Waste Remediation Services (WRS) Ltd
Symes Manawapou Landfarm

Monitoring Programme

Annual Report

2021-2022

Technical Report 2022-27

Working with people | caring for Taranaki

Taranaki
Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

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Executive summary

Waste Remediation Services Ltd (the Company) operates WRS Symes Manawapou Landfarm, located at 156 Manawapou Road, Manutahi, in the Manawapou catchment, South Taranaki. The consent was granted in 2012 and was then transferred to the Company in June 2014. This report marks the eighth year that the Company has been in charge of the landfarm and it is the 10th annual report by the Council for this facility.

During the monitoring period, the Company demonstrated an overall good level of environmental performance and an overall improvement required level of administrative performance.

This report for the period July 2021 to June 2022 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 include a total of 31 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to allow it to discharge drilling waste and water treatment sludge to land under the practice known as landfarming.

The Council's monitoring programme for the year under review included three routine inspections fourteen water samples and four composite soil samples collected for physicochemical analysis. Most of the samples demonstrated stability for the analytes tested. GND2302 has observed a steady rise in chloride concentrations since 2017 and has since been fluctuating yearly, but appears to be slightly declining again. While in the case of GDN2303, these have risen since its installation in 2012, but are also now experiencing a slight decline since late 2021, displaying some improvement in both the wells.

Bore GND2303 was damaged for the first half of this monitoring period and was repaired in February 2022.

Only in two instances were traces of petroleum related contaminants detected, but the remaining results were below the levels of detection.

The Company accepted material from 21 different sources and received a total 16,017 m^3 of both solid and liquid wastes. Preparation of a new spreading area in Stage II seaward and westward of site area M2110 occurred during this monitoring period.

The Company was late in notifying the Council of discharged material on site in November 2021 which is a requirement stated under condition 8 in consent 7795-1.1. No subsequent sample analysis was undertaken by the Company either, which is necessary under condition 10 of the same consent. This resulted in '14 Day Letters' being issued to both the WRS and the associated client. The Company were very transparent with the Council when it discovered that they were unaware of the deposits themselves and were late in notification. The response explanation and preventative measures implemented were accepted by the Council.

For reference, in the 2021-2022 year, consent holders were found to achieve a high level of environmental performance and compliance for 88% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 10% 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 has improved in the year under review from the previous year, although site control can still be improved.

This report includes recommendations for the 2022-2023 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 2021 to June 2022 by the Taranaki Regional Council (the Council) on the monitoring programme associated with a resource consent held by Waste Remediation Services Ltd (WRS) (the Company). The Company operates a landfarm, WRS Symes Manawapou Landfarm situated at 156 Manawapou Road, Manutahi, in the Manawapou 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 to discharge drilling waste to land.

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 land, and is the ninth annual report by the Council for the Company.

1.1.2 Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by the Company in the Manawapou 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 2021-2022 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' in as much 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 consent holders, this report also assigns a rating as to each Company's environmental and administrative performance during the period under review. The rating categories are high, good, improvement required and poor for both environmental and administrative performance. The interpretations for these ratings are found in Appendix III.

For reference, in the 2021-2022 year, consent holders were found to achieve a high level of environmental performance and compliance for 88% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 10% of the consents, a good level of environmental performance and compliance was achieved.[1]

1.2 Process description

1.2.1 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 (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, paraffin 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

[1] The Council has used these compliance grading criteria for more than 18 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

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.

1.2.2 Landfarming

The landfarming process has typically been used in the Taranaki region to assist the 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.

Photos 1 -3 depict different stages in the landfarming process at the Manawapou Landfarm. The landfarming process utilised at the site is on a single application basis. This means dedicated spreading areas each receive only a single application of waste. When disposal is complete, the area will be reinstated and monitored until consent surrender criteria have been met.

Photo 1 WRS Symes Manawapou Landfarm post discharge and reinstatement pre-seeding 2014

Photo 2 WRS Symes Manawapou Landfarm post surrender sampling 2018

Site location and description

The site is located on Manawapou Road, Manutahi in South Taranaki. This site is positioned on marginal coastal farm land situated on reworked dune fields. An extensive (100-250 m) foredune is located seaward of the consented site, and will remain undisturbed by site activities. The foredune provides a considerable natural buffer from prevailing onshore winds. A natural gas pipeline runs adjacent to the length of the site on the seaward side, marking the seaward extent of the disposal site. In addition, a QE II covenant is located in the north western end of the site, and Lake Taumaha (which is a QE II covenant and a Key Native Ecosystem) is located east of the site. The proximity of the site to these recognised ecosystems has been taken into account in the setting of buffer distances and location of the stockpiling facilities.

The predominant soil type has been identified as black loamy sand and vegetation growth is primarily a mixture of pasture and dune grasses. Test pitting and the logging of boreholes on site indicated a relatively shallow water table. Test bores were augured to 10 m in the pit area, revealing extensive compacted, low permeable clays underlying coastal dune sands. Pit construction revealed mostly tightly packed sand at the pit bases (approximately 4-5 m below surface). Average annual rainfall for the site is 1,023 mm (taken from the nearby 'Duffy' monitoring station). As with the other South Taranaki coastal sites, this site is subject to strong winds.

Photo 3 Landfarming area M2110 2021 (image provided by WRS)

Figure 1 WRS Symes Manawapou Landfarm extent and regional location

Site data

Location	
Word descriptor:	Manawapou Road, Manutahi, Taranaki
Map reference:	E 1717244
(NZTM)	N 5608736
Mean annual rainfall:	1,023 mm
Mean annual soil temperature:	~15.1°C
Mean annual soil moisture:	~32.9%
Elevation:	~40 m
Geomorphic position:	Dune backslope
Erosion / deposition:	Erosion
Vegetation:	Pasture, dune grasses
Parent material:	Aeolian deposit
Drainage class:	Free / well draining

1.3 Resource consents

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

A summary of the various consent types issued by the Council is included in Appendix I, as are copies of all permits held by the Company during the period under review.

Table 1 Consent held by the Company

Consent number	Purpose	Granted	Review	Expires
Discharge of wastes to land				
7795-1.1	To discharge drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and Sediment retention pond sludge from water treatment plants onto and into land via landfarming	(May 2012) December 2020	June 2025	June 2028

1.4 Monitoring programme

1.4.1 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 Symes Manawapou Landfarm consisted of four primary components.

1.4.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

The Symes Manawapou Landfarm was visited four times during the monitoring period; three routine inspections and one follow-up from the previous monitoring period. The main points of interest were the storage of material in fit for purpose cells, the management of stormwater, the scale of revegetation of previously landfarmed areas, housekeeping and record keeping. The neighbourhood was also surveyed for environmental effects. This included for any potential impacts to air through odour, which may have been generated as a process of the exercise of this consent.

1.4.4 Chemical sampling

Soil, groundwater, and surface water monitoring form part of the annual compliance monitoring programme for the Manawapou Landfarm. Previously landfarmed areas had been sown into pasture and had shown good growth. As such soil samples were collected during June 2022, while groundwater samples were collected quarterly, and surface water in June 2022.

Groundwater monitoring

The facility, as part of its consented obligations contains an active groundwater monitoring network which is comprised of four groundwater monitoring bores. These bores were sampled four times per annum to identify the seasonal groundwater level fluctuation and monitor for any adverse effects. Sampling was undertaken using a peristaltic pump, with samples collected once field parameters had been stable for three consecutive readings. Field parameters were captured via a Yellow Springs Instrument (YSI) multi parameter probe.

Groundwater analysis parameters

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

Soil monitoring

Soil sampling is undertaken to assess the concentration of target contaminants within the soil, within a landfarmed area. The methodology utilised by the Council for the collection of soil samples was adapted from the Guidelines for the Safe Application of Biosolids to land in New Zealand (2003). A soil corer is inserted to a depth of 400 mm +/- to encompass the zone of drilling mud application. Ten soil cores are collected in a line, with ten meter spacing between each sample. These ten soil cores are then composited to gain one representative soil sample of a landfarm application area.

Soil analysis parameters

- Total heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc);
- Chloride, conductivity, sodium, sodium adsorption ratio (SAR) and soluble salts;
- Total petroleum hydrocarbons; poly-cyclic aromatic hydrocarbons and mono-cyclic aromatic hydrocarbons; and
- Moisture factor.

Surface water monitoring

A surface water sample is collected from Lake Taumaha annually. The aim of this sample is to provide a brief chemical assessment of the surface water body.

- Total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylenes (BTEX).
- Temperature, electrical conductivity, chloride, sodium, pH, total dissolved solids and acid soluble barium.

1.4.5 Provision of consent holder provided data

As required by resource consent (7795-1.1, condition 13), the Company provided the Council with an annual report on the consent holder's operations in the 2021-2022 monitoring period. A copy of the annual report can be found in Appendix II of this compliance monitoring report.

2 Results

2.1 Inspections

6 July 2021

A follow up inspection was undertaken after recent non-compliance due to the acceptance and discharge to land of LOSP treated sawdust. The inspection found that no more sawdust had been accepted on site.

Pit 1 liquid level was high, therefore it was difficult to determine if any sawdust remained. However, it appeared that the sawdust has been discharged to land. The pile of sawdust last noted on land in the storage area, has been removed and discharged to land. No further issues to note. The site was deemed compliant with Abatement Notice EAC-24109.

29 October 2021

Compliance monitoring inspection was undertaken to assess compliance with resource consent conditions. Land farming activities were being undertaken at the time of inspection.

Overall, there were no issues to note and the Company was found compliant at the time of inspection.

3 December 2021

An office assessment was undertaken after recent non-compliance in November 2021. Notification was received of material delivered to WRS Manawapou Landfarm on the 18 November2021, the notification was provided by OMV to Council on 02 December2021. A notification from the consent holder is required within 48 hours prior to drilling waste activities in preparation for stockpiling by consent 7795-1.1 condition 8.

Further, no sample analysis as stipulated by consent 7795-1.1, condition 10 had been supplied and the consent holder did not realise the material had been accepted to the site until the 29-11-2021.

5 April 2022

An inspection was undertaken to assess compliance with resource consent conditions. Land farming activities have recently been undertaken in the area adjacent to the area previously land farmed. Waste had not been incorporated into the soil as yet.

Previously land farmed area had good pasture strike. Historically land farmed areas look good and few barren patches remained.

Overall, there were no issues to note and the Company was found compliant at the time of inspection.

7 June 2022

A routine Inspection was undertaken to assess compliance with Resource Consent conditions. The inspection found that the area in front of the pits that was most recently land farmed has good pasture strike. Land spreading activities are still taking place next to this area and there appeared to be recent deliveries into pit 1.

Overall, there were no issues to note on the inspection and the Company was monitoring within their consent conditions.

2.2 Results of receiving environment monitoring

2.2.1 Results of the discharge monitoring

2.2.1.1 Groundwater monitoring

The Symes Manawapou Landfarm contains four groundwater monitoring bores (Figure 2). The bores were installed as part of the consent and have been monitored since October 2012. They were installed to assess the quality of the groundwater; in close proximity to the storage cells in the case of GND2300 and 2301, and the landfarming exercise, in the case of GND2302 and 2303.

Four monitoring rounds were undertaken across the four bores. These were as close to quarterly as practicable to assess for seasonal variation. The analysis of the four monitoring rounds is provided in the following Tables 2-5.

Figure 2 WRS Symes Manawapou Landfarm groundwater monitoring locations

GND2300 is located in close proximity to the storage cells of Symes Manawapou Landfarm. The results of the four rounds are provided in Table 2.

Table 2 GND2300 2021-2022 monitoring period

GND2300	Collected	13 Sep 2021	12 Jan 2022	30 Mar 2022	22 Jun 2022
Parameter	Time	12:50	09:20	12:25	13.25
TEMP	°C	14.8	15.8	16.4	15.3
Electrical Conductivity (EC)	µS/cm	751	749	871	768
	mS/m	75.1	74.9	87.1	76.8

GND2300	Collected	13 Sep 2021	12 Jan 2022	30 Mar 2022	22 Jun 2022
Parameter	Time	12:50	09:20	12:25	13.25
Total Dissolved Solids (TDS)	g/m^3	440	450	520	460
Acid Soluble Barium	g/m^3	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m^3	0.029	0.022	0.044	0.019
Chloride	g/m^3	161	138	178	129
Total Sodium	g/m^3	74	89	103	108
pH	pH Units	6.2	6.5	6.3	6.4
C7 - C9	g/m^3	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m^3	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 00010
m&p-Xylene	g/m^3	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010

- Temperature remained relatively stable, ranging 14.8-16.4 °C.
- Electrical conductivity (EC) remained relatively stable during September, January, and June, with a slight increase displayed in March 2022. When compared to the long term record, there has been a general reduction in EC since 2019 (Figure 3).
- Total dissolved solids (TDS), in similarity to the EC results, demonstrated stable levels across September, January, and June, with a slight increase in March. Over the long term record this parameter has recorded a reduction in concentration since 2019 (Figure 4).
- Acid soluble barium remained below the laboratory defined limit of detection (LOD), across all four monitoring rounds this period.
- Dissolved barium remained of low concentration across all four samples analysed. Ranging from 0.019-0.044 g/m^3.
- Chloride results ranged 129-178 g/m^3. This analyte had lower levels in January and June, with slightly elevated levels occurring in the September and March rounds. This similarly echoes both the EC and TDS results over time (Figure 5).
- Sodium results ranged 74-108 g/m^3 and showed a slight increasing trend.
- pH results remained quite stable and weakly acidic, ranging 6.2-6.5 pH.
- No total petroleum hydrocarbons (TPH) or benzene, toluene, ethylbenzene or xylenes (BTEX) were recorded above the LOD this monitoring period.

