resource Management Act 1991

COPY

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikaikai Farms Limited)

**Inspection Number:** OBS-2018-49467  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 06 Jul 2018  
**Inspection Time:** 11:00

**Weather Details:**  
Rainfall: None  
Wind Direction: NE  
Wind Strength: Light

**Samples Taken:** No

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Conditions Assessed:** 32 of 32

**Overall Compliance Status:** Compliance

### Inspection Comments:

No objectionable odours or visible emissions were found during the inspection. Lined pits contain drilling wastes, contractors on-site emptying drilling muds from pit 1. Pit 2 appeared to contain liquid only with some surface crude. Both liners appeared in good repair. Spreading area has had muds applied, impacted soil stockpiled at the northern end of the current spreading area and is awaiting spreading. Historic application areas inspected, pasture cover complete and all pasture appeared healthy, no muds were identified at the surface.

**Further Actions Advice:** Nil

### Signed:



**Council Officer:** John Cooper

**Officer Warrant Number:** 174

Disclaimer: The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.

## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikalkai Farms Limited)

COPY

**Inspection Number:** OBS-2018-50425  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 13 Aug 2018  
**Inspection Time:** 10:15

**Weather Details:**  
Rainfall: None  
Wind Direction: NE  
Wind Strength: Light

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Overall Compliance Status:** Compliance

**Inspection Comments:** No objectionable odours or visible emissions were found during the inspection. No recent mud deliveries appear to have occurred. Storm water component of pit 2 recently applied to current spreading area, southern extent bunded, some ponded mud/water present at the bund wall. Works have occurred to incorporate the muds. Stockpiled topsoil stable. Pits maintained below capacity, liners appeared in good repair. Crude and surface hydrocarbons in both pits, some vegetation die-off around the pit fringes due to evaporating hydrocarbons.

**Further Actions Advice:**

**Signed:**



**Council Officer:** John Cooper

**Officer Warrant Number:** 174

Disclaimer: The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.

## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Walkaikai Farms Limited)

COPY

**Inspection Number:** OBS-2018-52988  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 22 Nov 2018  
**Inspection Time:** 12:15

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Overall Compliance Status:** Compliance

**Inspection Comments:** No objectionable odours or visible emissions were found during the inspection. Recent spreading area has been worked and pasture has been sown, strike looked good across all areas, no mud was identified at the surface. Historic spreading areas had complete pasture cover which appeared healthy. Pit liners appeared in good repair, one pit contained a red liquid, the second pit was partially emptied during the most recent spreading campaign and contained mainly muds, lots of crude/hydrocarbons present in the pit.

**Further Actions Advice:**



**Signed:**

**Council Officer:** John Cooper

**Officer Warrant Number:** 174

**Disclaimer:** The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.



## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikaikai Farms Limited)

COPY

**Inspection Number:** OBS-2019-55455  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 26 Feb 2019  
**Inspection Time:** 15:00

**Weather Details:**

Rainfall:	None
Wind Direction:	W
Wind Strength:	Light

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Overall Compliance Status:** Compliance

**Inspection Comments:** Inspection found the historic spreading areas had good pasture cover which appeared healthy, no muds were identified at the surface. Storage pits found to contain product, liners appeared in good repair and storage capacity was available within the pits. A drop test was being undertaken but had to be abandoned due to product deliveries occurring. A new storage pit is being dug and a synthetic liner has been sourced. Meeting held with contractors to assess new area where disposal is to occur, the earth is to be contoured in the south west of the site prior to having muds applied in the near future. No incidents were reported.

### Further Actions Advice:

**Signed:**



**Council Officer:** John Cooper

**Officer Warrant Number:** 174

Disclaimer: The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.

## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikaikai Farms Limited)

COPY

**Inspection Number:** OBS-2019-56980  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 08 Apr 2019  
**Inspection Time:** 09:45

**Weather Details:**  
Rainfall: Light  
Wind Direction: S  
Wind Strength: Medium

**Samples Taken:** No

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Overall Compliance Status:** Compliance

### Inspection Comments:

A new lined pit has been finished at the storage area, the pit is approximately 45 x 15 metres, liner in good condition, no muds have been introduced yet. The other two lined pits were quite full but had available capacity to cope with likely storm water inputs, liners appeared in good repair. Recent landspreading area inspected and found to be satisfactory, muds remaining within the designated area, topsoil has been scraped to form a bund wall around the area and the paddock is essentially level, works yet to occur to incorporate the muds. Historic spreading areas found to have complete pasture cover which appeared healthy.

**Further Actions Advice:** Nil

**Signed:**



**Council Officer:** John Cooper

**Officer Warrant Number:** 174

**Disclaimer:** The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.

## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikaikai Farms Limited)

COPY

**Inspection Number:** OBS-2019-57831  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 06 May 2019  
**Inspection Time:** 10:15

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Overall Compliance Status:** Compliance

**Inspection Comments:** No objectionable odours or visible emissions were found during the inspection. The southern pit in the storage area was full, very little surface hydrocarbons present. The eastern pit has been emptied onto the current spreading area and the liner has been removed, a new liner is onsite awaiting installation. The northern pit is yet to have any muds introduced. Spreading area inspected, muds drying out and broke apart easily in places, no ponded liquids present. historic spreading areas had good pasture cover which appeared healthy, no muds were identified at the site surface. No incidents were reported.

**Further Actions Advice:**



**Signed:**  
**Council Officer:** John Cooper  
**Officer Warrant Number:** 174

Disclaimer: The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.

## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikaikai Farms Limited)

COPY

**Inspection Number:** OBS-2019-59377  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 14 Jun 2019  
**Inspection Time:** 09:45

**Weather Details:**  
Rainfall: None  
Wind Direction: E  
Wind Strength: Light

**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming

**Conditions Assessed:** 32 of 32

**Overall Compliance Status:** Compliance

**Inspection Comments:** No objectionable odours or visible emissions were found during the inspection. The new pit liner has been installed and muds have been introduced, the southern pit has been lowered, it was outlined by management that the liner integrity is to be investigated and may need to be renewed. The northern lined pit is yet to have mud introduced. A new area adjacent to the previous spreading area has been worked (approx. 3Ha), muds have been applied, no evidence of run-off beyond the spreading area was found, the previous spreading area is yet to have works undertaken to incorporate the muds. Previous spreading areas had good pasture cover which appeared healthy, no muds were found at the surface.

**Further Actions Advice:**



**Signed:**

**Council Officer:** John Cooper

**Officer Warrant Number:** 174

**Disclaimer:** The compliance rating reflects the warranted Officer/s observations at the time of inspection and does not provide a comprehensive assessment of compliance with the consent. Therefore the compliance rating is limited to the exact period during which the inspection was undertaken as well as the specific aspects that were inspected.