Waste Remediation Services (WRS) Ltd
Symes Manawapou Landfarm

Monitoring Programme

Annual Report

2022-2023

Technical Report 2023-03

Working with people | caring for Taranaki

Taranaki
Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: 3175057 (Word)
Document: 3206919 (Pdf)
February 2024

Waste Remediation Services (WRS) LTD

Symes Manawapou Landfarm

Monitoring Programme

Annual Report

2022-2023

Technical Report 2023-03

Waste Remediation Services (WRS) LTD

Symes Manawapou Landfarm

Monitoring Programme

Annual Report

2022-2023

Technical Report 2023-03

Taranaki Regional Council
Private Bag 713
Stratford

ISSN: 1178-1467 (Online)
Document: 3175057 (Word)
Document: 3206919 (Pdf)
February 2024

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 for the period July 2022 to June 2023 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.

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

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 routine groundwater samples, one additional groundwater sample, one surface water sample and seven composite soil samples collected for physicochemical analysis.

Inspections found the site to be compliant on all occasions. Previously landfarmed areas held good pasture cover.

During the early part of the monitoring year the groundwater samples demonstrated stability for the analytes tested. However, in the latter part of the monitoring year there was a rise in analytes in two of the monitoring bores whilst the others remained relatively stable.

Bore GND2303 was severely damaged during the previous monitoring year and some rehabilitation was attempted. However, during the second half of the monitoring period, it was determined by camera to be permanently damaged. It is therefore, currently not possible to obtain a groundwater sample from this monitoring bore.

There was an additional investigation during May/June 2023 with respect to a rise in total dissolved salts (TDS) concentration in monitoring bore GND2301. An extra sample was obtained and analysed, and the TDS concentration was deemed compliant. The rapid response by the Company and the subsequent compliant sample was accepted by the Council.

Increased drilling in the region during 2022/2023, as a result of the demand for gas, has led to the need for a new spreading area (Phase 3). This has been established during this monitoring year in Stage 2, located between the storage pits and Lake Taumaha. Landfarming commenced in this area during the monitoring year. Additional groundwater bores will be required to monitor this new area of landfarming.

Lake Taumaha sample analysis demonstrates that the surface water quality is stable.

Soil sample analysis found that further bioremediation would be required prior to surrender of the areas sampled.

For reference, in the 2022-2023 year, consent holders were found to achieve a high level of environment performance and compliance for 878 (87%) of a total of 1007 consents monitored through the Taranaki tailored monitoring programmes, while for another 96 (10%) of the consents a good level of environmental performance and compliance was achieved. A further 27 (3%) of consents monitored required improvement in their performance, while the remaining one (<1%) achieved a rating of poor. 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 remains at a good level.

This report includes recommendations for the 2023-2024 year.

Table of contents

		Page
1	Introduction	1
1.1	Compliance monitoring programme reports and the Resource Management Act 1991	1
1.1.1	Introduction	1
1.1.2	Structure of this report	1
1.1.3	The Resource Management Act 1991 and monitoring	1
1.1.4	Evaluation of environmental and administrative performance	2
1.2	Process description	2
1.2.1	Drilling waste	2
1.2.2	Landfarming	3
1.3	Site location and description	5
1.4	Resource consents	7
1.5	Monitoring programme	7
1.5.1	Introduction	7
1.5.2	Programme liaison and management	7
1.5.3	Site inspections	7
1.5.4	Chemical sampling	8
1.5.5	Provision of consent holder provided data	9
2	Results	10
2.1	Inspections	10
2.2	Results of receiving environment monitoring	10
2.2.1	Groundwater monitoring	10
2.2.2	Surface water monitoring	19
2.2.3	Soil monitoring	21
2.3	Consent holder provided information	27
2.4	Incidents, investigations, and interventions	30
3	Discussion	31
3.1	Discussion of site performance	31
3.2	Environmental effects of exercise of consents	32
3.3	Evaluation of performance	33
3.4	Recommendations from the 2021-2022 Annual Report	37
3.5	Alterations to monitoring programmes for 2023-2024	37
4	Recommendations	39
Glossary of common terms and abbreviations		40

Bibliography and references 43

Appendix I Resource consents held by WRS Ltd Symes Manawapou Landfarm 45

Appendix II Company provided annual report

Appendix III Categories used to evaluate environmental and administrative performance

List of tables

Table 1 Consent held by the Company 7

Table 2 GND2300 2022-2023 monitoring period 11

Table 3 GND2301 2022-2023 monitoring period 13

Table 4 GND2302 2022-2023 monitoring period 15

Table 5 GND2303 2022-2023 monitoring period 17

Table 6 Lake Taumaha surface water sample 20

Table 7 Soil results for 2022-2023 23

Table 8 WRS Symes Manawapou Landfarm drilling waste delivery record 2022-2023 in m^3 (adapted from WRS Annual Report) 27

Table 9 Incidents, investigations, and interventions summary table 30

Table 10 Summary of performance for consent 7795-1.1 33

Table 11 Evaluation of environmental performance over time 36

List of figures

Figure 1 WRS Symes Manawapou Landfarm extent and regional location 6

Figure 2 WRS Symes Manawapou Landfarm groundwater monitoring locations 11

Figure 3 Long term EC monitoring GND2300 2012-2023 12

Figure 4 Long term TDS monitoring GND2300 2012-2023 12

Figure 5 Long term chloride monitoring GND2300 2012-2023 13

Figure 6 Long term EC monitoring GND2301 2012-2023 14

Figure 7 Long term TDS monitoring GND2301 2012-2023 14

Figure 8 Long term chloride monitoring GND2301 2012-2023 15

Figure 9 Long term EC monitoring GND2302 2012-2023 16

Figure 10 Long term TDS monitoring GND2302 2012-2023 16

Figure 11 Long term chloride monitoring GND2302 2012-2023 17

Figure 12 Long term EC monitoring GND2303 2012-2023 18

Figure 13 Long term TDS monitoring GND2303 2012-2023 18

Figure 14 Long term chloride monitoring GND2303 2012-2023 19
Figure 15 Sample location Lake Taumaha 19
Figure 16 Location of soil transects in relation to WRS Symes Manawapou Landfarm for 2022-2023 21
Figure 17 WRS provided map of landfarmed areas 29

List of photos

Photo 1 WRS Symes Manawapou Landfarm post discharge and reinstatement pre-seeding 2014 4
Photo 2 WRS Symes Manawapou Landfarm post surrender sampling 2018 4
Photo 3 Landfarming area M2110 2021 (image provided by WRS) 5
Photo 4 Top soiling completed, awaiting sowing (1/11/22) Area M2110 Stage II 27
Photo 5 Formation of bunds around the spread area, Stage II/Phase 3 2/8/22 32

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 2022 to June 2023 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 tenth 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 2023-2024 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 2022-2023 year, consent holders were found to achieve a high level of environment performance and compliance for 878 (87%) of a total of 1007 consents monitored through the Taranaki tailored monitoring programmes, while for another 96 (10%) of the consents a good level of environmental performance and compliance was achieved. A further 27 (3%) of consents monitored required improvement in their performance, while the remaining one (<1%) achieved a rating of poor.

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 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:

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.

The required area is prepared by scraping back and stockpiling existing pasture/topsoil and levelling out uneven ground.

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.

Waste is allowed to dry sufficiently before being tilled into the soil to the required depth with a tractor and discs.

The disposal area is levelled with chains or harrows.

Stockpiled or brought in topsoil/clay is applied to aid stability and assist in grass establishment.

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

1.3 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

1.4 Resource consents

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

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

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

1.5 Monitoring programme

1.5.1 Introduction

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

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

The monitoring programme for the Symes Manawapou Landfarm consisted of four primary components.

1.5.2 Programme liaison and management

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

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

1.5.3 Site inspections

The Symes Manawapou Landfarm was visited three times during the 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.

1.5.4 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 2023, while groundwater samples were collected quarterly, and surface water in June 2023.

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) and barium;
- Chloride, conductivity, calcium, magnesium, potassium, sodium, sodium adsorption ratio (SAR) and soluble salts;
- Total petroleum hydrocarbons (C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36} and C_7-C_{36}), poly-cyclic aromatic hydrocarbons and mono-cyclic aromatic hydrocarbons;
- BTEX (benzene, toluene, ethylbenzene, m&p-Xylene and o-Xylene); 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.

1.5.5 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 2022-2023 monitoring period. This report contains information relating to the receipt, handling, storage and disposal of wastes.

A copy of the Company annual report can be found in Appendix II of this compliance monitoring report.

2 Results

2.1 Inspections

20 October 2022

The inspection found that the area in front of the pits that was most recently land farmed has good pasture growth. Land spreading activities are still being undertaken on the seaward side of this area but were not occurring at the time of inspection. An almost continuous stream of waste has been received and discharged on site in the last couple of months. It was observed that a rip (approximately 0.5 metre in length) has occurred in the lining of Pit 2 on one of the sidewalls.