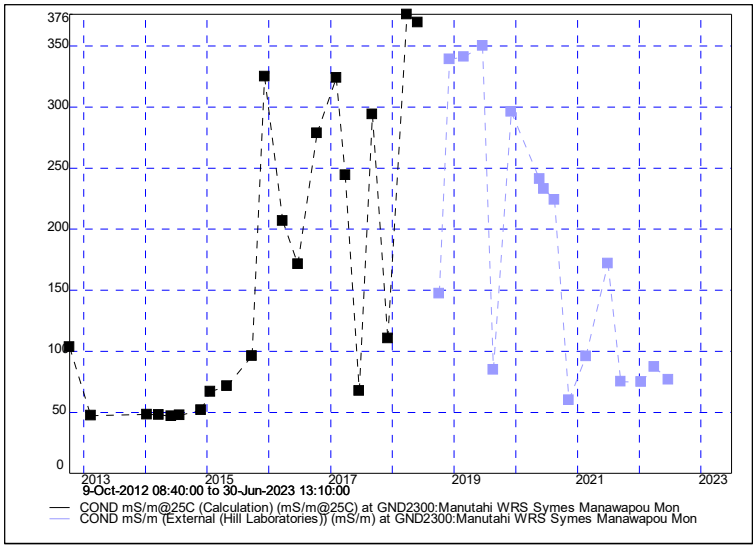


Figure 3 Long term EC mS/m @ 25°c monitoring GND2300 2012-2022

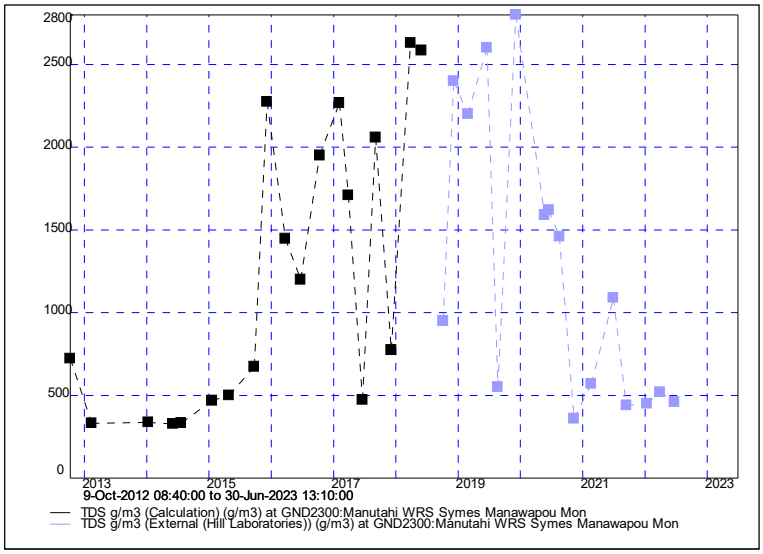


Figure 4 Long term TDS g/m^3 GND2300 2012-2022

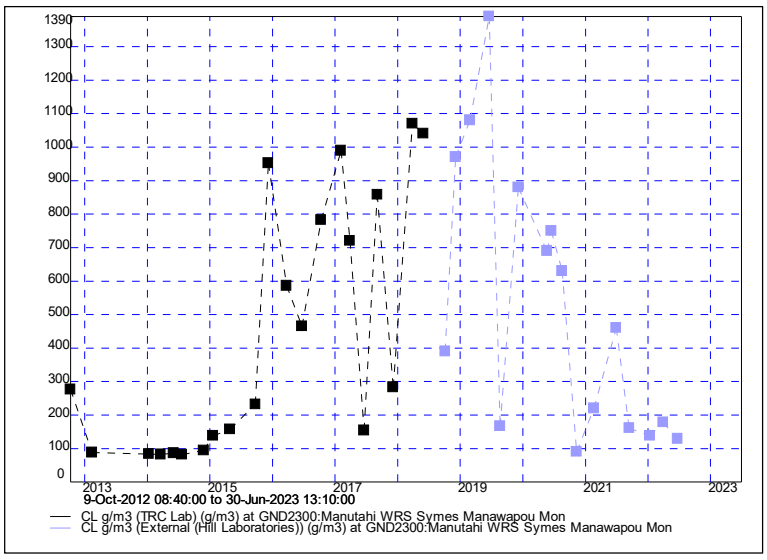


Figure 5 Long term chloride g/m^3 results GND2300 2012-2022

GND2301 is also located in close proximity to the storage cells. The results of the four monitoring rounds are provided in the following Table 3.

Table 3 GND2301 2021-2022 monitoring period

GND2301	Collected	13 Sep 2021	12 Jan 2022	30 Mar 2022	22 Jun 2022
Parameter	Time	12:10	09:55	11:50	12:35
TEMP	°C	15.1	16.2	17.1	15.5
Electrical Conductivity (EC)	µS/cm	908	859	674	1137
	mS/m	90.8	85.9	67.4	113.7
Total Dissolved Solids (TDS)	g/m³	560	560	420	660
Acid Soluble Barium	g/m³	0.59	0.60	0.44	0.54
Dissolved Barium	g/m³	0.63	0.59	0.43	0.50
Chloride	g/m³	78	63	50	129
Total Sodium	g/m³	50	46	47	55
pH	pH Units	6.5	6.9	6.6	6.7
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010	< 0.0010	0.027
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010

The monitoring of GND2301 is provided in Table 3.

- Temperature remained relatively stable, ranging 15.1-17.1 °C.
- EC results started off high, then dropped in March before increasing again in June, ranging 67.4-113.7 mS/m.
- TDS also remained stable, ranging 420-660 g/m³, with a marginal rise in June.
- Acid soluble and dissolved barium remained relatively stable and of low concentrations across the four monitoring rounds.
- Chloride ranged 50-129 g/m³, starting fairly stable then rising slightly in June.
- Sodium remained stable, ranging 46-55 g/m³.
- pH remained weakly acidic, ranging 6.5-6.7 pH.
- Traces of toluene was recorded at 0.027 g/m³ in June 2022, but for the majority of the monitoring period TPH and BTEX were not recorded above the LOD.

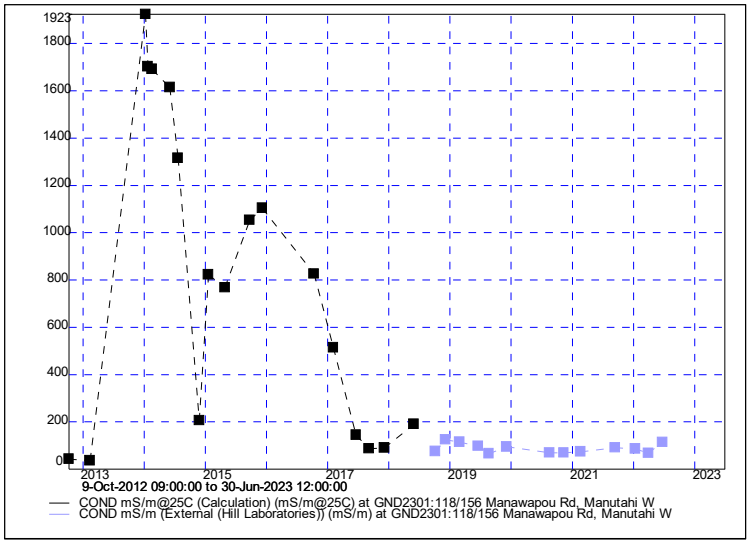


Figure 6 Long term EC mS/m @ 25°c monitoring GND2301 2012-2022

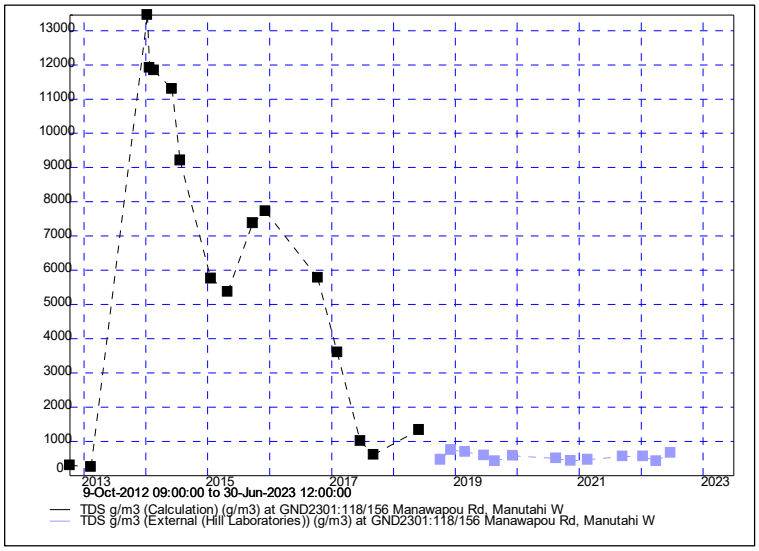


Figure 7 Long term TDS g/m^3 GND2301 2012-2022

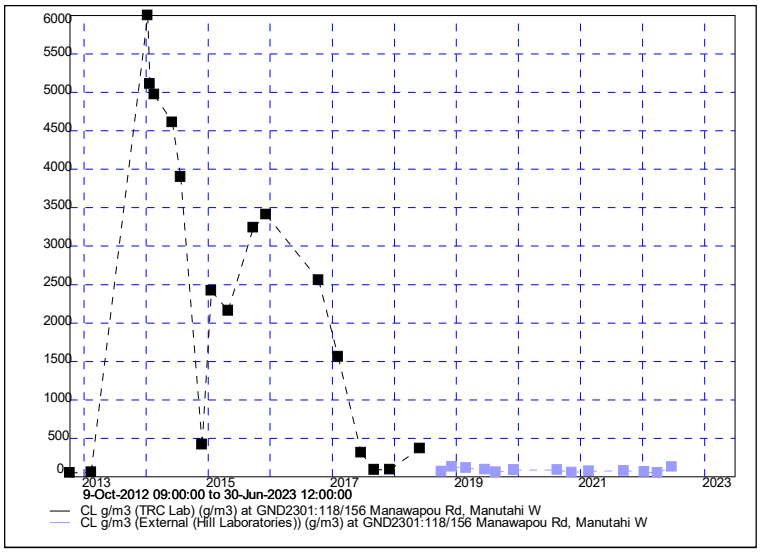


Figure 8 Long term chloride g/m^3 results GND2301 2012-2022

GND2302 is located in the north western corner of the site, in the older landfarmed areas, which were farmed prior to the Company involvement at the site.

Table 4 GND2302 2021-2022 monitoring period

GND2302	Collected	13 Sep 2021	12 Jan 2022	30 Mar 2022	22 Jun 2022
Parameter	Time	11:30	10:45	09:30	10:55
TEMP	°C	14.8	16.9	15.7	14.6
Electrical Conductivity (EC)	µS/cm	1290	1132	833	1339
	mS/m	129.0	113.2	83.3	133.9
Total Dissolved Solids (TDS)	g/m^3	800	720	540	820
Acid Soluble Barium	g/m^3	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m^3	0.058	0.044	0.030	0.057
Chloride	g/m^3	280	230	150	300
Total Sodium	g/m^3	80	75	65	90
pH	pH Units	6.3	6.6	6.6	6.5
C7 - C9	g/m^3	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m^3	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m^3	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m^3	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010

The monitoring of GND2302 is provided in Table 4.

- Temperature ranged 14.6-16.9°C.
- EC has recorded an annual increase in this parameter since 2017. The results in this period recorded a slight reduction in concentration during March, ranging 83.3-133.9 mS/m. The annual peak in concentration (June 2022) within this monitoring period (133.9 mS/m) was less than the previous monitoring period (170.9 mS/m, July 2021). Over the long term record this parameter has recorded a steady increase in concentration over time (Figure 9). The results from this monitoring period suggest that the peak concentration has been reached. However, further monitoring will assess for this over time.
- TDS followed a similar trend to EC, with a lower concentration during March, prior to an increase in the final monitoring round, with a range 540-820 g/m^3. The long term record (Figure 10) suggests a steady increase in this parameter. However, TDS has recorded a reducing peak concentration since June 2019. The results do not exceed the consent condition 22, which allows up to 2,500 g/m^3 of this analyte. Further monitoring will assess this location over time.
- Acid soluble barium was below the LOD.