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

6 March 2023

An inspection was undertaken to assess compliance with resource consent conditions. Pit 4 contained liquid. Pit 1 contained some solids, Pit 2 and 3 contained some liquids. Very good pasture growth was observed on one of the recently landfarmed areas. The most seaward area was still exposed, and no spreading appeared to have occurred in the last two months. A request was made by the inspector that the Company should submit integrity reports for the pit liners.

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

26 June 2023

A routine inspection was undertaken to assess compliance with resource consent conditions. Pit 2 is not currently being used due to the rip in the lining that occurred earlier in the monitoring season. The inspection found that the large area in front of the pits that was most recently landfarmed had good pasture growth. Land spreading activities were still being undertaken on the seaward side of this area but were not occurring at the time of inspection. A pit had been constructed at the low point of this site to capture any overland flow as this is at risk of over topping the bund. This pit can be pumped out within 2 to 3 days and discharged back to land. It was suggested by the inspector that the new pit should be lined and the management plan consequently updated.

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 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 GND2301, and the landfarming exercise, in the case of GND2302 and GND2303.

Four monitoring rounds were undertaken across three bores and two monitoring rounds of one bore. These were as close to quarterly as practicable to assess for seasonal variation. The analysis of the monitoring rounds are provided in the following Tables 2-5.

Where the analyses of total petroleum hydrocarbons (C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36}) and benzene, toluene, ethylbenzene and xylenes (m, o &p) (collectively termed BTEX), were recorded below the laboratory defined limit of detection (LOD) they have not been tabulated.

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 2022-2023 monitoring period

GND2300	Collected	25 Aug 2022	30 Nov 2022	30 Mar 2023	18 May 2023
Parameter	**Time**	**13:40**	**11:23**	**11:10**	**13.20**
TEMP	**°C**	15.6	16.9	16.2	16.0
Electrical Conductivity (EC)	**µS/cm**	833	832	1291	1447
	mS/m	83.3	83.2	129.1	144.7
Total Dissolved Solids (TDS)	**g/m³**	460	470	860	1150
Acid Soluble Barium	**g/m³**	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	**g/m³**	0.031	0.031	0.048	0.019
Chloride	**g/m³**	154	144	310	330
Total Sodium	**g/m³**	115	114	139	133
pH	**pH Units**	6.7	6.3	6.9	6.4

- Temperature remained relatively stable, ranging 15.6-16.9°C.
- Electrical conductivity (EC) remained relatively stable during the first part of the monitoring year (833 and 832 mS/m), however there was an increase in March and then again in May (144.7 mS/m). When compared to the long term record, there has been a general reduction in EC since 2019, however there was a rise in levels in the latter part of this monitoring period (Figure 3).

- Total dissolved solids (TDS), in similarity to the EC results, demonstrated stability in the first part of the monitoring year then an increase in March followed by a further increase in May. Over the long term record this parameter has recorded a reduction in concentration since 2019, however there was a rise in levels in the latter part of this monitoring period (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 0.019-0.031 g/m^3.
- Chloride results ranged 144-330 g/m^3. This analyte had lower levels in August and November, with slightly higher levels occurring in the March and May rounds. This similarly echoes both the EC and TDS results over time with a rise on levels during the second half of this monitoring period (Figure 5).
- Sodium results ranged 114-139 g/m^3 and showed a slight increasing trend.
- pH results remained quite stable and weakly acidic, ranging 6.3-6.9 pH.
- No total petroleum hydrocarbons (TPH) or benzene, toluene, ethylbenzene or xylenes (BTEX) were recorded above the LOD this monitoring period.

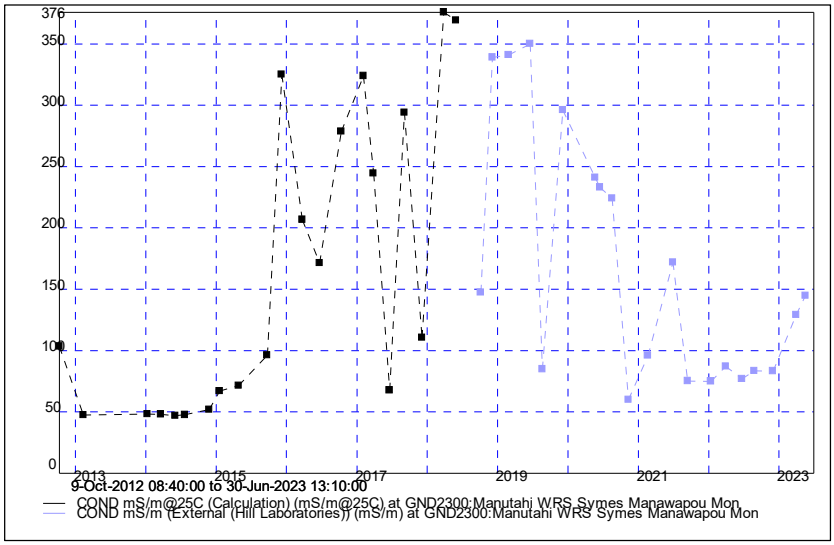


Figure 3 Long term EC monitoring GND2300 2012-2023

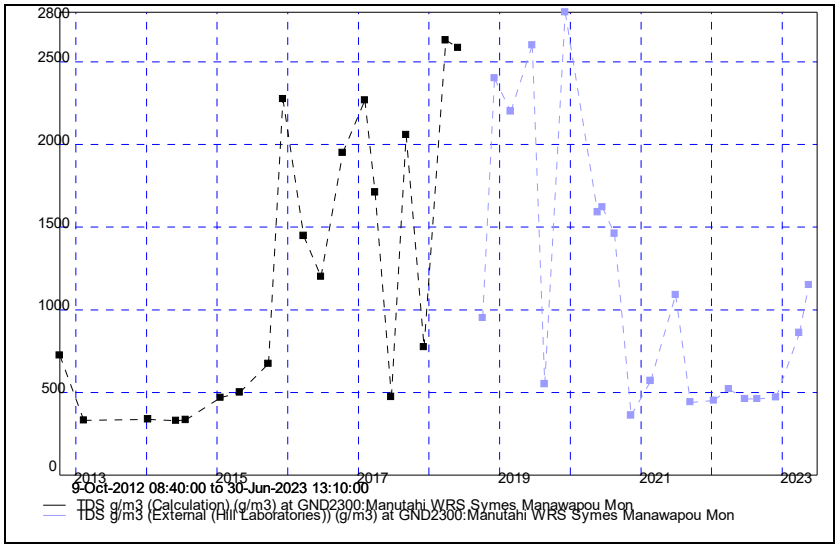


Figure 4 Long term TDS monitoring GND2300 2012-2023

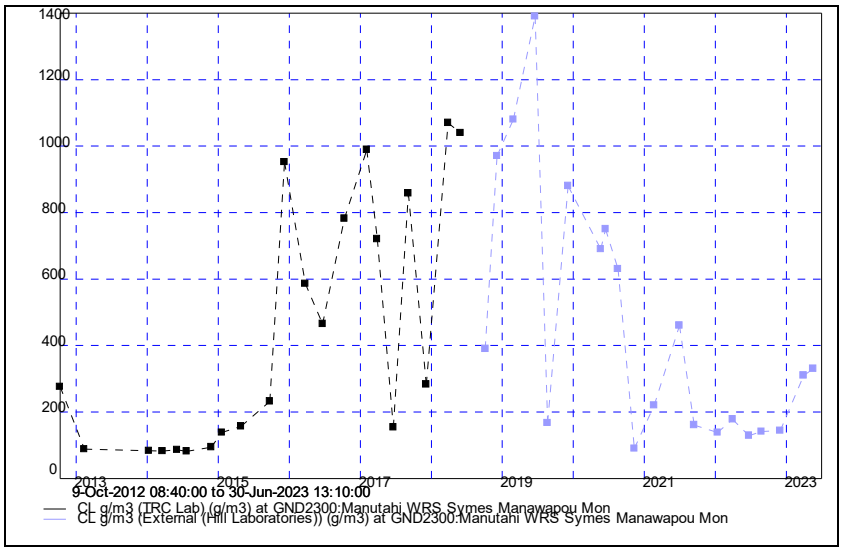


Figure 5 Long term chloride monitoring GND2300 2012-2023

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

Table 3 GND2301 2022-2023 monitoring period

GND2301	Collected	25 Aug 2022	01 Dec 2022	29 Mar 2023	18 May 2023	Additional sample 13 Jun 2023
Parameter	**Time**	**12:55**	**10:20**	**13:50**	**11:40**	**11:50**
TEMP	**°C**	16.1	16.6	16.2	16.1	17.4
Electrical Conductivity (EC)	**µS/cm**	1212	939	2820	4030	3710
	mS/m	121.2	93.9	282	403	371
Total Dissolved Solids (TDS)	**g/m^3**	700	600	1760	3000	2200
Acid Soluble Barium	**g/m^3**	0.83	0.58	1.09	1.79	2.1
Dissolved Barium	**g/m^3**	0.8	0.59	1.16	1.39	2.3
Chloride	**g/m^3**	154	87	680	1040	880
Total Sodium	**g/m^3**	56	45	93	135	192
pH	**pH Units**	6.9	7.2	6.5	6.5	6.5
Toluene	**g/m^3**	< 0.0010	< 0.0010	0.0128	< 0.0010	0.0142

- Temperature remained relatively stable, ranging 16.1-17.4 °C.
- EC results remained stable for the first two rounds, then increased significantly in March and a further increase in May, ranging 93.9-403 mS/m. The extra sample showed a marginal decrease from May. Although there was an increase in concentration levels, they still remain much lower than in previous monitoring years (Figure 6).
- TDS also remained stable initially, with a significant increase in March and again in May when it reached 3000 g/m^3, ranging 600-3000 g/m^3, with a marginal decrease in the extra sample in June to 2200 g/m^3. Although high compared to recent years, this is not the highest it has been in the past (Figure 7).

- Acid soluble and dissolved barium remained relatively stable and of low concentrations for the first half of the monitoring period, then there was a marginal increase in the second half.
- Chloride ranged 87-1040 g/m^3, starting fairly stable then rising significantly in March and subsequently in May, with a marginal decrease in June. Similarly to EC and TDS these levels are still lower than some previous monitoring years (Figure 8).
- Sodium remained relatively stable, with an increase for the March, May and June sample, ranging 45-192 g/m^3.
- pH remained weakly acidic, ranging 6.5-67.2 pH.
- Traces of toluene was recorded at 0.0128 g/m^3 and 0.0142 g/m^3 in March and June respectively, but for the majority of the monitoring period TPH and BTEX were not recorded above the LOD.

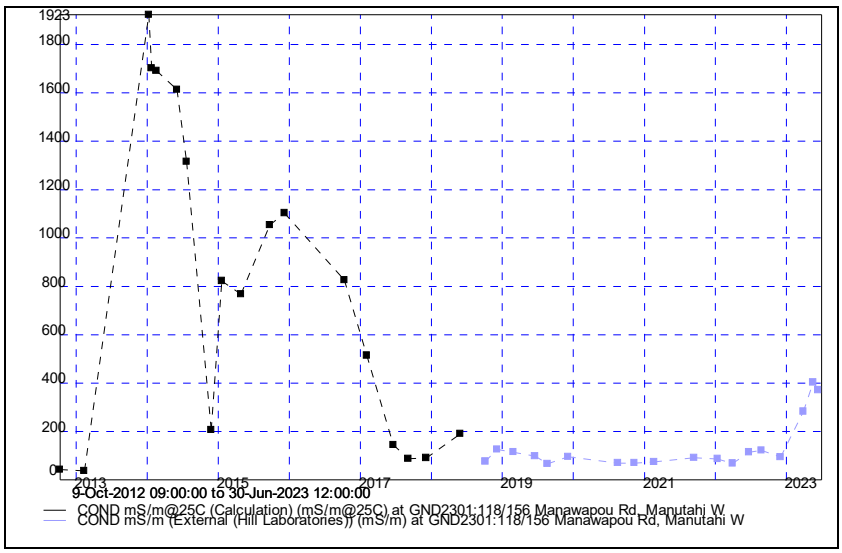


Figure 6 Long term EC monitoring GND2301 2012-2023

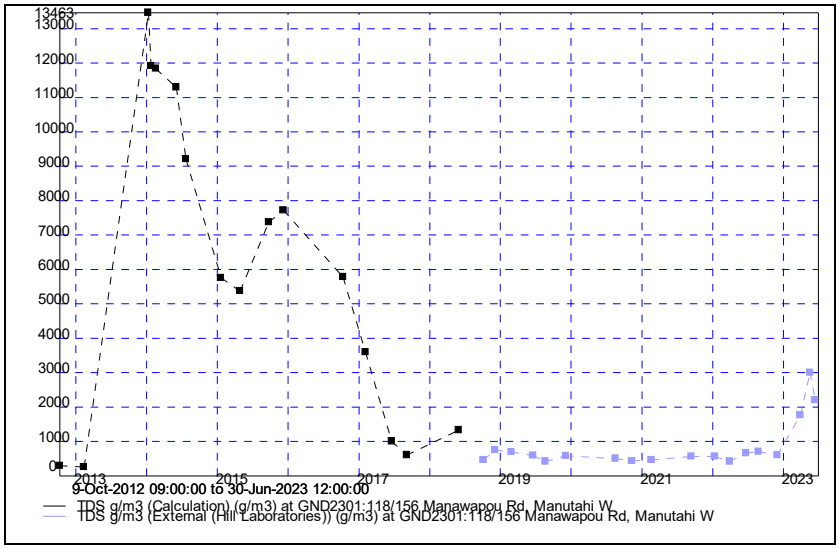


Figure 7 Long term TDS monitoring GND2301 2012-2023

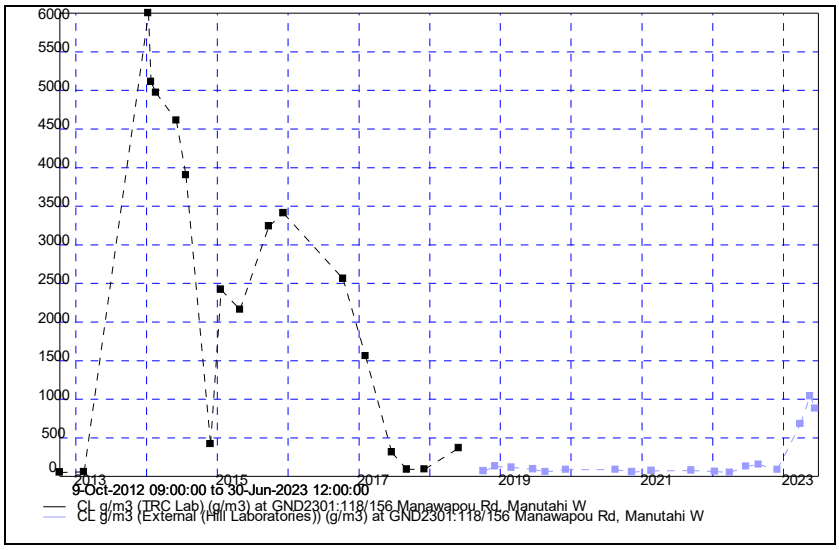


Figure 8 Long term chloride monitoring GND2301 2012-2023

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 2022-2023 monitoring period

GND2302	Collected	25 Aug 2022	30 Nov 2022	29 Mar 2023	18 May 2023
Parameter	**Time**	**10:50**	**14:16**	**10:40**	**10:50**
TEMP	**°C**	15.4	15.8	15.1	14.9
Electrical Conductivity (EC)	**µS/cm**	1063	1136	1054	949
	mS/m	106.3	113.6	105.4	94.9
Total Dissolved Solids (TDS)	**g/m^3**	630	480	810	860
Acid Soluble Barium	**g/m^3**	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	**g/m^3**	0.041	0.050	0.045	0.036
Chloride	**g/m^3**	195	230	198	171
Total Sodium	**g/m^3**	77	78	74	70
pH	**pH Units**	6.7	6.4	6.5	6.6

- Temperature remained stable, ranging 14.9-16.7°C.
- EC has recorded an annual increase in this parameter since 2017 peaking in 2020, and has fluctuated since. The results in this monitoring period remained stable, ranging 94.9-133.6 mS/m. 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 and there is a general downward trend in concentration. However, levels continue to fluctuate.
- TDS was stable for the first two monitoring rounds, increasing in concentration during March and May, with a range 480-860 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 2020, but continues to fluctuate.
- Acid soluble barium was below the LOD.
- Dissolved barium remained of low concentrations, ranging 0.036-0.050 g/m^3.

- Chloride monitoring, remained relatively stable for the monitoring period, ranging 171-230 mg/kg. The long term record indicates a steady increase over time (Figure 11), and similar to other parameters, having peaked in 2020 there is now an overall downward trend. Concentration levels continue to fluctuate.
- Sodium ranged 70-78 g/m^3.
- pH remained relatively stable and weakly acidic, ranging 6.4-6.7 pH.
- No TPH or BTEX were recorded above the LOD in any of the four monitoring rounds this monitoring period.