- Dissolved barium remained of low concentrations, ranging 0.030-0.058 g/m^3.
- Chloride monitoring, had a similar trend to EC and TDS, ranging 150-300 mg/kg. The long term record indicates a steady increase over time (Figure 11). The annual peak in concentration (300 g/m^3, June 2022) was of lesser concentration than in the previous monitoring period (400 g/m^3, June 2021). This may suggest that peak concentrations have been reached in this well, however, further monitoring will assess for this over time.
- Sodium ranged 65-90 g/m^3.
- pH remained relatively stable and weakly acidic, ranging 6.3-6.6 pH.
- No TPH or BTEX were recorded above the LOD in any of the four monitoring rounds this monitoring period.

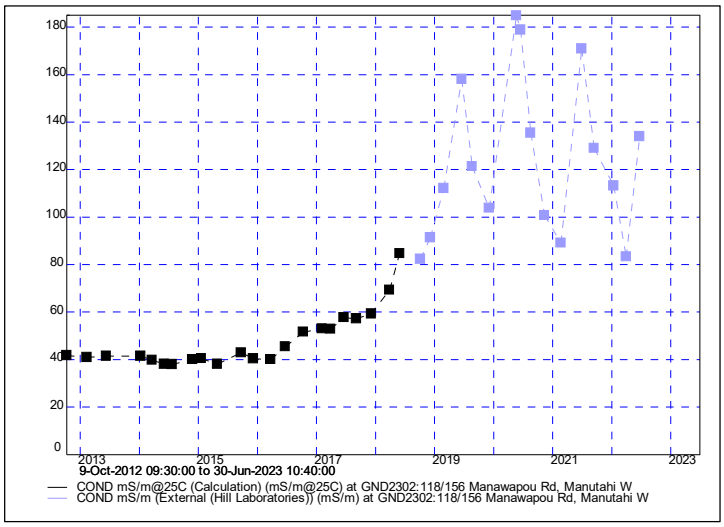


Figure 9 Long term EC mS/m @ 25°C monitoring GND2302 2012-2022

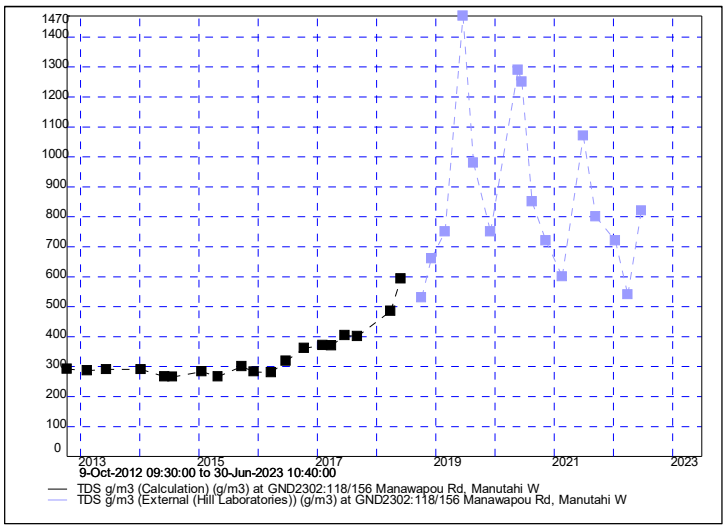


Figure 10 Long term TDS g/m^3 monitoring GND2302 2012-2022

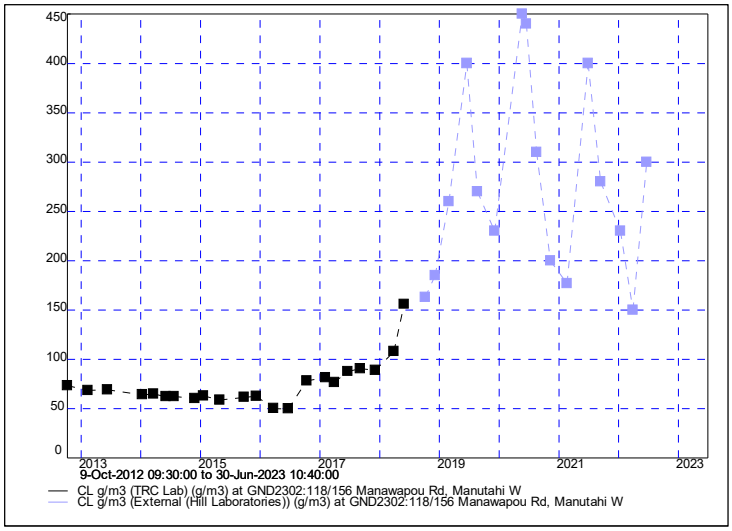


Figure 11 Long term chloride g/m^3 monitoring GND2302 2012-2022

GND2303 is located on the north eastern side of the site, close to the older landfarmed areas of the site and area M1408. The results are provided in the following Table 5. This well was damaged by heavy hedge cutting machinery during the 2020-2021 monitoring period, and the Company communicated that it would be repaired February 2022, and routine sampling was able to continue in March 2022.

Table 5 GND2303 2021-2022 monitoring period

GND2303	Collected	13 Sep 2021	12 Jan 2022	30 Mar 2022	22 Jun 2022
Parameter	Time			10:35	11:40
TEMP	°C	Bore broken	Bore broken	17.6	14.6
Electrical Conductivity (EC)	µS/cm	-	-	563	696
	mS/m	-	-	56.3	69.6
Total Dissolved Solids (TDS)	g/m^3	-	-	390	440
Acid Soluble Barium	g/m^3	-	-	0.61	< 0.11
Dissolved Barium	g/m^3	-	-	0.043	0.047
Chloride	g/m^3	-	-	90	119
Total Sodium	g/m^3	-	-	64	76
pH	pH Units	-	-	6.7	6.5
C7 - C9	g/m^3	-	-	0.32	< 0.10
C10 - C14	g/m^3	-	-	< 0.2	< 0.2
C15 - C36	g/m^3	-	-	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m^3	-	-	< 0.7	< 0.7
Benzene	g/m^3	-	-	< 0.0010	< 0.0010
Toluene	g/m^3	-	-	< 0.0010	< 0.0010
Ethylbenzene	g/m^3	-	-	< 0.0010	< 0.0010
m&p-Xylene	g/m^3	-	-	< 0.002	< 0.002

GND2303	Collected	13 Sep 2021	12 Jan 2022	30 Mar 2022	22 Jun 2022
Parameter	Time			10:35	11:40
o-Xylene	g/m^3	-	-	< 0.0010	< 0.0010

This monitoring well has recorded some elevated saline impacts to groundwater over the past ten years (Figures 12-14). TDS in particular (Figure 13) has been found to be in breach of consent 7795-1.1, condition 22 on seven occasions since 2015 (peaking at 3,900 g/m^3 in June 2019). However, the previous seven monitoring rounds had been below this limit.

The increase noted in EC, TDS and chloride appear to correspond loosely with landfarming dates undertaken by the Company over time. Area M1408 was finalised in at the end of August 2014, with elevation in these parameters noted to occur throughout 2015. Area M1610 was landfarmed in October 2016, while area M1810 was initiated in June 2017 through to October 2018.

The monitoring well has since been repaired and the results observed are set out below:

- Temperature ranged 14.6-17.6°C.
- EC ranged 56.3-69.6 mS/m
- TDS ranged 390-440 g/m^3
- Acid soluble barium was recorded at 0.61 g/m^3 in March 2022 and below the LOD in June.
- Dissolved barium remained stable and of low concentrations, ranging 0.043-0.047 g/m^3.
- Chloride monitoring remained stable with a slight increase in the last round, ranging 90-119 g/m^3. This concentration level is much lower than that recorded in the previous period which was 1060 g/m^3.
- Sodium ranged 64-76 g/m^3, which is also lower than the previous period
- pH remained relatively stable and weakly acidic, ranging 6.5-6.7 pH.
- Traces of C7-C9 were recorded at 0.32 g/m^3 in March 2022. No other TPH or BTEX were recorded above the LOD.

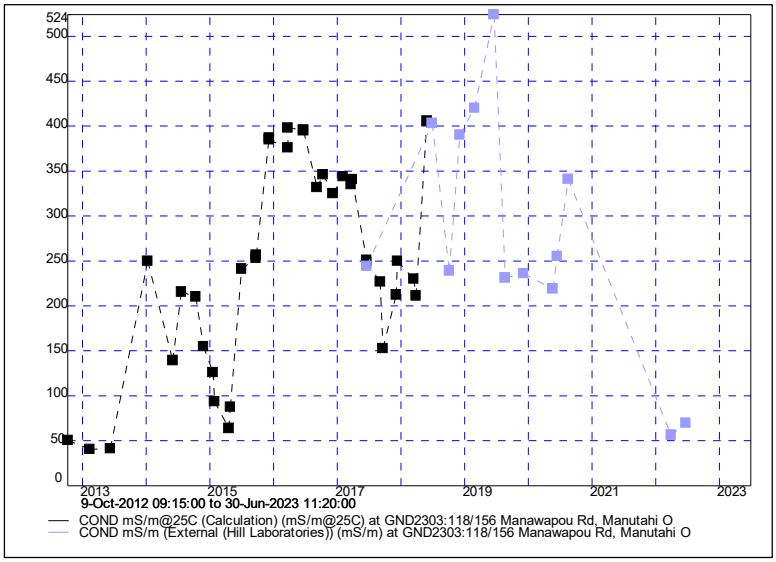


Figure 12 Long term EC mS/m @25°C monitoring GND2303 2012-2022

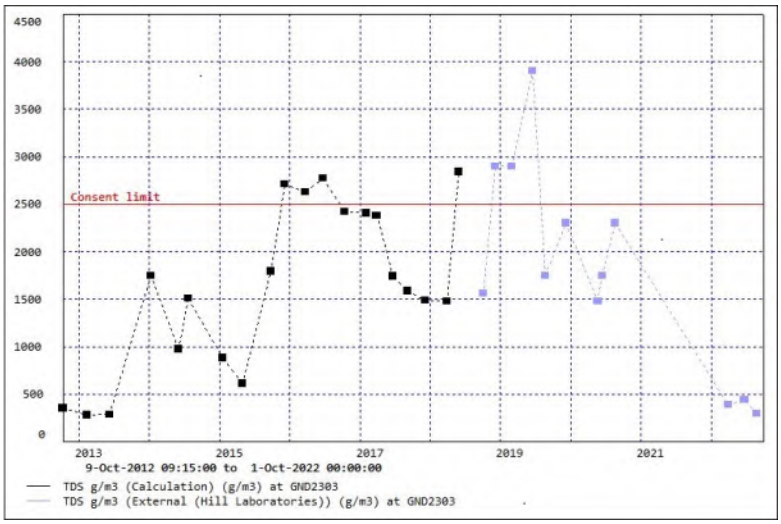


Figure 13 Long term TDS g/m^3 monitoring GND2303 2012-2022

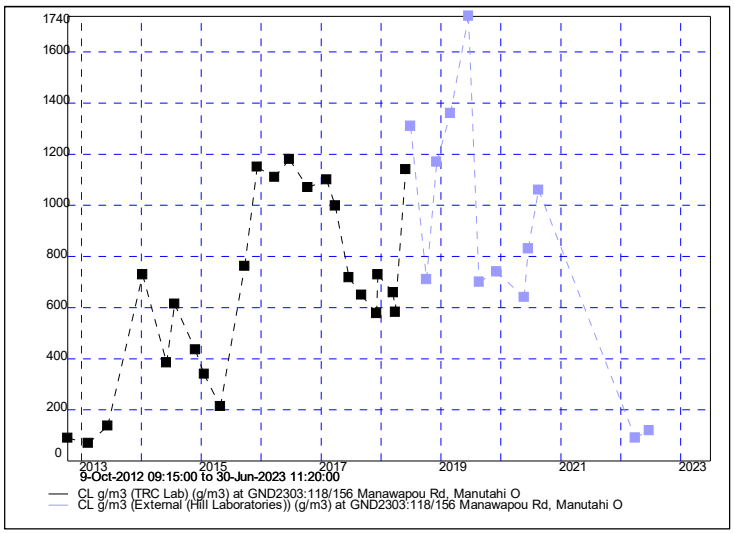


Figure 14 Long term chloride g/m^3 monitoring GND2303 2012-2022

Lake Taumaha surface water sample

A surface water sample (Table 6) was collected from Lake Taumaha (Figure 15) this monitoring period.