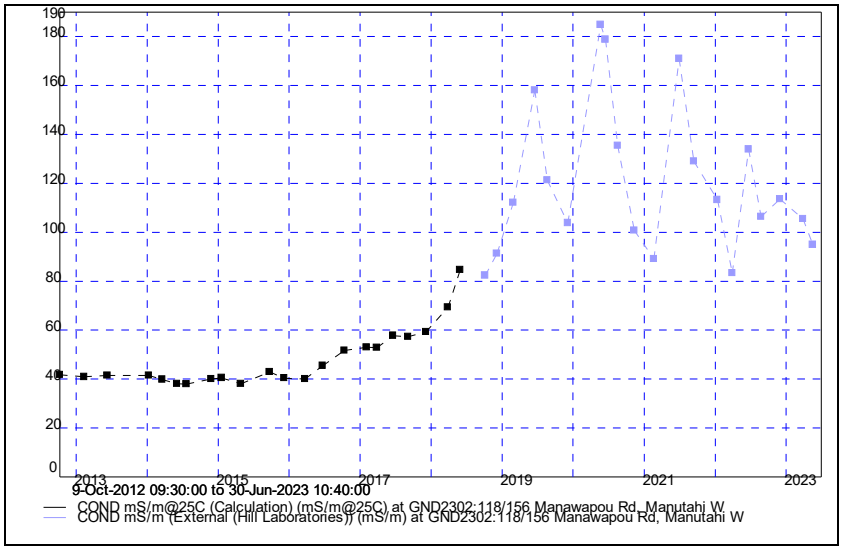


Figure 9 Long term EC monitoring GND2302 2012-2023

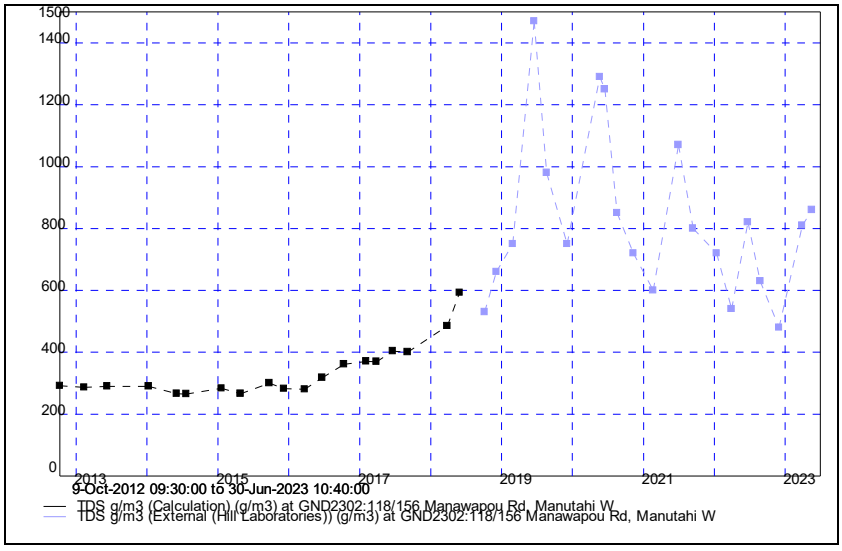


Figure 10 Long term TDS monitoring GND2302 2012-2023

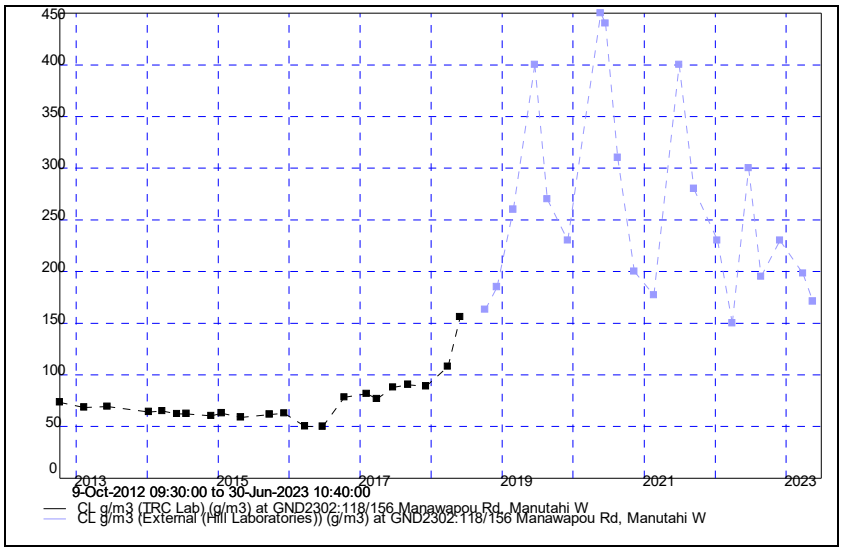


Figure 11 Long term chloride monitoring GND2302 2012-2023

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 repaired the bore during February 2022, and routine sampling was able to continue in March 2022. However, this bore has continued to cause issues for obtaining a groundwater sample. Monitoring during the first part of the 2022-2023 monitoring was feasible. However, during the second part of the monitoring year it was not possible to obtain a sample, as there appeared to be a blockage at approximately 4.5 m below ground level. Investigation was subsequently carried out by the Company by sending a camera down the bore. It was determined that the casing has pulled apart, most likely as a result of the previous damage it sustained during the 2020-2021 monitoring period.

Table 5 GND2303 2022-2023 monitoring period

GND2303	Collected	25 Aug 2022	30 Nov 2022	Mar 2023	May 2023
Parameter	Time	11:55	13:02		
TEMP	°C	15.1	15.8	Bore damaged	Bore damaged
Electrical Conductivity (EC)	µS/cm	504	538	-	-
	mS/m	50.4	53.8	-	-
Total Dissolved Solids (TDS)	g/m^3	300	260	-	-
Acid Soluble Barium	g/m^3	< 0.11	< 0.11	-	-
Dissolved Barium	g/m^3	0.037	0.044	-	-
Chloride	g/m^3	72	76	-	-
Total Sodium	g/m^3	58	64	-	-
pH	pH Units	6.8	6.5	-	-

This monitoring well has recorded some elevated saline impacts to groundwater previously (Figures 12-14). The fluctuations in EC, TDS and chloride appear to correspond loosely with landfarming dates undertaken by the Company over time. Recent results have shown a stabilisation of parameters at lower concentration levels.

The monitoring bore was repaired enough to obtain samples for the first two monitoring rounds, however subsequently it was decommissioned due to the cracked casing preventing the ability to obtain samples. Monitoring of this bore for groundwater has now ceased.

For the first part of the year:

- Temperature ranged 15.1-15.8°C.
- EC ranged 50.4-53.8 mS/m.
- TDS ranged 260-300 g/m^3.
- Acid soluble barium was recorded below the LOD.
- Dissolved barium remained stable and of low concentrations, ranging 0.037-0.044 g/m^3.
- Chloride monitoring remained stable with a slight increase in the last round, ranging 72-76 g/m^3. This concentration level continues to decrease compared to previous years.
- Sodium ranged 58-64 g/m^3, which is similar to the previous period.
- pH remained relatively stable and weakly acidic, ranging 6.5-6.8 pH.
- No TPH or BTEX were recorded above the LOD.