Figure 15 Sample location Lake Taumaha

Table 6 Lake Taumaha surface water sample

LTM00001	Collected	22 Jun 2022
Parameter	Time	11:30
TEMP	°C	11.4
Electrical Conductivity (EC)	µS/cm	383
	mS/m	38.3
Total Dissolved Solids (TDS)	g/m³	220
Acid Soluble Barium	g/m³	< 0.11
Chloride	g/m³	72
Total Sodium	g/m³	39
pH	pH Units	7.9
C7 - C9	g/m³	< 0.10
C10 - C14	g/m³	< 0.2
C15 - C36	g/m³	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7
Benzene	g/m³	< 0.0010
Toluene	g/m³	< 0.0010

LTM00001	Collected	22 Jun 2022
Parameter	Time	11:30
Ethylbenzene	g/m^3	< 0.0010
m&p-Xylene	g/m^3	< 0.002
o-Xylene	g/m^3	< 0.0010

- Water temperature of Lake Taumaha was recorded at 11.4°C.
- EC was recorded at 38.3 mS/m, which is similar to the previous two monitoring periods (39.2-41.2 mS/m).
- TDS was recorded at 220 g/m^3, which is equal to the previous monitoring period.
- Acid soluble barium remains below the LOD.
- Chloride was recorded at 72 g/m^3, which is within range of the previous two sample periods, ranging 70-74 g/m^3.
- Sodium was recorded at 39 g/m^3, which is within range of the previous two monitoring periods, ranging 39-41 g/m^3.
- No TPH or BTEX were recorded above the LOD this monitoring period.
- The water quality of the lake is as expected for a small coastal lake. There is no evidence of an effect from the landfarming activities in the locality..

2.2.1.2 Soil samples

Previously landfarmed areas had been completed since the previous monitoring period. As such, a total of four soil samples were collected across area M2110.

All previously landfarmed areas (RNZ, M1408, M1610, and M1810, Figure 13) have been surrender-assessed and found to be within criteria that would enable them to be removed from the consent. However, the Company has not yet elected to have these removed.

While the previously landfarmed areas are still part of the consent they are considered live and remain zoned temporary industrial. As such no livestock may graze these areas until they have been removed from the resource consent and this is recognised by the District Council who advises on the status of a parcel of land.

During 2021-2022 there has been a high level of activity. Preparation of a new spreading area in Stage 2 seaward westward of site M2110 was undertaken; the continuum of waste receipt, spreading and remediation continued during this monitoring period. (Photo 4)

Figure 16 Location of soil transects in relation to WRS Symes Manawapou Landfarm for 2021-2022

The analysis is provided in Table 7. It can be noted that the organonitro and organophosphorus pesticides which did not record results above the LOD were not tabulated. This included analytes which are defined in the consent by a limit.

Table 7 Soil results for 2021-2022

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4
Soil samples 21-22	Date and Units	7795-1 surrender criteria	28 June	28 June	28 June	28 June
Parameters	Time		12:00	12:20	12:45	13:10
Dry Matter (Env)	g/100g as rcvd		90	87	89	91
pH	pH Units		8.1	7.4	7.9	8.0
Benzo[a]pyrene (BAP)	mg/kg dry wt	**<0.027**	< 0.011	< 0.012	< 0.012	< 0.011
Naphthalene	mg/kg dry wt	**7.2**	< 0.06	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt		0.015	<0.012	<0.012	0.029
Phenanthrene	mg/kg dry wt		0.018	<0.012	<0.012	<0.011

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4
Soil samples 21-22	Date and Units	7795-1 surrender criteria	28 June	28 June	28 June	28 June
Pyrene	mg/kg dry wt	160	0.016	< 0.012	< 0.012	< 0.011
1-Methylnaphthalene	mg/kg dry wt		0.048	0.034	0.017	<0.011
1-Methylnaphthalene	mg/kg dry wt		0.057	0.036	0.017	<0.011
Total of Reported PAHs in Soil	mg/kg dry wt		< 0.03	< 0.3	< 0.3	< 0.3
Conductivity from soluble salts	mS/cm	2.9	0.2	0.4	0.2	< 0.2
Chloride	mg/kg dry wt	700	200	310	184	74
Total Recoverable Calcium	mg/kg dry wt		6700	5400	5700	18
Total Recoverable Magnesium	mg/kg dry wt		2400	2300	2200	1930
Total Recoverable Potassium	mg/kg dry wt		640	590	520	310
Total Recoverable Sodium	mg/kg dry wt	460	310	330	320	250
Soluble Salts	g/100g dry wt	0.25	0.08	0.13	0.08	< 0.05
Sodium Absorption Ratio (SAR)	$mmol/L^{0.5}$	<18	2.0	2.5	2.4	1.6
Benzene	mg/kg dry wt	1.1	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	68	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	53	< 0.05	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	48	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	48	< 0.05	< 0.05	< 0.05	< 0.05
C_7 - C_9	mg/kg dry wt	<120	< 20	< 20	< 20	< 20
C_{10} - C_{14}	mg/kg dry wt	<58	2300	1460	670	270
C_{15} - C_{36}	mg/kg dry wt	<4,000	11300	7600	5400	3000
Total hydrocarbons (C_7 - C_{36})	mg/kg dry wt		13600	9100	6100	3200
Total Recoverable Barium	mg/kg dry wt		3100	2200	2200	880
Total Recoverable Arsenic	mg/kg dry wt	20	4	< 2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	1	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	600	22	20	18	18

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4
Soil samples 21-22	Date and Units	7795-1 surrender criteria	28 June	28 June	28 June	28 June
Total Recoverable Copper	mg/kg dry wt	100	13	12	12	10
Total Recoverable Lead	mg/kg dry wt	300	3.4	2.3	2.6	1.9
Total Recoverable Mercury	mg/kg dry wt	1	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	60	9	9	8	8
Total Recoverable Zinc	mg/kg dry wt	300	65	72	61	63
Permethrin	mg/kg dry wt		0.85	1.38	0.59	0.28
Propiconazole	mg/kg dry wt		0.92	1.39	0.67	0.37
Tebuconazole	mg/kg dry wt		1.28	1.90	0.88	0.71
Calcium (Sat Paste)	mg/L		220	305	212	123
Magnesium (Sat Paste)	mg/L		35	47	27	15
Sodium (Sat Paste)	mg/L		124	178	137	71

The analysis of the soil samples indicated the following:

- Sodium absorption ratio (SAR) ranged from 1.6 to 2.5 mmol/$L^{0.5}$, the limit is set at <18.
- In terms of petroleum hydrocarbons:
  - C_7-C_9 was not recorded above the LOD.
  - C_{10}-C_{14} ranged 270-2,300 mg/kg. The limit for surrender is set at <150 mg/kg. All these transects are currently above the limit for surrender.
  - C_{15}-C_{36} ranged 3,000-11,300 mg/kg; the limit for surrender is <4,000 mg/kg. All samples were over the limit except for one.
- Chloride ranged 74-310 mg/kg. The surrender concentration must be below 700 mg/kg.
- Sodium was below the limit of surrender (460 mg/kg), ranging 250-330 mg/kg.
- Traces of permethrin, propiconazole and tebuconazole (organonitro & organophosphorus based pesticides) were recorded above the LOD this monitoring period.
- Area M2110 due to concentrations of TPH C_{10}-C_{14} & C_{15}-C_{36} being above consent criteria of surrender will need further monitoring.

Photo 4 Ground preparation westward of M2110 (looking south via drone) (Image supplied by WRS)

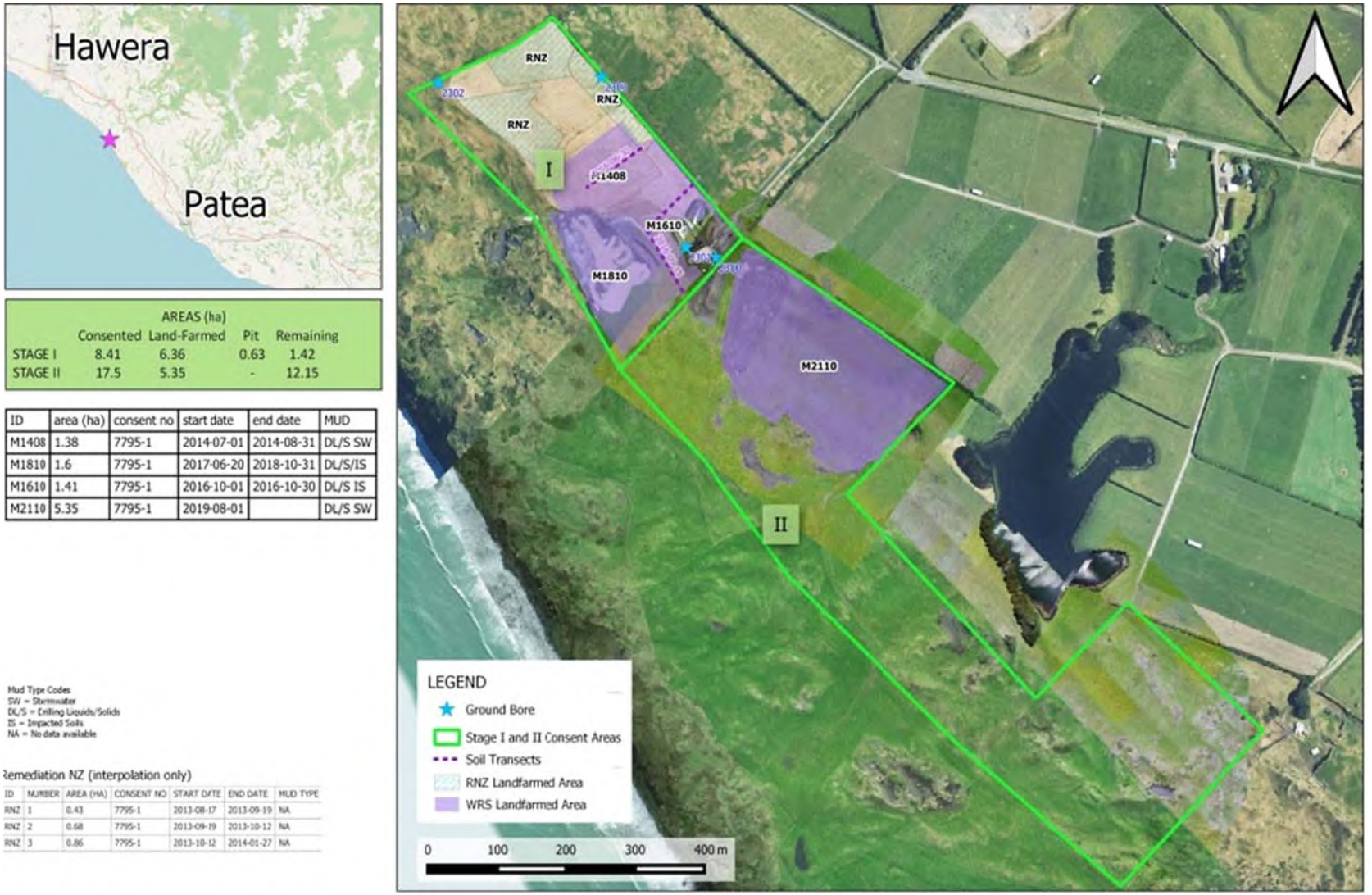
2.2.2 Provision of consent holder data

The Company provided the Council with an annual report, as required by condition 13, of consent 7795-1.1. A copy of the Company report is attached in Appendix II. Table 8 contains the delivery record for material accepted by the landfarm during this monitoring period. Figure 17, also provided by the Company, is a map of the previous and current landfarming operations.