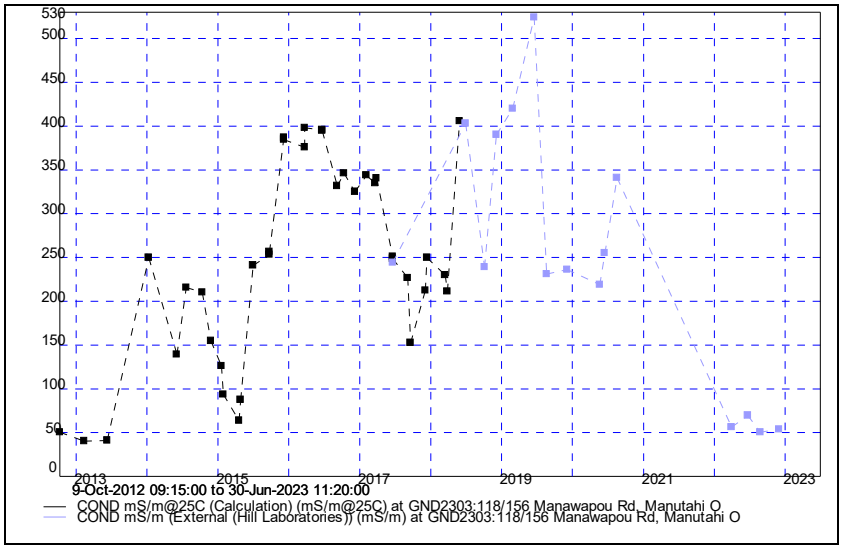


Figure 12 Long term EC monitoring GND2303 2012-2023

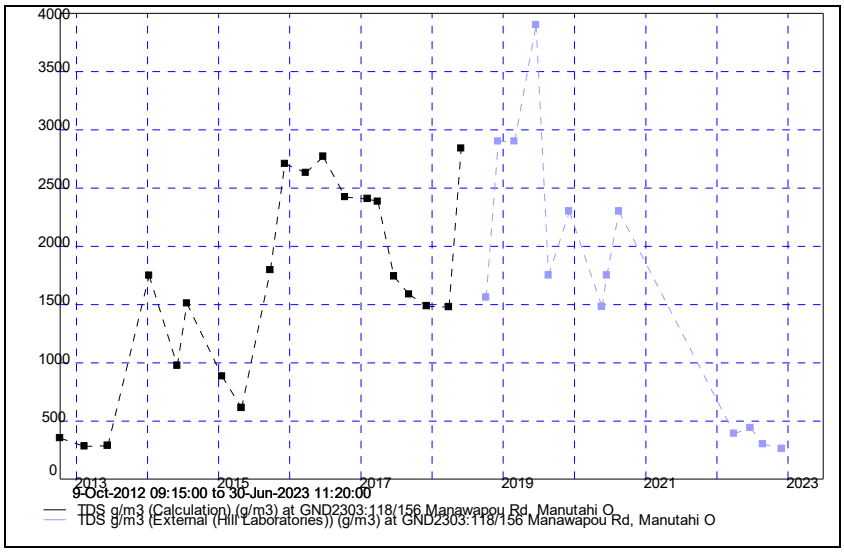


Figure 13 Long term TDS monitoring GND2303 2012-2023

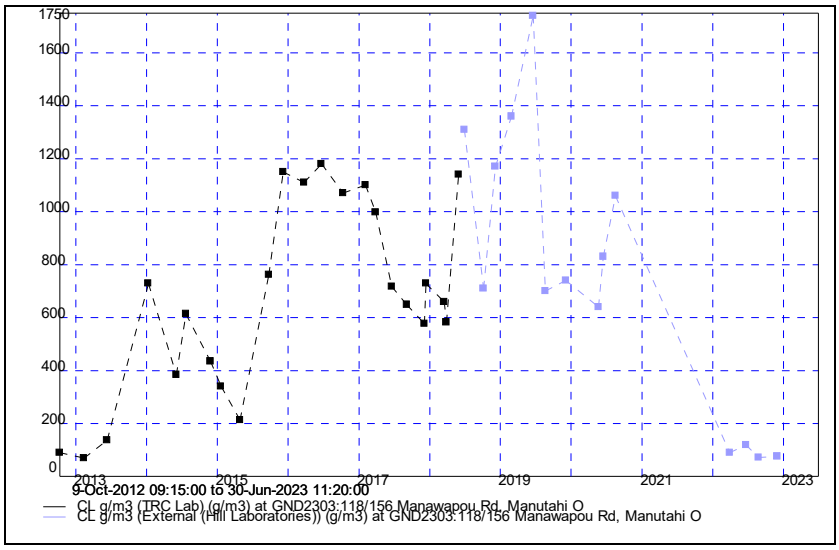


Figure 14 Long term chloride monitoring GND2303 2012-2023

2.2.2 Surface water monitoring

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	16 Jun 2023
Parameter	**Time**	**10:35**
TEMP	**°C**	10.6
Electrical Conductivity (EC)	**µS/cm**	401
	mS/m	40.1
Total Dissolved Solids (TDS)	**g/m³**	240
Acid Soluble Barium	**g/m³**	< 0.11
Chloride	**g/m³**	68
Total Sodium	**g/m³**	42
pH	**pH Units**	8.0
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
Ethylbenzene	**g/m³**	< 0.0010
m&p-Xylene	**g/m³**	< 0.002
o-Xylene	**g/m³**	< 0.0010

- Water temperature of Lake Taumaha was recorded at 10.6°C.
- EC was recorded at 40.1 mS/m, which is similar to the previous two monitoring periods (38.3-41.2 mS/m).
- TDS was recorded at 240 g/m^3, which is similar to the previous monitoring period.
- Acid soluble barium remains below the LOD.
- Chloride was recorded at 68 g/m^3, which is within range of the previous two sample periods, ranging 70-74 g/m^3.
- Sodium was recorded at 42 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.

2.2.3 Soil monitoring

Four transects were taken from the previously completed landfarmed section within area M2110. A further three transects were taken from a recently completed section of 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 surrendered.

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 2022-2023 there has been a reasonably high level of activity. The site has received drilling/production waste remediation materials from Todd Energy, Beach Energy and OMV. Preparation of a new spreading area (Phase 3) in Stage 2 of the site was undertaken, and spreading and incorporation of material commenced and continues at the conclusion of the monitoring period.

Figure 16 Location of soil transects in relation to WRS Symes Manawapou Landfarm for 2022-2023

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 includes analytes which are defined in the consent by a limit.

Table 7 Soil results for 2022-2023

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7
Soil samples 2022-23	Date collected	Consent surrender limit 7795-1	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023
Parameters	Unit/Time		11:05	11:05	11:50	12:18	13:12	13:40	14:05
Dry Matter (Env)	g/100g as rcvd		86	87	87	88	87	89	87
pH	pH Units		8.9	8.9	8.4	8.4	9.0	9.3	9.0
Benzo[a]pyrene (BAP)	mg/kg dry wt	**<0.027**	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
Naphthalene	mg/kg dry wt	**7.2**	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt		<0.012	0.014	<0.012	<0.012	0.015	0.012	0.018
Phenanthrene	mg/kg dry wt		0.021	0.015	<0.012	0.013	0.015	<0.012	0.016
Pyrene	mg/kg dry wt	**160**	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012
1-Methylnaphthalene	mg/kg dry wt		0.043	0.030	0.012	0.018	0.011	<0.011	0.019
2-Methylnaphthalene	mg/kg dry wt		0.046	0.030	0.016	0.018	0.011	0.014	0.021
Total of Reported PAHs in Soil	mg/kg dry wt		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Conductivity from soluble salts	mS/cm	**2.9**	0.2	0.4	0.2	0.3	0.4	0.3	0.3
Chloride	mg/kg dry wt	**700**	128	370	105	134	350	147	183
Total Recoverable Calcium	mg/kg dry wt		6200	9900	7300	5500	13400	13300	14700

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7
Soil samples 2022-23	Date collected	Consent surrender limit 7795-1	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023
Total Recoverable Magnesium	mg/kg dry wt		2200	2300	2200	2000	2600	2600	3200
Total Recoverable Potassium	mg/kg dry wt		600	1090	610	520	1110	1070	1220
Total Recoverable Sodium	mg/kg dry wt	460	290	320	330	310	390	410	370
Soluble Salts	g/100g dry wt	0.25	0.07	0.15	0.07	0.09	0.15	0.09	0.11
Sodium Absorption Ratio (SAR)	$mmol/L^{0.5}$	<18	1.9	2.6	2.2	2.2	4.5	5.2	4.4
Benzene	mg/kg dry wt	1.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	68	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	53	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	48	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	48	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
C_7 - C_9	mg/kg dry wt	<120	< 20	< 20	< 20	< 20	< 20	< 20	< 20
C_{10} - C_{14}	mg/kg dry wt	<58	1450[1]	1610	460	910	990	1460	1550
C_{15} - C_{36}	mg/kg dry wt	<4,000	6400	7000	4400	5600	6600	8900	9600

[1] Figures in red are above the consent surrender limit.

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7
Soil samples 2022-23	Date collected	Consent surrender limit 7795-1	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023
Total hydrocarbons (C_7 - C_{36})	mg/kg dry wt		7900	8600	4900	6500	7600	10400	11200
Total Recoverable Barium	mg/kg dry wt		3000	3400	2800	2400	2900	3400	3200
Total Recoverable Arsenic	mg/kg dry wt	20	4	4	5	3	3	3	4
Total Recoverable Cadmium	mg/kg dry wt	1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	600	21	19	22	19	20	21	20
Total Recoverable Copper	mg/kg dry wt	100	11	13	14	12	15	14	14
Total Recoverable Lead	mg/kg dry wt	300	3.2	5.7	4.4	3.2	6.5	5.6	9.1
Total Recoverable Mercury	mg/kg dry wt	1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	60	9	9	9	8	10	10	11
Total Recoverable Zinc	mg/kg dry wt	300	59	59	62	64	60	66	56
Permethrin	mg/kg dry wt		1.14	1.70	0.70	1.63	0.53	0.86	0.73
Propiconazole	mg/kg dry wt		1.27	1.40	0.71	1.48	0.47	0.62	0.61
Tebuconazole	mg/kg dry wt		2.6	2.8	1.51	2.6	0.77	1.13	0.95

WRS Symes Manawapou	Area M2110	Transect number	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Transect 6	Transect 7
Soil samples 2022-23	Date collected	Consent surrender limit 7795-1	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023	16 June 2023
Calcium (Sat Paste)	mg/L		195	351	217	179	311	141	199
Magnesium (Sat Paste)	mg/L		25	53	27	22	44	22	29
Sodium (Sat Paste)	mg/L		105	198	129	118	322	252	249

The analysis of the soil samples indicated the following:

- Sodium absorption ratio (SAR) ranged from 1.9 to 5.2 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 460-1600 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 4400-9600 mg/kg; the limit for surrender is <4,000 mg/kg. All samples were over the limit.
- Chloride ranged 105-370 mg/kg. The surrender concentration must be below 700 mg/kg, all samples were below this limit.
- Total recoverable sodium was below the limit of surrender (460 mg/kg), ranging 20-410 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 Top soiling completed, awaiting sowing (1/11/22) Area M2110 Stage II

(Images supplied by WRS)

2.3 Consent holder provided information

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 2022-2023 in m^3 (adapted from WRS Annual Report)

Date	Source	Customer	Solid	Liquid	Total
July to August 2022	Todd Pouri A – 1a	Todd	-	250	250
July 2022	Intergroup Yard	OMV	188	-	188
July 2022 to June 2023	Halliburton LBMP	Halliburton	-	1104	1104
August 2022 to June 2023	Kupe	Beach Energy	-	786	786
August 2022	MHW C 9&11	Todd Energy	-	10	10

Date	Source	Customer	Solid	Liquid	Total
August to September 2022	MHW G 33	Todd Energy	626	635	1261
September to October 2022	MHW G 34	Todd Energy	601	774	1375
October to November 2022	MHW G 36	Todd Energy	657	678	1335
November to December 2022	MHW G 35	Todd Energy	701	837	1538
June 2023	MHW G Skimmer Pit	Todd Energy	8	-	8
August to September 2022 and January to March 2023	Kapuni J	Todd Energy	-	73	73
November 2022, May to June 2023	Kapuni J KA25	Todd Energy	586	568	1154
November 2022	Kapuni J KA26	Todd Energy	8	48	56
November 2022	Kapuni J KA27	Todd Energy	8	40	48
November 2022 and June 2023	Kapuni J KA28	Todd Energy	652	579	1231
September 2022	OMV MB 05	OMV	-	219	219
May to June 2023	OMV MB 08	OMV	-	222	222
October 2022 to January 2023	Kapuni Production Station	Todd Energy	-	7	7
ANNUAL TOTAL TO 30 JUNE 2023 (m^3)			**4035**	**6829**	**10864**

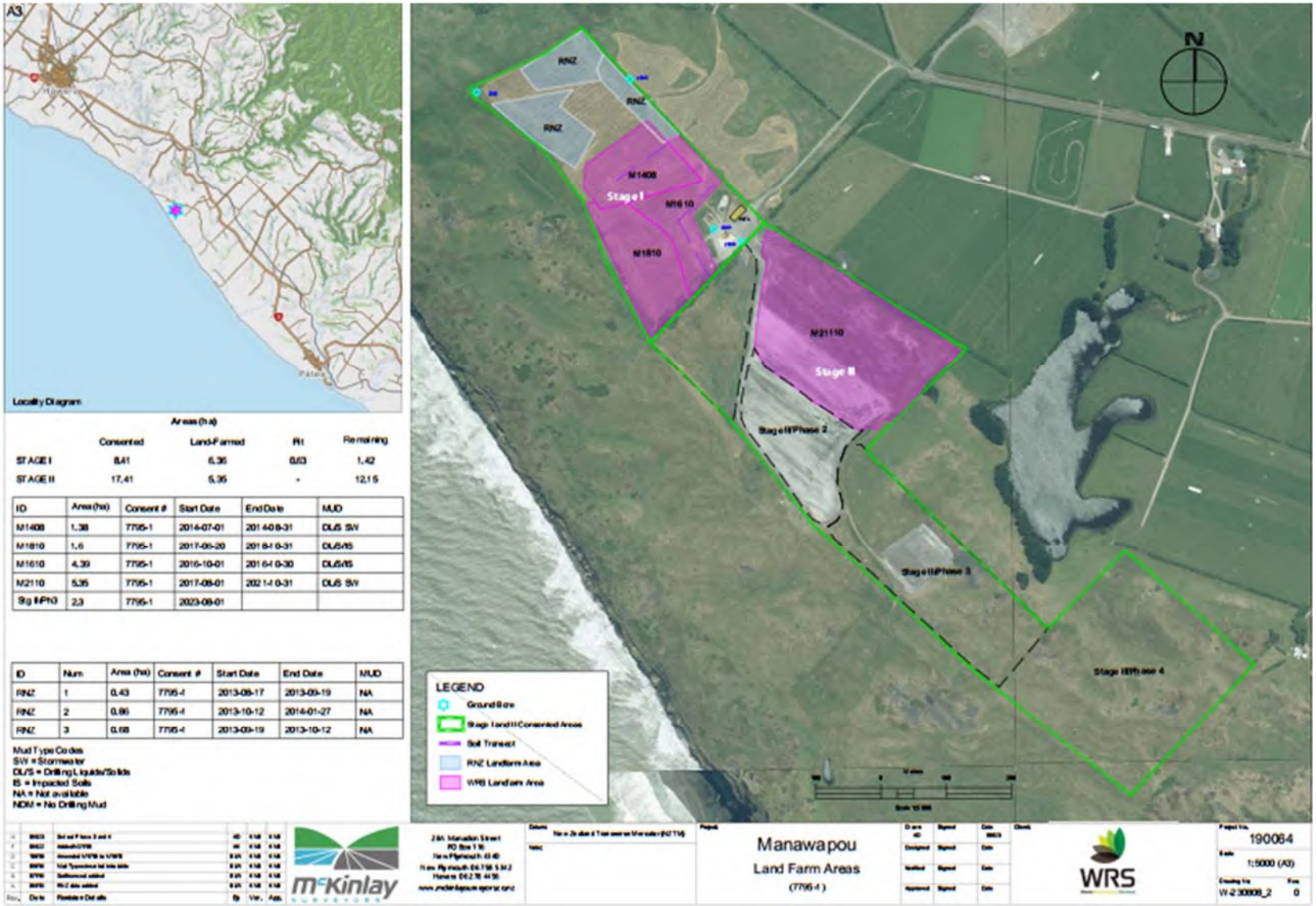


Figure 17 WRS provided map of landfarmed areas

2.4 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 2022-2023 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
18 May 2023	Result for groundwater monitoring of GND2301 for TDS was above consent limit as per condition 22 (7795-1.1). Consent limit is 2500 gm^3 and result was 3000 gm^3.	N	WRS was informed. WRS suggested a further sample to be analysed. The bore was re-sampled on 14th June 2023, and the TDS result was now compliant at 2200 gm^3.	Accepted re-sample.

3 Discussion

3.1 Discussion of site performance

The Symes Manawapou Landfarm observed a reasonably high level of activity, with 10,864 m^3 of both solid and liquid waste from 18 sources accepted to site. The Company has landfarmed the site in two stages, which are illustrated in Figure 17 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 2022–2023 monitoring period spreading operations commenced in a new area (Phase 3) 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, the Company 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 three inspections carried out during this monitoring period, and the Company was compliant.

During this monitoring period the liner of Pit 2 had been accidently ripped by a contractor's staff member acting alone and without authorisation when attempting to retrieve a bucket from the pit. The staff member left the employ of the contractor the following day. Subsequently Pit 2 has been decommissioned until repairs can be undertaken during the summer of 2023-2024. Rainwater levels in the pit have been maintained below the rips by regular vacuum tank removal of the liquid.

An additional pit was constructed in June 2023 to collect overland flow at the low point of the storage area. This is pumped out within 3 days of capture and discharged to land.

There was an additional investigation during May/June 2023 with respect to a rise in TDS concentration in monitoring bore GND2301. Another sample was taken and analysed, and the TDS concentration concentrations had reduced and was compliant with consent limits. The rapid response by the Company, and the subsequent compliant sample was accepted by the Council without enforcement. No environmental effects have been identified relating to this issue. It is also in conclusive as to what the cause of increased concentration levels may be. It is noted that these levels are historically lower than previous long term figures, and the environmental effects are minimal.

Only two samples for groundwater monitoring bore GND2303 were possible this monitoring period. Using a down hole camera the casing of the bore was determined to be damaged during the monitoring year. It was agreed by the Council and the Company that groundwater monitoring was not currently possible for this bore, and the bore has been decommissioned for the time being as a monitoring bore.

Work has been initiated by the Company to airlift and clean out the bores and re-define true groundwater levels in all the bores to assist with greater resolution of the piezometric gradient of the area. This work is

constrained by the availability of a suitable contractor and staff. It is the endeavour of the Company to have this work competed by the end of the calendar year 2023.