Table 8 WRS Symes Manawapou Landfarm drilling waste delivery record 2021-2022 in m^3

Date	Source	Customer	Solid	Liquid	Direct spread	Total
Jul, Aug 21	KW 03	Todd	32	286	-	318
Jul, Aug, Sep, Oct, Nov, Dec 2021 and Jan, Feb, Mar, April May 2022	Maui A	OMV	497	2695	182	3373
Jul, Sep, Oct, Nov 2021	Symonds Yard	Todd	-	86	-	86
Jul, Sep, Oct, Nov 2021	Kupe	Beach	-	811	-	811
Aug, Nov, Dec 2021 and Jan 2022	Halliburton Yard	Halliburton	-	149	-	149
Aug, Sep, Oct 2021	Todd KA 21 – J	Todd	624	851	-	1475
Sep 21	Todd Mangahewa E	Todd Energy	-	8	-	8
Oct 21	Todd Mangahewa D	Todd Energy	-	8	-	8

Date	Source	Customer	Solid	Liquid	Direct spread	Total
Oct, Nov 2021	Todd KA 22 – J	Todd	674	673	-	1347
Nov, Dec 2021 and Jan 2022	Todd KA 23 – J	Todd	877	1130	-	2007
Nov, Dec 2021 and Jan, Feb, Mar, April 2022	Todd KA 24 – J	Todd	797	1383	-	2180
Nov 2021 and Mar, April, May, Jun 2022	Pohokura and Pohokura POW-04	OMV	1614	1357	-	2971
Feb, Mar, Apr 2022	MHWG 33	Todd Energy	14	43	-	57
Mar 2022	MHWG 34	Todd Energy	9	33	-	42
Mar 2022	MHWG 35	Todd Energy	-	27	-	27
Mar 2022	MHWG 36	Todd Energy	9	77	-	86
Mar, Apr, May 2022	McKee D – 10	Todd	8	159	-	167
Apr, May, Jun 2022	Maui B 06	OMV	776	-	-	776
May, Jun 22	Todd Pouri A – 2a	Todd	30	84	-	114
Jun 2022	Todd MHW 28	Todd	-	8	-	8
Jun 2022	Todd Pouri A – 1a	Todd	-	8	-	8
ANNUAL TOTAL TO 30 JUNE 2022 (m^3)			**5960**	**9875**	**782**	**16017**



AREAS (ha)				
	Consented	Land-Farmed	Pit	Remaining
STAGE I	8.41	6.36	0.63	1.42
STAGE II	17.5	5.35	-	12.15

ID	area (ha)	consent no	start date	end date	MUD
M1408	1.38	7795-1	2014-07-01	2014-08-31	DL/S SW
M1810	1.6	7795-1	2017-06-20	2018-10-31	DL/S/IS
M1610	1.41	7795-1	2016-10-01	2016-10-30	DL/S IS
M2110	5.35	7795-1	2019-08-01		DL/S SW

Mud Type Codes
SW = Stormwater
DL/S = Drilling Liquids/Solids
IS = Impacted Soils
NA = No data available

Remediation NZ (interpolation only)

ID	NUMBER	AREA (HA)	CONSENT NO	START DATE	END DATE	MUD TYPE
RNZ	1	0.43	7795-1	2013-08-17	2013-09-19	NA
RNZ	2	0.68	7795-1	2013-09-19	2013-10-12	NA
RNZ	3	0.86	7795-1	2013-10-12	2014-01-27	NA

Figure 17 WRS provided map of landfarmed areas

2.3 Incidents, investigations, and interventions

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

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

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

Table 9 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the Company activities during the 2021-2022 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 9 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
03 Dec 2021	Notification of material discharged on site was received late. Condition 8; consent 7795-1.1 allows a 48 hour window for notification prior to drilling wastes etc. on site for stockpiling. Notification was received on 12 Dec 2021 by OMV for material supplied 18 Nov 2021. The Company was not aware of the accepted material until 29 Nov 2021. Further, no sample analysis was taken as required under condition 10; consent 7795-1.1		14-Day Letters issued to OMV and WRS. Dated 13 January 2022.	Accepted response

3 Discussion

3.1 Discussion of site performance

The Symes Manawapou Landfarm observed a high level of activity, with 16,017 m^3 of both solid and liquid waste from 21 sources accepted to site. The Company has landfarmed the site in two stages, which are illustrated in Figure 13 and discussed below.

Stage I farmed an area of 6.36 ha, this included three areas (M1408, M1610 and M1810) farmed by the Company and three areas completed by the previous consent holder. The final parcel within stage I was completed in the 2018 year.

During the 2021–2022 monitoring period spreading operations commenced in a new 5.4 ha area (Phase 2) in Stage II of the Manawapou site (Figure 17). Disposal in this area was still underway at the end of the monitoring period.

Notifications were provided to the Council of material delivered to the site and of landfarming operations. In addition, drilling waste analysis and the Company annual report, which are a requirement of the consent (7795-1.1) have been provided by the Company for this monitoring period.

Composite samples are taken across each waste stream before materials leave the well/source site for delivery. In the past, WRS took pre-spreading samples from the pits prior to land spreading for further waste characterisation. Presently, with the substantial increase in drilling to meet the increased demand for gas, the pits are now merely transfer points from road trucks to agricultural machines with the receipt of waste and spreading often daily. For this reason, pre-spreading wastes no longer provides further information that might be expected from storage of material in the pits for long periods of time.

There were four inspections carried out during this monitoring period, three programmed and the fourth on 6 July 2021 was a follow-up inspection to close out an issue from the previous monitoring period. All inspections were deemed compliant.

There was an incident during January 2022 with respect to non-notification by a new client. A "14-day letter" was presented to WRS and the respective client. The response from both parties with associated explanation and preventative changes implemented was accepted by the Council. No environmental effects have been identified relating to this incident.

Groundwater monitoring bore GND2303 remained damaged for the first two rounds of monitoring, but was repaired in time for March 2022 monitoring.

3.2 Environmental effects of exercise of consents

Environmental effects associated with the Symes Manawapou Landfarm were mainly related to moderate saline impacts to groundwater, as recorded in monitoring bore GND2302. Bores GND2303 and GND2302 have also recorded a steadily increasing concentration of chloride over time. Both are located in Stage I and no new landfarming has occurred in this area since 2018.

Salts mobilise in water; the elevations previously observed are likely a result of salts leaching from previous landfarmed areas into the groundwater and these salts gradually moving towards the coast. Bore GND2303 was damaged during the previous monitoring year and was repaired in February 2022. This bore previously indicated saline impacts, which had been increasing since its installation in 2012. The elevations appeared to correspond with landfarming dates undertaken by the Company over time. During this monitoring period bore GND 2300, GND2301 and GND2302 saline concentrations have stabilised and are similar to the 2020-2021 monitoring period. Bore GND 2303 had stable chloride concentrations for this monitoring period, notably lower than 2020-2021.

Landfarmed area M2110 was sampled this monitoring period. The corresponding results indicated that the parcel of land is still above surrender criteria for mid to high range petroleum hydrocarbons. It should be noted that the site is meeting consent conditions that relate to current site activities.

In December 2022, the Company will need to demonstrate to the Council that the liners within the pits/cells remain fit for purpose.

Literature on the degradation of LOSP chemicals suggests that in the case of permethrin (insecticide), the half-life ranges from 11-113 days in aerobic soils[2]. Propiconazole (fungicide) has a half-life ranging between 40-315 days[3]. While in the case of tebuconazole (fungicide), its half-life ranges from 20-912 days[4]. Soil sampling in the upcoming monitoring period will continue to assess for the degradation of these three compounds, in addition to normal landfarming soil sample analytes, which are provided in section 1.4.4.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 10 and 11.

Table 10 Summary of performance for consent 7795-1.1

Purpose: ***To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Definitions which apply to the consent	N/A	N/A
2. Best practicable option to be adopted	Inspection and liaison with consent holder. Late notification of material received on site. GND2303 damaged for first half of period	No
3. The consent holder shall provide a stockpiling and landfarming management plan prior to the exercise of the consent	Management plan received and approved, latest version 2019-2020.	Yes
4. Before 1 Feb 2025 consent holder to amend management plan referenced by condition 3 to include sediment and retention pond sludge disposal to demonstrate compliance with conditions of consent	1 February 2025 required date	N/A

[2] http://npic.orst.edu/factsheets/half-life.html

[3] Garrison, Avants and Miller; Loss of propiconazole and its four stereoisomers from the water phase of two soil water slurries as measured by capillary electrophoresis August 2011. International Journal of Environmental Research and Public Health

[4] Ministry for Health New Zealand Volume 3 Datasheets- Chemical and physical determinants Part 2.3 Pesticides 2019 health.govt.nz

Purpose: *To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Install a minimum of three groundwater monitoring wells prior to exercise of consent	Groundwater monitoring wells installed in 2012 Three of four monitoring wells active to consent	Yes One monitoring well damaged until Feb 2022
6. Any pits utilised for the storage of solid or liquid waste shall be lined with fit for purpose synthetic liners or equivalent	Inspection	Yes
7. Integrity check of pit liners to be conducted per 24 month period	Notification will be required by December 2022	N/A
8. Notify TRC 48 hrs prior to stockpiling	Notifications mostly received when stockpiling. Notification of material discharged on site was received late. Condition 8; consent 7795-1.1 allows a 48 hour window for notification prior to drilling wastes etc. on site for stockpiling. Notification was received on 12 Dec 2021 by OMV for material supplied 18 Nov 2021. The Company was not aware of the accepted material until 29 Nov 2021.	No
9. Notify TRC 48 hrs prior to landfarming	Notifications received when landfarming.	Yes
10. The consent holder shall sample for the following: a. Total petroleum hydrocarbons b. Benzene, toluene, ethylbenzene, xylenes c. Polycyclic aromatic hydrocarbons d. Chloride, nitrogen, pH, potassium, sodium	Predisposal samples analysis supplied by consent holder as requested. No sample analysis was taken for the material that was discharged without 48 hours notice.	No

Purpose: *To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
11. The consent holder to take a representative sample of each disposal of sediment retention pond sludge and analyse for the following - dry matter - total recoverable potassium and sodium - chloride - Total nitrogen - Total recoverable arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc and aluminium	No samples received. However, representative sample analysis of the source is supplied prior to transportation and there are no consent limits for discharge of sludge to land.	Yes
12. Keep records relating to wastes, areas, compositions, volumes, dates, treatments and monitoring	Company records provided in annual report	Yes
13. Report on records in condition 9 to Council by 31 August each year	Report received, extension was granted to end of October 2022.	Yes
14. Discharges made only within area as specified by submitted application	Inspection indicated the discharges occur within the consented area	Yes
15. No discharge within 25 m of a water body, 10 m from any property boundary and 50 m from the QEII covenant Key Native Ecosystems	Inspection indicated the discharges are of sufficient distance from water courses and an earthen bund had been erected to prevent overland flow	Yes
16. Maximum application thickness for wastes: a. 100 mm TPH <5% b. 50 mm TPH >5% c. No ponded liquids 1 hr after application	Company records, inspection and sample	Yes
17. Incorporation into soil as soon as practicable to a depth of at least 250 mm	Inspection and sampling	Yes
18. Hydrocarbon concentrations in soil shall not exceed 50,000 mg/kg dry weight	Sampling	Yes

Purpose: *To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
19. Landfarming areas to be used in accordance with conditions 14 and 15 and shall not be used for any subsequent discharges of drilling wastes	Inspection	Yes
20. All material to be landfarmed as soon as practicable and no later than 12 months	Company records and inspections	Yes
21. Re-vegetate landfarmed areas as soon as practicable	Company records and inspections Inspections indicated the odd barren patch though minor	Yes
22. Total dissolved salts in any fresh water body shall not exceed 2,500 g/m^3	Sampling indicated that GND2303 is close to the limit at 2,300 g/m^3. However this well is damaged and up to date monitoring is not possible	Yes
23. Disposal of waste shall not lead to contaminants entering surface water or ground water exceeding background concentrations	Sampling indicated that saline impacts were slowly trending up at monitoring well GND2302. However, during this period the concentrations have levelled off, suggesting peak concentrations may have been reached. GND2303 was recommissioned in February 2022.	Yes
24. Conductivity must be less than 400 mS/m. If background conductivity exceeds 400 mS/m, then increase shall not exceed 100 mS/m	Sampling	N/A
25. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Sampling	N/A
26. Concentrations of heavy metals in the soil shall at all times comply with MfE guidelines	Sampling	N/A
27. Prior to expiry/cancellation of consent these levels must not be exceeded: a. conductivity, 290 mSm^{-1} b. chloride, 700 g/m^3 c. dissolved salts, 2500 g/m^3 d. sodium, 460 g/m^3	Areas RNZ 1, 2, 3 and X, M1408, M1610 and M1810 have been assessed against this condition and found to be compliant	N/A
28. If condition 23 is not met, consent cannot be surrendered	Previously landfarmed areas may be surrendered if the soils meet the surrender criteria	N/A

Purpose: *To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
29. Notification of discovery of archaeological remains	Not applicable – none discovered in this monitoring period	N/A
30. Consent shall lapse on 30 June 2017	Not applicable – consent exercised	N/A
31. Optional review provision re environmental effects	Next optional review was due in June 2022. During the previous reporting period it was considered that there are no grounds requiring a review in June 2022.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Good** **Improvement required**

N/A = not applicable

Table 11 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2012-2013	7795-1	-	-	-	1
2013-2014	7795-1	-	1	-	-
Waste Remediation Services consent holder 2014-2015 onwards					
2014-2015	7795-1	-	1	-	-
2015-2016	7795-1	-	1	-	-
2016-2017	7795-1	-	1	-	-
2017-2018	7795-1	-	1	-	-
2018-2019	7795-1	-	1	-	-
2019-2020	7795-1.1	1	-	-	-
2020-2021	7795-1.1	-	-	1	-
2021-2022	7795-1.1		1		
Totals		1	7	1	1

During the year, the Company demonstrated an overall good level of environmental performance but the level of administrative performance required improvement with the resource consent as defined in Appendix III.

3.4 Recommendations from the 2020-2021 Annual Report

In the 2020-2021 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at Symes Manawapou Landfarm in the 2021-2022 year continue at the same level as in 2020-2021 with the addition of six soil samples, which brings the total to eight soil samples.
2. THAT bore GND2303 is reinstated to enable groundwater monitoring to continue.
3. Any further elevations in groundwater salinity, in excess of condition 22, will require the Company to investigate and mitigate the cause.
4. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
5. THAT the option for a review of resource consent in June 2022, as set out in condition 31 of the consent, not be exercised, on the grounds that it is currently fit for purpose.

In terms of the recommendations: four soil samples were analysed for completed area M2110. Groundwater was undertaken quarterly. Bore GND2303 was reinstated in February 2022 enabling monitoring to continue. The spot sample of Lake Taumaha was collected. There was no review of the resource consent exercised in June 2022.

3.5 Alterations to monitoring programmes for 2022-2023

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.

It is recommended that a review of consent Condition 11 be undertaken in view of the fact that practically the procedure has altered slightly.

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.

Planned changes for 2022-2023 monitoring programme include the provision of eight soil samples in order to continue to monitor area M2110. The rest of the compliance programme will remain unchanged.

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 2022-2023.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Symes Manawapou Landfarm in the 2022-2023 year continue at the same level as in 2021-2022.
2. Any elevations in groundwater salinity, in excess of condition 22, will require the Company to investigate and mitigate the cause.
3. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

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

Al*	Aluminium.
As*	Arsenic.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in µS/cm.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m^3s^{-1}).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
FNU	Formazin nephelometric units, a measure of the turbidity of water
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$g/m^2/day$	grams/$metre^2$/day.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.

Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m^2	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
MPN	Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample.
µS/cm	Microsiemens per centimetre.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM_{10}, $PM_{2.5}$, $PM_{1.0}$	Relatively fine airborne particles (less than 10 or 2.5 or 1.0 micrometre diameter, respectively).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU or FNU.
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 an Environmental Quality Manager.

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Waste Remediation Services Ltd (WRS), Waikaikai (Wards) & Manawapou (Symes) Landfarm Management Plan 2018-2019.

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Waste Remediation Services Ltd (WRS), Waikaikai (Wards) & Manawapou (Symes) Landfarm Management Plan 2020-2021.

Appendix I

Resource consents held by WRS Ltd Symes Manawapou Landfarm

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

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 (Change):	15 December 2020
Commencement Date (Change):	15 December 2020 (Granted Date: 1 May 2012)

Conditions of Consent

Consent Granted:	To discharge: • drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and • sediment retention pond sludge from water treatment plants onto and into land via landfarming
Expiry Date:	1 June 2028
Review Date(s):	June 2022, June 2025
Site Location:	156 Manawapou Road, Manutahi
Grid Reference (NZTM)	1717240E-5608740N
Catchment:	Manawapou

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

47 Cloten Road · Private Bag 713 · Stratford 4352 · New Zealand
T: 06 765 7127 · F: 06 765 5097 · E: info@trc.govt.nz · www.trc.govt.nz
www.facebook.com/TaranakiRegionalCouncil twitter.com/TaranakiRC
Please quote our document number in your reply

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) stockpiling means a discharge of drilling wastes and/or sediment retention pond sludge from vehicles, tanks, or other containers onto land for the purpose of interim storage prior to landfarming, but without subsequently spreading onto, or incorporating the discharged material into the soil within 48 hours; and
    b) landfarming means the discharge of drilling wastes and/or sediment retention pond sludge onto land, subsequent spreading and incorporation into the soil, for the purpose of attenuation of hydrocarbon and/or other contaminants including sediment retention pond waste, and includes any stripping and relaying of topsoil.

2. The consent holder shall adopt the best practicable option (as defined section 2 of the Resource Management Act 1991) to prevent or minimise any actual or potential effects on the environment arising from the discharge.

Requirements prior to exercise of consent

3. Prior to the exercise of this consent, the consent holder shall provide a stockpiling and landfarming management plan that, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council, demonstrates the activity can and will be conducted to comply with all of the conditions of this consent. The management plan shall be reviewed annually (on or about the anniversary of the date of issue of this consent) and shall include as a minimum:

    a) procedures for notification to Council of disposal activities;
    b) procedures for the receipt and stockpiling of drilling wastes onto the site;
    c) methods used for the mixing and testing of different waste types;
    d) procedures for site preparation;
    e) procedures for landfarming drilling wastes (including means of transfer from stockpiling area, means of spreading, and incorporation into the soil);
    f) procedures for sowing landfarmed areas, post-landfarming management, monitoring and site reinstatement;
    g) contingency procedures;
    h) sampling regime and methodology;
    i) control of site access; and
    j) documentation for all the procedures and methods listed above.

4. Before 1 February 2025 the consent holder shall amend the stockpiling and landfarming management plan referenced in condition 3 above, to include the disposal of sediment retention pond sludge, and demonstrate its discharge can and will be conducted to comply with all of the conditions of this consent.

5. 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.

6. 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.

7. 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 6.

Notifications, monitoring and reporting

8. The consent holder shall notify the Chief Executive, Taranaki Regional Council at least 48 hours prior to permitting drilling wastes or sediment retention pond sludge onto the site for stockpiling, from each well drilled or sediment retention pond received. Notification shall include the following information:

   a) the consent number;
   b) the name of the well(s) from which the waste was generated or the location of the sediment retention pond from which waste has originated;
   c) the type of waste to be stockpiled; and
   d) the volume of waste to be stockpiled.

   Unless the Chief Executive advises that an alternative method is required the notice required by this condition shall be served by completing and submitting the 'Notification of work' form on the Council's website (http://bit.ly/TRCWorkNotificationForm).

9. The consent holder shall notify the Chief Executive, Taranaki Regional Council at least 48 hours prior to landfarming stockpiled 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) from which the waste was generated or the location of the sediment retention pond from which waste has originated;
   c) the type of waste to be landfarmed;
   d) the volume and weight (or density) of the waste to be landfarmed;
   e) the concentration of chlorides, nitrogen and hydrocarbons in the waste; and
   f) the specific location and area over which the waste will be landfarmed.

   Unless the Chief Executive advises that an alternative method is required the notice required by this condition shall be served by completing and submitting the 'Notification of work' form on the Council's website (http://bit.ly/TRCWorkNotificationForm).

10. The consent holder shall take a representative sample of each type of drilling waste, from each individual source, and have it analysed for the following:

    a) total petroleum hydrocarbons (C_6-C_9, C_{10}-C_{14}, C_{15}-C_{36});
    b) benzene, toluene, ethylbenzene, and xylenes;
    c) polycyclic aromatic hydrocarbons screening; and
    d) chloride, nitrogen, pH, potassium, sodium, barium and heavy metals.

11. The consent holder shall take a representative sample of each disposal of sediment retention pond sludge, from each individual source, and have it analysed for the following:

    a) dry matter;
    b) total recoverable: potassium, sodium;
    c) chloride;
    d) pH;
    e) total nitrogen;
    f) total recoverable: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, aluminium.

12. The consent holder shall keep records of the following:

    a) wastes from each individual well or sediment retention pond;
    b) composition of wastes (in accordance with condition 8);
    c) stockpiling area(s);
    d) volumes of material stockpiled;
    e) landfarming area(s), including a map showing individual disposal areas with GPS co-ordinates;
    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.

13. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, by 31 August of each year, a report on all records required to be kept in accordance with condition 9, for the period of the previous 12 months, 1 July to 30 June.

Discharge limits

14. The discharge shall only occur on the disposal sites shown in the Drawing entitled 'Remediation NZ Ltd Proposed Disposal Site' submitted with the application and attached to this consent.

15. There shall be no discharge within buffer zone, being:

    - 25 metres of the Manawapou River;
    - 25 metres of the unnamed tributary;
    - 10 metres from any property boundary; and
    - 50 metres from the QE II covenant Key Native Ecosystem areas.

16. For the purposes of landfarming, drilling wastes or sediment retention pond sludge 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;
    b) 50 mm thick for wastes with a hydrocarbon concentration equal to or greater than 50,000 mg/kg dry weight; and
    c) in a rate and manner such that no ponded liquids remain after one hour, for all wastes;

    prior to incorporation into the soil.

17. As soon as practicable following the application of solid drilling wastes or sediment retention pond sludge to land, the consent holder shall incorporate the wastes into the soil to a depth of at least 250 mm.

18. The hydrocarbon concentration in the soil over the landfarming area shall not exceed 50,000 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.

19. An area of land used for the landfarming of drilling wastes in accordance with conditions 14 and 15 of this consent, shall not be used for any subsequent discharges of drilling waste.

Operational requirements

20. All material must be landfarmed as soon as practicable, but no later than twelve months after being brought onto the site.

21. 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 environment limits - water

22. The exercise of this consent shall not result in the concentration of total dissolved salts in any fresh water body exceeding 2500 g/m3.

23. Other than as provided for in condition 22, the exercise of this consent shall not result in any contaminant concentration, within surface water or groundwater, which after reasonable mixing, exceeds the background concentration for that particular contaminant.

Receiving environment limits - soil

24. The conductivity of the soil/waste layer after landfarming shall be less than 400 mS/m, or alternatively, if the background soil conductivity exceeds 400 S/m, the landfarming of waste shall not increase the soil conductivity by more than 100 mS/m.

25. The sodium adsorption ratio (SAR) of the soil/waste layer after landfarming shall be less than 18.0, or alternatively if the background soil SAR exceeds 18.0, the landfarming of waste shall not increase the SAR by more than 1.0.

26. The concentration of heavy metals in the soil over the disposal area shall at all times comply with the Ministry for the Environment and New Zealand Water & Wastes Association's Guidelines for the safe application of biosolids to land in New Zealand (2003), as shown in the following table:

Constituent	Standard (mg/kg dry weight)
Arsenic	20
Cadmium	1
Chromium	600
Copper	100
Lead	300
Mercury	1
Nickel	60
Zinc	300

27. From 1 March 2028 (three months prior to the consent expiry date), constituents in the soil shall not exceed the standards shown in the following table:

Constituent	Standard
conductivity	290 mS/m
chloride	700 mg/kg
sodium	460 mg/kg
total soluble salts	2500 mg/kg
MAHs PAHs TPH	Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Ministry for the Environment, 1999). Tables 4.12 and 4.15, for soil type sand.

MAHs - benzene, toluene, ethylbenzene, xylenes
PAHs - napthalene, non-carc. (pyrene), benzo(a)pyrene eq.
TPH - total petroleum hydrocarbons (C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36})

The requirement to meet these standards shall not apply if, before 1 March 2028, the consent holder applies for a new consent to replace this consent when it expires, and that application is not subsequently withdrawn.

28. This consent may not be surrendered at any time until the standards in condition 27 have been met.

Archaeological remains

29. 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.

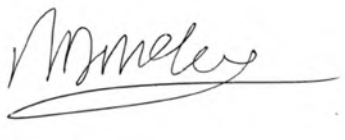
Lapse and review

30. This consent shall lapse on 30 June 2017, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

31. 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 2016 and/or June 2022 and/or 2025, 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 15 December 2020

For and on behalf of
Taranaki Regional Council



A D McLay
Director - Resource Management

Appendix II

Company provided annual report

31 October 2022

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

Attention: Chania Hattle

Dear Chania

RE: Resource Consent 7795-1.1 - Manawapou (Symes) - 156 Manawapou Road, RD 2, Patea

As required under special condition 9 of resource consent 7795-1.1, please find all relevant information recorded from the operational period 1 July 2021 to 30 June 2022 relating to receipt and land-spreading activities undertaken at Waste Remediation Services (WRS) Manawapou remediation site. It is the eighth report completed by WRS following the previous periods.

2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21

This report is designed to follow on from the previously submitted 2020-21 consent monitoring report and, as such is focused on activities, records, and results from the 2021-22 period. This report is structured into seven sections, as follows:

1. Overview and Background
2. Wastes Received for Disposal
3. Remediation – comprising preparatory earthworks, land-spreading and incorporation and Rehabilitation Operations - comprising topsoil application, sowing, additional works)
4. Monitoring
5. Additional Consent Requirements
6. Summary

1. OVERVIEW AND BACKGROUND

WRS began operating the Manawapou remediation site in 2014, replacing the original site operators Remediation NZ Ltd, who were issued resource consent 7795-1.1 in 2012. Between 2014 and the currently reported on year, there have been intermittent periods of activity at the site, reflecting fluctuating levels of activity within the local drilling industry.

During 2021-22 there has been a high level of activity at the Manawapou site. The site has received drilling/production wastes from Todd Energy, Beach Energy, and OMV. Preparation of a new spreading area in Stage 2 seaward westward of site (M2110) was undertaken; the continuum of waste receipt, spreading and remediation at the conclusion of the 2021 monitoring year continued into the 2022 year and similarly into the 2023 monitoring year.

Monitoring of the site undertaken in the 2021-22 year by both the Taranaki Regional Council (TRC) and WRS management has shown the operations undertaken at Manawapou to be compliant with consent conditions; no incidents were recorded against the site in 2021-22.

2. WASTES RECEIVED FOR DISPOSAL

Waste Types and Volumes

During the 2021-22 year, a total of 16,017m^3 of both solid and liquid wastes were received onsite from the following sources:

- Todd Energy wells KW-03, Kapuni J-21, -22, -23, -24 , Mangahewa D, E, G-33, G-34, G-35, G-36, McKee D-10, Pouri A-1a, A-2a
- Halliburton's Liquid Mud Plant supplying Todd Energy drilling
- Beach Energy's Kupe Production Station
- OMV's Maui A MACI programme, Maui B MBIRF programme and Pohokura POW-04 project.