During 2022/2023 an increase in demand for gas, resulted in the need for a new spreading area (Phase 3). The new area has been established during this monitoring year in Stage 2, located between the storage pits and Lake Taumaha (Figure 17). Landfarming commenced in this area during the monitoring period. One or two additional groundwater bores will be required to monitor the new area of landfarming.

Photo 5 Formation of bunds around the spread area, Stage II/Phase 3 2/8/22

(Image provided by WRS)

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 all the monitoring bores.

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. During this monitoring period bore GND2300, GND2301 and GND2302 saline concentrations were stabilised with a marginal increase during the latter part of the monitoring period, levels remain lower or similar to previous monitoring periods. Bore GND2303 had stable saline concentrations and similar to the 2021-2022 monitoring period, and are substantially lower than previously.

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.

During this monitoring period, the Company demonstrated to the Council that the liners within the pits/cells in use remain fit for purpose. There are recommendations by the consultant within the pit liner report for minor repairs and to prevent further degradation of the areas around the pit.

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]. All three chemicals were still present in the soil samples during this monitoring period. Soil sampling in the next 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.	Yes
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
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 bore currently decommissioned due to casing damage during 2023

[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?**
6. Any pits utilised for the storage of solid or liquid waste shall be lined with fit for purpose synthetic liners or equivalent	Inspection Liner of Pit 2 accidently damaged, currently not in use	Yes
7. Integrity check of pit liners to be conducted per 24 month period	Notification received June 2023	Yes
8. Notify TRC 48 hrs prior to stockpiling	Notifications received when stockpiling.	Yes
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.	Yes
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	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?**
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
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	Yes
22. Total dissolved salts in any fresh water body shall not exceed 2,500 g/m^3	Sampling indicated that GND2301 was over the limit during May 2023. However the resampling in June 2023 demonstrated a TDS concentration lower than the limit.	Yes
23. Disposal of waste shall not lead to contaminants entering surface water or ground water exceeding background concentrations	Sampling indicates that saline impacts were stabilising with minor increases in the latter part of the monitoring year. Results are indicative that peak concentrations have been reached with a continuing overall downward trend.	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?**
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
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 is due in June 2025.	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

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					

Year	Consent no	High	Good	Improvement req	Poor
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	-	-
2022-2023	7795-1.1	1	-	-	-
Totals		2	7	1	1

During the year, the Company demonstrated an overall high level of environmental performance and a high level of administrative performance with the resource consent as defined in Appendix III.

3.4 Recommendations from the 2021-2022 Annual Report

In the 2021-2022 Annual Report, it was recommended:

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. THAT 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.

In terms of the recommendations: seven soil samples were analysed for completed area M2110. Groundwater was undertaken quarterly. Bore GND2303 was decommissioned early 2023 preventing further monitoring for this bore during this monitoring period. An extra groundwater sample was taken from bore GND2301 to investigate the elevation in salinity as per condition 22. The annual sample of Lake Taumaha was collected.

3.5 Alterations to monitoring programmes for 2023-2024

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.

In light of the increased landfarming to the east (Phase 3) additional groundwater monitoring is required in Stage 2.

It is recommended that a review of consent Condition 11 be undertaken at the next review date 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.

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 2023-2024.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Symes Manawapou Landfarm in the 2023-2024 year continue at the same level as in 2022-2023.
4. THAT any elevations in groundwater TDS, in excess of condition 22, will require the Company to investigate and mitigate the cause.
5. THAT should there be issues with environmental or administrative performance in 2023-2024, 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.

Bibliography and references

Ministry for the Environment, (2018). Best Practice Guidelines for Compliance, Monitoring and Enforcement under the Resource Management Act 1991. Wellington: Ministry for the Environment.

Ministry for the Environment (2003): Guidelines for the safe application of bio solids to land in New Zealand, Ministry for the Environment.

Taranaki Regional Council (2021): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2021-2022. Technical Report 2022-27.

Taranaki Regional Council (2021): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2020-2021. Technical Report 2021-79.

Taranaki Regional Council (2020): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2019-2020. Technical Report 2020-88.

Taranaki Regional Council (2019): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2018-2019. Technical Report 2019-68.

Taranaki Regional Council (2018): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2017-2018. Technical Report 2018-84.

Taranaki Regional Council (2017): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2016-2017. Technical Report 2017-74.

Taranaki Regional Council (2016): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2015-2016. Technical Report 2016-92.

Taranaki Regional Council (2015): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2014-2015. Technical Report 2015-77.

Taranaki Regional Council (2014): Waste Remediation Services (WRS) Limited Symes Manawapou Landfarm Monitoring Programme Annual Report 2013-2014. Technical Report 2014-118.

Taranaki Regional Council (2013): Remediation NZ Limited Drilling Waste Disposal Monitoring Programme Annual Report 2012-2013. Technical report 2013-67.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2015.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2016.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2017.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2018.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2019.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2020.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2021.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2022.

Waste Remediation Services (WRS) Manawapou (Symes) Disposal Site Annual Report 2023.

Waste Remediation Services Ltd (WRS), Waikaikai (Wards) & Manawapou (Symes) Landfarm Management Plan 2017-2018.

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

Waste Remediation Services Ltd (WRS), Waikaikai (Wards) & Manawapou (Symes) Landfarm Management Plan 2019-2020.

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

30 August 2023

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 2022 to 30 June 2023 relating to receipt and landspreading activities undertaken at Waste Remediation Services (WRS) Manawapou remediation site. It is the ninth report completed by WRS following the previous periods;

2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22

This report is designed to follow on from the previously submitted 2021-22 consent monitoring report and as such is focused on activities, records and results from the 2022-23 period. This report is structured into seven sections, as follows:

1. Overview and Background
2. Material Received for Remediation

3. Remediation – comprising preparatory earthworks, landspreading 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 in 2012. The consent was varied in late 2020 to enable the receipt of sediment retention pond sludge from WTPs from 15 Dec 2020 under 7795-1.1. Between 2014 and the currently reporting year, there have been intermittent periods of activity at the site, reflecting fluctuating levels of activity within the local drilling industry.

During 2022-23 there has been a high level of activity at the Manawapou site. The site has received drilling/production material for remediation from Todd Energy, Beach Energy, and OMV/InterGroup. Preparation of a new spreading area in Stage 11, Stage11/ Phase 3- seaward and south of site (M2110) was undertaken; the continuum of receipt, spreading and remediation at the conclusion of the 2022 monitoring year continued into the 2023 year and similarly will continue into the 2023-24 monitoring year.

Monitoring of the site undertaken in the 2022-23 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 resulting in deleterious outcomes were recorded against the site in 2022-23.

2. WASTES RECEIVED FOR DISPOSAL

Waste Types and Volumes

During the 2021-22 year, a total of 10,864 m³ of both solid and liquid wastes were received onsite from the following sources:

- Todd Energy wells Pouri A-1a, Mangahewa C -9, 11, G-33, 34, 36, 35, Kapuni KA – 25, 26, 27, 28, and miscellaneous from MHW G site and Kapuni J site eg Skimmer Pits
- Intergroup rehandling yard for Maui A and B drilling programmes
- Halliburton's Liquid Mud Plant supplying Todd Energy drilling
- OMV/Intergroup Wells MB-05 and MB-08
- Beach Energy's Kupe Production Station
- Todd's Kapuni Production Station

Further details of quantities of material, dates and volumes are provided in the updated mud register attached as Appendix A.

Remediation Materials Characterisation

Consent 7795-1.1 requires the site operator to sample and keep records of the chemical composition of materials received for remediation. Composite samples are taken (generally by wellsite staff prior to transport) across each material stream before materials leave the well/source site for delivery. In the past when the receipt and recovery and spreading of liquids and cuttings from the storage pits was campaigned, WRS took samples from the pits prior to landspreading for additional waste characterisation. 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 and spreading occurring simultaneously. For this reason, pre-spreading sampling 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 Hills Labs for analysis. 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 2022-23 operational period spreading operations commenced in a new 5.4ha area (Phase 3) in Stage 11 of the Manawapou site (as identified on the updated site map, Appendix B). Spreading in this area was still underway at the end of the 2023 operational period.

A recent panorama photograph of the new spread area Stage11/Phase4, the current spreading area Phase 3 and the completed area M2110 at the Manawapou site are attached as Appendix C.

4. MONITORING

Site Inspections - WRS

WRS closely supervise site operations, receipt of materials for remediation, 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 by WRS management 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 with the principal's consent, management standards and practices. The methods undertaken are well established and efficacious.

Site Inspections – TRC

WRS has received three site inspections from the TRC for the 2022-23 year; all three were programmed. 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. Copies of the TRC inspection notices are attached as Appendix D.

Receiving Environment Sampling

WRS has presented the composite soil sampling and groundwater results in Appendix E and F; sampling is undertaken exclusively by TRC staff, with all samples being sent to Hill's Labs for the full suite of analytes required under consent 7795-1.1 . Of particular importance are surrender criteria values listed in Conditions 26. and 27. Pertaining to heavy metals, salts and hydrocarbons (MAH, PAH and TPH).