Further details of quantities of material are provided in the updated mud register attached as

Appendix A.

Waste Characterisation

Consent 7795-1.1 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 well/source site for delivery. In the past when the receipt and recovery of liquids and cuttings from the storage pits was campaigned WRS took pre-spreading samples from the pits prior to land spreading for further waste characterization. Now with the substantial increase in drilling to meet the increased demand for gas, the pits are now merely transfer points from road trucks to agricultural machinery with the receipt of waste and spreading often daily. For this reason pre-spreading wastes no longer provides further information that might be expected from storage of material in the pits for long periods on time. All samples are sent to RJ Hill Laboratories for analyses. Results are forwarded directly 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 12 of consent 7795-1.1 to ensure the hydrocarbon limit in condition 14 is adhered to. As TRC have been directly provided all results simultaneously with WRS, in the interest of avoiding duplication, PDF copies will not be attached to this report.

3. REMEDIATION AND REHABILITATION OPERATIONS

During the 2021-22 operational period spreading operations commenced in a new 5.4ha area (Phase 2) in Stage 2 of the Manawapou site (as identified on the updated site map, Appendix B). Disposal in this area was still underway at the end of the operational period.

Recent photographs of the new current spreading area M2110 at the Manawapou site are attached as Appendix C.

4. MONITORING

Site Inspections - WRS

WRS closely supervises site operations, both receipt of waste and spreading and rehabilitation to ensure all contractors are following best practice as per the site operation management plan and conditions specified in consent 7795-1.1 Regular site inspections are also undertaken during periods of inactivity at the site. The agricultural contractor used at Manawapou has been engaged continuously from 2014 and has considerable experience and knowledge of working in coastal sand environments and the principals consent and management standards and practices. The methods undertaken are well established and efficacious.

Site Inspections – TRC

WRS has received four inspection notices from the TRC for the 2021-22 year, three programmed and the fourth dated 6 July 2022 a follow-up inspection to close out an issue from the previous 202021 monitoring period Notices 1/3, 2/3, 3/3 recorded that the TRC inspector was satisfied with the physical state of the site, and with operations being undertaken around the time of inspection. The fourth inspection was a specific follow up of an issue raised by the TRC in the 20-

2021 monitoring year. This issue identified by the consent holder was quickly rectified by WRS and closed out by the TRC, but

remains very confusing for WRS who were simply replicating an existing service, that had been operating at another site for many years without question or regulatory action against that site or operator. Copies of the TRC inspection notices are attached as Appendix D.

Receiving Environment Sampling

WRS has no sampling results to submit as composite soil sampling and groundwater sampling is now undertaken exclusively by TRC staff, with all samples being sent to RJ Hill Laboratories for the full suite of analyses required under consent 7795-1.1 . Bore GND2303 was severely damaged by hedge trimming operations in 2021 and left by the contractor unreported and as such, was not able to be sampled during the first half of the monitoring period. Repairs were effected Dec-January 2022 and sampling has now resumed.

Groundwater monitoring results

TRC have completed quarterly groundwater monitoring at the Manawapou as per the agreed monitoring programme and have supplied all results to WRS, e. Consent 7795-1.1 has two conditions relating to groundwater, conditions 18 and 19. Condition 18 relates specifically to the concentration of total dissolved salts (TDS), which is limited to a maximum concentration of 2500 g/m^3. Condition 19 has a relatively broad requirement around the exercising of the consent not resulting in any other contaminant concentrations above background levels.

WRS have reviewed these supplied results and have not identified any non-compliances with condition 19. The full range of groundwater results will likely be included in the TRC Annual Report (as has been done in previous years), so these will not be presented in this report in full. The TDS results, however, will be presented and discussed below, in relation to condition 18. The results for 2021-22 are presented below in Table 1.

Table 1 TRC Groundwater TDS results, all monitoring bores 2021-22

Parameter	Bore	GND2300				GND2301			
	Date	13/09/21	12/01/22	30/03/22	22/06/22	13/09/21	12/01/22	30/03/22	22/06/22
	Lab Number	2703091.1	2825702.1	2969047.1	3019825.1	2703091.2	2825702.2	2939047.2	3019825.2
pH	pH Units	6.2	6.5	6.3	6.4	6.5	6.9	6.6	6.7
Electrical Conductivity (EC)	mS/m	75.1	74.9	87.1	76.8	90.8	85.9	67.4	113.7
Electrical Conductivity (EC)	µS/cm	751	749	871	768	908	859	674	1,137
Total Dissolved Solids (TDS)	g/m3	440	450	520	460	560	560	420	660
Dissolved Barium	g/m3	0.029	0.022	0.044	0.019	0.63	0.59	0.43	0.50
Acid Soluble Barium	g/m3	<0.11	<0.11	<0.11	<0.11	0.59	0.60	0.44	0.54
Total Sodium	g/m3	74	89	103	108	50	46	47	55

Chloride	g/m3	161	138	178	129	78	63	50	129
Benzene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Toluene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.027
Ethylbenzene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
m&p-Xylene	g/m3	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
o-Xylene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
C7 - C9	g/m3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
C10 - C14	g/m3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
C15 - C36	g/m3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Total hydrocarbons (C7 - C36)	g/m3	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7

Parameter	**Bore**	**GND2302**				**GND2303**			
	Date	13/09/21	12/01/22	30/03/22	22/06/22	13/09/21	12/01/22	30/03/22	22/06/22
	Lab Number:	2703091.3	2825702.3	2969047.3	3019825.3	Bore Damaged Unable to be Sampled	Bore Damaged Unable to be Sampled	2939047.4	3019825.4
pH	pH Units	6.3	6.6	6.6	6.5			6.7	6.5
Electrical Conductivity (EC)	mS/m	129.0	113.2	83.3	133.9			56.3	69.6
Electrical Conductivity (EC)	µS/cm	1290	1132	833	1339			563	696
Total Dissolved Solids (TDS)	g/m3	800	720	540	820			390	440
Dissolved Barium	g/m3	0.058	0.044	0.030	0.057			0.043	0.047
Acid Soluble Barium	g/m3	<0.11	<0.11	<0.11	<0.11			0.61	<0.11
Total Sodium	g/m3	80	75	65	90			64	76
Chloride	g/m3	280	230	150	300			90	119
Benzene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010
Toluene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010
Ethylbenzene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010
m&p-Xylene	g/m3	<0.002	<0.002	<0.002	<0.002			<0.002	<0.002
o-Xylene	g/m3	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010
C7 - C9	g/m3	<0.10	<0.10	<0.10	<0.10			0.32	<0.10
C10 - C14	g/m3	<0.2	<0.2	<0.2	<0.2			<0.2	<0.2
C15 - C36	g/m3	<0.4	<0.4	<0.4	<0.4			<0.4	<0.4
Total hydrocarbons (C7 - C36)	g/m3	<0.7	<0.7	<0.7	<0.7			<0.7	<0.7

The groundwater results show compliance with the groundwater conditions 18 and 19 of consent 7795-1.1 . No hydrocarbons have been detected in any of the samples, salinity is slightly elevated in bores GND2302, and 2303 but remains well within the consented TDS limit (2500 g/m³) given in condition 18.
For the current monitoring period, the results have all been compliant with the TDS consent limit. It should however be noted that GND2303 was damaged by an hedge trimming contractor (and not reported) during the monitoring period and sampling could not be conducted for this bore during the first two sampling runs.

5. ADDITIONAL CONSENT REQUIREMENTS

As per condition 3 of consent 7795-1.1, the site management plan has been reviewed for the period July 2021 to June 2022. Operations at the Manawapou remediation site are all undertaken generally in accordance with the WRS' Land-farm Management Plan (LMP) 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. In 2021-22 no significant changes were made to the LMP. The current plan is available upon request.

INCIDENT SUMMARY

As stated in Section 4 of this report, during an incident follow up inspection on 20 May 2021, TRC's inspecting officer had queried the nature of some sawdust that was present onsite in storage Pit 1 . This led to an investigation including a follow-up inspection in July 2021 that closed out the incident It is not reported further here, but a dateline and detail of the incident was reported in the 20-2021 WRS annual report.

With considerable concern and disquiet an incident occurred in January 2022 with respect to non-notification by a new client that had approached WRS in Q3/Q4 of 2022 to send spudding waste from a Pohokura (POW-04) conductor casing installation. Several personal under contract to the project management joint venture delivered a small quantity of surface soil and rock to the Manawapou site without any reference and required notification to either WRS or the TRC. The principal partner of the project team immediately took ownership of the incident and conducted an investigation of how this occurred and contributing factors. WRS was completely exonerated of any responsibility by the principal following their investigation, who then undertook a number of changes to their procedures to prevent a re-occurrence.

These were accepted by the TRC following WRS's submission of a "14 Day Letter" explaining the sequence of events and preventative changes that had been made.

6. SUMMARY

During 2021-22 there has been a reasonable amount of activity at the Manawapou site. The site has received drilling/production wastes from Halliburton Todd Energy, Beach Energy, and OMV. Preparation of a new spreading area (Phase II) in Stage 2 of the site was undertaken, and disposal of the aforementioned waste commenced and continues at the conclusion of the monitoring period. Monitoring results from TRC sampling have indicated that no significant adverse effects have occurred from the exercise of consent 7795-1 during the monitoring period under review. However, one issue was recorded at the site, due to the non- compliant activities of a first time customer.

No environmental effects have been identified relating to this incident.

As similarly noted in the company's Waikaikai report WRS is now being asked by the major oil and gas operators in the region what is the expected life of both WRS's land-farms. This is a conundrum dependent upon national and local political decisions, the volume and rate of drilling waste produced and the implications of the Waste Minimization Act (WMA) 2008 registration and reporting requirements. In effect the countdown of remaining acreage for land farming in the region is underway; once this is exhausted, the operational areas - turnarounds and pits- will be returned to functional farmable paddocks by removing the pits, recontouring the ground and spreading the last of the waste accepted. At this point the efforts undertaken by the consent holder to construct and maintain the impermeability of the storage pits, now transfer points, will have immediately become a futile exercise in respect of avoiding discharge to ground, cost, and efforts by all during the entire operational life of the land farm.

It should also be noted WRS's Manawapou remediation operation alone has prevented 16,017 m3 (and together with Waikaikai's 4,647m3 a grand total of 20,664m3)of incompressible liquids and solids going to land fill at facilities several hundred kilometers further afield.

WRS would welcome constructive comment on this aspect of the consent holders' views and the sector's future options for disposal of oilfield wastes by well managed remediation activities that are undertaken in full compliance with consents and with positive outcomes for the oil and gas operators, and landowner, all of which contribute to the continuing support of livelihoods and services both regionally and nationally.

Waste Remediation Services Ltd

w +64 6 751 9221 m + 64 275 996 105 f +64 751 9225

Address 141 – 143 Connett Road East, Bell Block 4312, New Zealand
Post PO Box 7150, New Plymouth 4341, New Zealand

Email: keith@wrsltd.co.nz

Appendix A Mud Register

Date	Source	Customer	Disposal Site m3			
			Solids	Liquids	Direct Spread	Total
Jul-21	KW 03	Todd	32	266	-	298
Aug-21	KW 03	Todd	-	20	-	20
		Todd KW 03 Total	***32***	***286***	***-***	***318***
Jul-21	Maui A	OMV	-	324	144	468
Aug-21	Maui A	OMV	-	254	38	292
Sep-21	Maui A	OMV	-	270	-	270
Oct-21	Maui A	OMV	53	295	-	348
Nov-21	Maui A	OMV	78	575	-	653
Dec-21	Maui A	OMV	-	159	-	159
Jan 22	Maui A	OMV	85	214	-	299
Feb 22	Maui A	OMV	258	100	-	358
Mar 22	Maui A	OMV	11	380	-	391
April 22	Maui A	OMV	12	100	-	112
May 22	Maui A	OMV	-	24	-	24
		Maui A Total	***497***	***2,695***	***182***	***3,373***
Jul-21	Symons Yard	Todd	-	22	-	22
Sep-21	Symons Yard	Todd	-	12	-	12
Oct-21	Symons Yard	Todd	-	16	-	16
Nov-21	Symons Yard	Todd	-	17	-	17
Nov-21	Symons Yard	Todd	-	19	-	19
		Todd Total	***-***	***86***	***-***	***86***
Jul-21	Kupe	Beach	-	60	-	60
Aug-21	Kupe	Beach	-	46	-	46
Oct-21	Kupe	Beach	-	39	-	39
Nov-21	Kupe	Beach	-	80	-	80
Dec-21	Kupe	Beach	-	117	-	117
Jan 22	Kupe	Beach	-	83	-	83
Feb 22	Kupe	Beach	-	109	-	109
April 22	Kupe	Beach	-	67	-	67
May 22	Kupe	Beach	-	120	-	120
June 22	Kupe	Beach	-	90	-	90
		Kupe Total	***-***	***811***	***-***	***811***
Aug-21	Halliburton Yard	Halliburton	-	34	-	34
Nov-21	Halliburton Yard	Halliburton	-	18	-	18
Dec 21	Halliburton Yard	Halliburton	-	75	-	75
Jan-22	Halliburton Yard	Halliburton	-	22	-	22
		Halliburton Total	***-***	***149***	***-***	***149***
Aig-21	Todd KA 21 - J	Todd	-	32	-	32
Sep-21	Todd KA 21 - J	Todd	591	503	-	1,094
Oct-21	Todd KA 21 - J	Todd	33	316	-	349
		Todd KA 21 Total	***624***	***851***	***-***	***1,475***
Sep-21	Todd Mangahewa E	Todd Energy	-	8	-	8
		Todd MHW E Total	***-***	***8***	***-***	***8***
Oct-21	Todd Mangahewa D	Todd Energy	-	8	-	8
		Todd MHW D Total	***-***	***8***	***-***	***8***

Oct-21	Todd KA 22 - J	Todd	664	431	-	1,095
Nov-21	Todd KA 22 - J	Todd	10	242	-	252
		Todd KA 22 Total	***674***	***673***	***-***	***1,347***
Nov-21	Todd KA 23 - J	Todd	624	591	-	1,215
Dec-21	Todd KA 23 - J	Todd	188	292	-	480
Jan-22	Todd KA 23 - J	Todd	65	247	-	312
		Todd KA 23 Total	***877***	***1,130***	***-***	***2,007***
Nov-21	Todd KA 24 - J	Todd	111	80	-	191
Dec-21	Todd KA 24 - J	Todd	525	438	-	963
Jan-22	Todd KA 24 - J	Todd	40	307	-	347
Feb 22	Todd KA 24 - J	Todd	121	551	-	672
Mar 22	Todd KA 24 - J	Todd	-	4	-	4
April 22	Todd KA 24 - J	Todd	-	3	-	3
		Todd KA 24 Total	***797***	***1,383***	***-***	***2,180***
Nov-21	Pohokura	OMV	-	36	-	36
Mar-22	Pohokura POW-04	OMV	927	916	-	1,843
April 22	Pohokura POW-04	OMV	426	57	-	483
May-22	Pohokura POW-04	OMV	165	256	-	421
Jun-22	Pohokura POW-04	OMV	96	92	-	188
		Pohokura Total	***1,614***	***1,357***	***-***	***2,971***
Feb-22	MHW G 33	Todd Energy	-	10	-	10
Mar 22	MHW G 33	Todd Energy	14	20	-	34
April 22	MHW G 33	Todd Energy	-	13	-	13
		MHW G 33 Total	***14***	***43***	***-***	***57***
Mar 22	MHWG 34	Todd Energy	9	33	-	42
		MHWG 34 Total	***9***	***33***	***-***	***42***
Mar 22	MHWG 35	Todd Energy	-	27	-	27
		MHWG 35 Total	***-***	***27***	***-***	***27***
Mar 22	MHWG 36	Todd Energy	9	77	-	86
		MHWG 36 Total	***9***	***77***	***-***	***86***
Mar 22	McKee D - 10	Todd	-	8	-	8
April 22	McKee D - 10	Todd	-	90	-	90
May 22	McKee D - 10	Todd	8	61	-	69
		McKee D - 10	***8***	***159***	***-***	***167***
April 22	Maui B 06	OMV	468	-	-	468
May 22	Maui B 06	OMV	283	-	-	283
Jun-22	Maui B 06	OMV	25	-	-	25
		Maui B 06 Total	***776***	***-***	***-***	***776***
May-22	Todd Pouri A - 2a	Todd	-	8	-	8
Jun-22	Todd Pouri A - 2a	Todd	30	76	-	106
		Todd Pouri A - 2a Total	***30***	***84***	***-***	***114***
Jun-22	Todd MHW 28	Todd	-	8	-	8
		Todd MHW 28 Total	***-***	***8***	***-***	***8***
Jun-22	Todd Pouri A - 1a	Todd	-	8	-	8
		Todd Pouri A - 1a Total	***-***	***8***	***-***	***8***
ANNUAL TOTAL TO 30 JUNE 2022 (m3)			**5,960**	**9,875**	**182**	**16,017**

Appendix B: Site Map

Appendix C Field Photographs

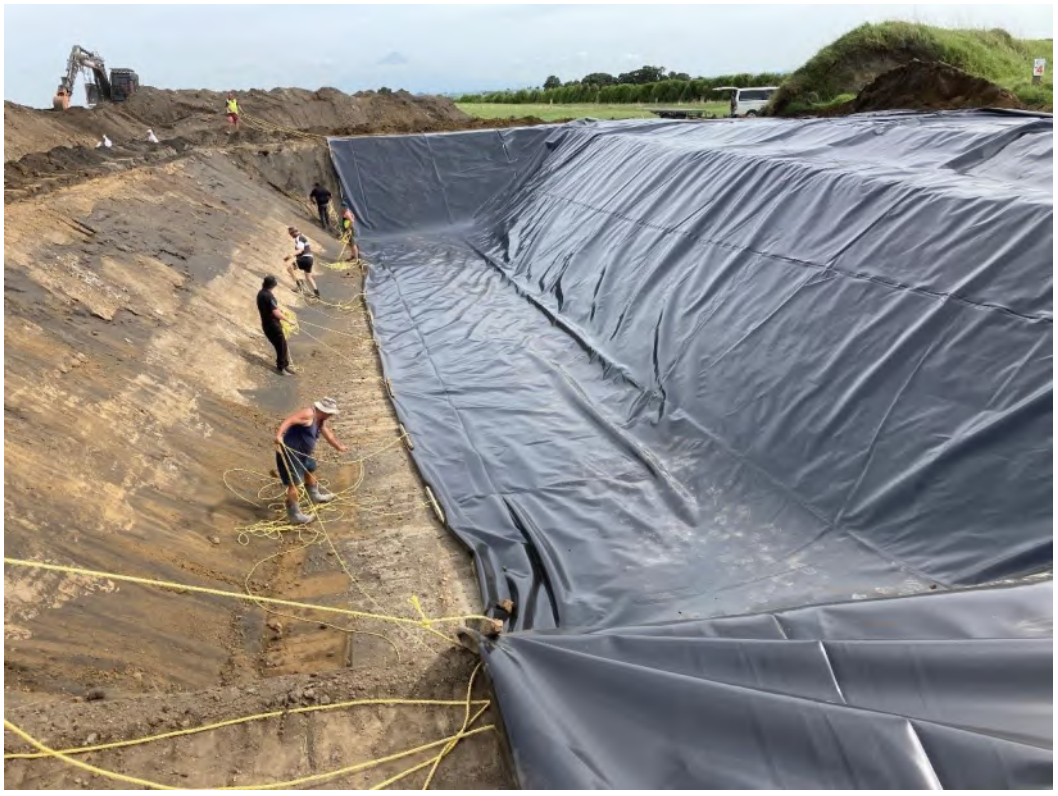
Ground Preparation Westward of M2110 (looking SW)

Ground Preparation Westward of M2110 (Looking NW)

Ground Preparation Westward of M2110 (Looking S via Drone)

Spreading/Deep Ripping Incorporation into Sands

Pit floor Construction/Compaction.



Pit 2 Liner installation.

Appendix D TRC Inspection Notices

Private Bag 713 | 47 Cloten Road | Stratford 4352 | New Zealand | T: 06 765 7127 | F: 06 765 5097 | www.trc.govt.nz

Taranaki Regional Council

Inspection Notice

Under section 332 of the Resource Management Act 1991

Consent Number:	R2/7795-1.1	
Consent Name:	Waste Remediation | Land Discharge | Manawapou Rd |change	
Contact Name:	Waste Remediation Services Limited	
Postal Address:	PO Box 7150, New Plymouth 4341	
Site Location Address:	156 Manawapou Road, Manutahi	
Inspection Number:	OBS-2021-90773	
Inspection Type:	Follow Up Inspection	
Inspection Date:	06 Jul 2021	
Inspection Time:	09:19	
Weather Details:	Rainfall:	None
	Wind Direction:	
	Wind Strength:	Nil
Samples Taken:	No	
Consent Purpose:	To discharge: • drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and • sediment retention pond sludge from water treatment plants onto and into land via landfarming	
Conditions Assessed:	1 of 144	
Overall Compliance Status:	Compliance	
Inspection Comments:	Inspection undertaken after recent non-compliance due to the acceptance and discharge to land of LOSP treated saw dust. The inspection found that no more saw dust had been accepted on site. Pit 1 liquid level was high, therefore it was difficult to determine if any saw dust remained. However, it appeared that the saw dust has been discharged to land. The pile of saw dust last noted on land in the storage area, has been removed and discharged to land. No further issues to note. Compliant with Abatement Notice EAC-24109.	
Further Actions Advice:	Nil	

Signed:

Council Officer:	Celeste Bevins
Officer Warrant Number:	299

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.

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Taranaki Regional Council

Inspection Notice

Under section 332 of the Resource Management Act 1991

Consent Number:	R2/7795-1.1
Consent Name:	Waste Remediation | Land Discharge | Manawapou Rd |change
Contact Name:	Waste Remediation Services Limited
Postal Address:	PO Box 7150, New Plymouth 4341
Site Location Address:	156 Manawapou Road, Manutahi
Inspection Number:	OBS-2021-94163
Inspection Type:	Compliance Monitoring Insp.
Inspection Date:	29 Oct 2021
Inspection Time:	11:40
Weather Details:	Rainfall: None Wind Direction: Wind Strength:
Samples Taken:	No
Consent Purpose:	To discharge: • drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and • sediment retention pond sludge from water treatment plants onto and into land via landfarming
Conditions Assessed:	31 of 144
Overall Compliance Status:	Compliance
Inspection Comments:	Inspection 1/3. Compliance monitoring inspection undertaken to assess compliance with resource consent conditions. Land farming activities were being undertaken at the time of inspection. No issues to note. Compliant at the time of inspection. Thanks, Celeste.
Further Actions Advice:	Nil

Signed:

Council Officer:	Celeste Bevins
Officer Warrant Number:	299

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.

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Taranaki Regional Council

Inspection Notice

Under section 332 of the Resource Management Act 1991

Consent Number:	R2/7795-1.1
Consent Name:	Waste Remediation | Land Discharge | Manawapou Rd |change
Contact Name:	Waste Remediation Services Limited
Postal Address:	PO Box 7150, New Plymouth 4341
Site Location Address:	156 Manawapou Road, Manutahi
Inspection Number:	OBS-2022-99121
Inspection Type:	Compliance Monitoring Insp.
Inspection Date:	05 Apr 2022
Inspection Time:	14:15
Weather Details:	Rainfall: Wind Direction: Wind Strength:
Samples Taken:	No
Consent Purpose:	To discharge: • drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and • sediment retention pond sludge from water treatment plants onto and into land via landfarming
Conditions Assessed:	31 of 144
Overall Compliance Status:	Compliance
Inspection Comments:	Inspection 2/3. Compliance monitoring inspection undertaken to assess compliance with resource consent conditions. Land farming activities have been recently been undertaken in the area adjacent to the area previously land farmed. Waste had not been incorporated into the soil as yet. Previously land farmed area had good pasture strike. Historically land farmed areas look good and few barren patches remained. No issues to note. Compliant at the time of inspection. Thanks, Celeste.
Further Actions Advice:	Nil

Signed:

Council Officer:	Celeste Bevins
Officer Warrant Number:	299

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.

WRS Waste Remediation Services

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Taranaki Regional Council

Inspection Notice

Under section 332 of the Resource Management Act 1991

Consent Number:	R2/7795-1.1
Consent Name:	Waste Remediation | Land Discharge | Manawapou Rd |change
Contact Name:	Waste Remediation Services Limited
Postal Address:	PO Box 7150, New Plymouth 4341
Site Location Address:	156 Manawapou Road, Manutahi
Inspection Number:	OBS-2022-100435
Inspection Type:	Compliance Monitoring Insp.
Inspection Date:	07 Jun 2022
Inspection Time:	10:18
Weather Details:	Rainfall: Wind Direction: Wind Strength:
Samples Taken:	No
Consent Purpose:	To discharge: • drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and • sediment retention pond sludge from water treatment plants onto and into land via landfarming
Conditions Assessed:	0
Overall Compliance Status:	Compliance
Inspection Comments:	Inspection 3/3. Inspection undertaken to assess compliance with Resource Consent conditions. The inspection found that the area in front of the pits that was most recently land farmed has good pasture strike. Land spreading activities are still taking place next to this area. Recent deliveries into pit 1. No issues to note today. Compliant at the time of inspection. Thanks, Celeste.
Further Actions Advice:	Nil
Signed:	
Council Officer:	Celeste Bevins
Officer Warrant Number:	299

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.

Appendix III

Categories used to evaluate environmental and administrative performance

Categories used to evaluate environmental and administrative performance

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

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

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

Environmental Performance

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

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

For example:

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

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

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

Administrative performance

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

Good: Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively

adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

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

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