All results for the TRC 2022-23 soil sampling is presented in Appendix E.

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. 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.

Bore GND2303 was severely damaged by hedge trimming operations in 2021 (and left by the contractor unreported) was not able to be sampled during the first half of the monitoring period. Repairs were effected Dec 2022-January 2023 and sampling was resumed during the current reporting period. However deep well damage identified during the restarted programme, prevented representative samples being obtained. Further sampling of this bore has now been suspended with decisions re the replacement or relocation of the bore to be determined post the 2022-23 monitoring and reporting year.

WRS have reviewed these supplied results and have not identified any more than minor non-compliances with consent 7795-1.1 conditions. 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 discussed in this report, but are presented in full in Appendix F.

The groundwater results show compliance with the groundwater conditions of consent 7795-1.1. No hydrocarbons have been detected in any of the samples, salinity is slightly elevated in bores GND2302, and 2301 but remains just above the consented TDS limit for any fresh water body (2500 g/m^3) given in condition 22.

5. ADDITIONAL CONSENT REQUIREMENTS

Operations at the Manawapou remediation site are all undertaken generally in accordance with the WRS' Landfarm 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.

As per condition 3 of consent 7795-1.1, the site management plan has been under review at the end of the monitoring period. A update of the plan is now required and will be available in Q4/23.

6. INCIDENT SUMMARY

WRS is not aware of any incidents or outcomes thereof of significance at the site during the 2022-23 monitoring period.

There has been a problem with the state of the G/W bores, the nature of which is only becoming known slowly as a result of the TRC's annual sampling and WRS general investigation into the general area's geohydrology. Work has been initiated to airlift and clean out the bores at Manawapou and re-define true groundwater levels in all the bores to assist with greater resolution of the piezometric gradient of the area, but this work is constrained by availability of a suitable contractor and staff availability. It is hoped to complete this work by the end of the calendar year 2023.

7. SUMMARY

During 2022-23 there has been a reasonably high amount of activity at the Manawapou site. The site has received drilling/production waste remediation materials from principally Todd Energy, Beach Energy, and OMV. Preparation of a new spreading area (Phase 3) in Stage 11 of the site was undertaken, and spreading and incorporation of material commenced and continues at the conclusion of the monitoring period. Monitoring results from TRC sampling have indicated that no significant adverse consequences have occurred from the exercise of consent 7795-1.1 during the monitoring period under review. However, an issue occurred at the site, due to the unauthorised activities of a contractor's staff member operating a digger to try and retrieve wind blown bucket from the surface if Pit 2 – in the course of his attempts the 3 month old liner was ripped quite badly in two places approximately ¼ of the way from the pits bottom to top. The staff member left the contractors employ and site the day following the incident. This Pit 2 has been moth-balled until repairs can be undertaken during the summer of 2023-24. Rainwater levels in the pit have been kept well below the rips by regular vacuum tank removal of water. A permanent trash pump is also available if required.

No significant environmental consequences have been identified relating to this incident as the pit water level has been maintained well below the tears during the reporting period and no material for remediation – liquid or solid has been discharged into the pit.

8. COMMENT

As similarly noted in the company's Waikaikai report, WRS is regularly being asked by the major oil and gas operators in the region what is the expected life of both WRS's landfarms. 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 Minimisation Act (WMA) 2008 registration and reporting requirements. In effect the countdown of remaining acreage for land farming in the region is continues; once this is exhausted, the operational areas - turnarounds and storage pits- will be returned to functional farmable paddocks by removing the pits, recontouring the ground and spreading the last of the material received for remediation. 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 10,864 m^3 (and

together with Waikaikai's 5,205m^3 a grand total of 16,069m^3 (approx. 22,500 tonnes) of incompressible liquids and solids going to land fill at facilities several hundred kilometers outside of the region where the material was produced – Taranaki's Oil and Gas fields.

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 landowners, all of which contributes to the continuing support of livelihoods and services both regionally and nationally.

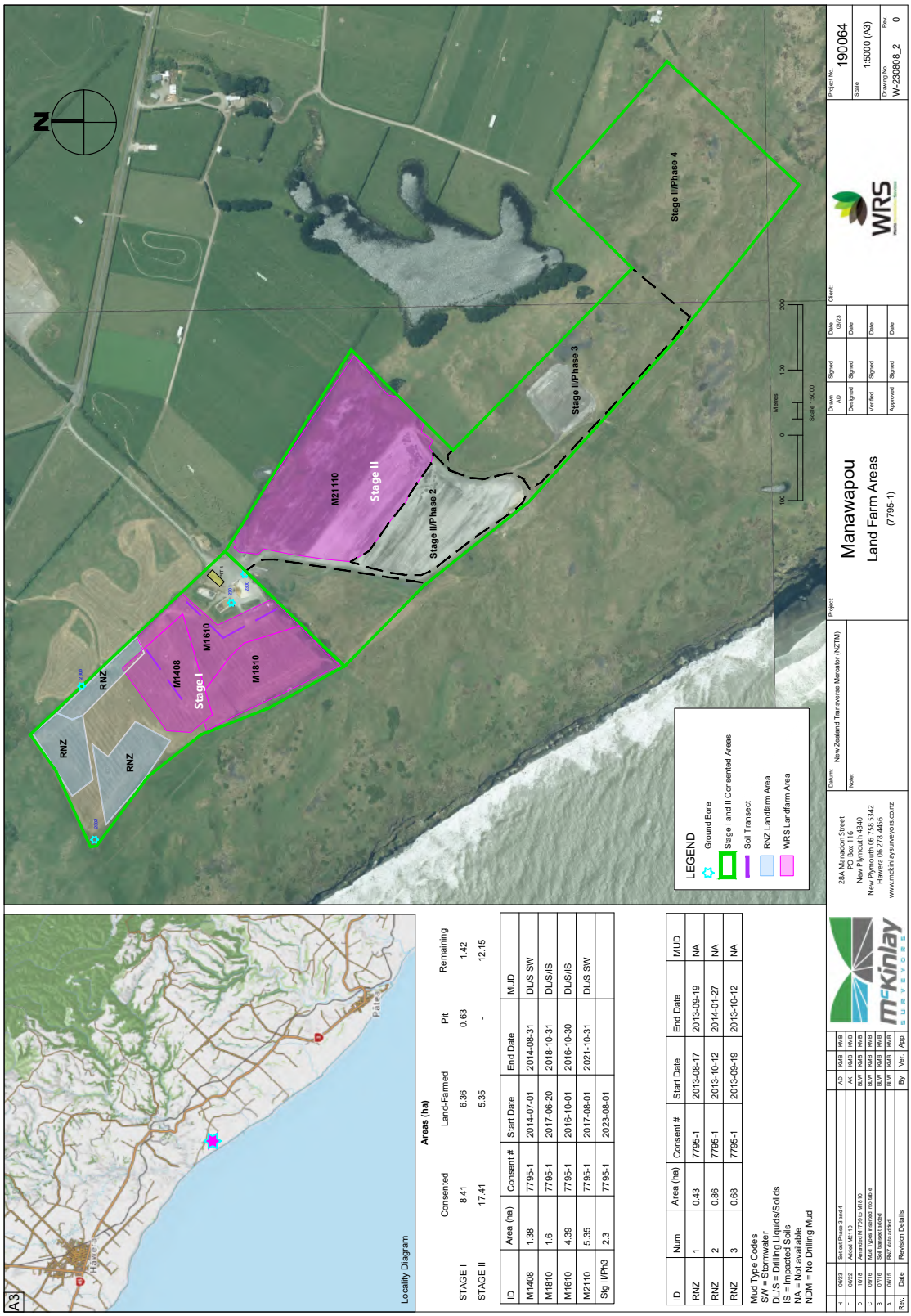
Waste Remediation Services Ltd
w +64 6 751 9221 m + 64 275 996 105 f +64 751 9225
Address 141 – 143 Connett Road East, Bell Block 4312, New Zealand Post
PO Box 7150, New Plymouth 4341, New Zealand
Email: **keith@wrsltd.co.nz**

Appendix A - Mud Register

Date	Source	Customer	Remediation Site (m3)			
			Manawapou			
			Solid	Liquid	Direct Spread	Total
Jul-22	Todd Pouri A - 1a	Todd	-	234	-	234
Aug-22	Todd Pouri A - 1a	Todd	-	16	-	16
	Todd Pouri A - 1a Total		***-***	***250***	***-***	***250***
Jul-22	Intergroup Yard	OMV	188	-	-	188
	Integroup Yard Total		***188***	***-***	***-***	***188***
Jul-22	Halliburton LBMP	Halliburton	-	170	-	170
Aug-22	Halliburton LBMP	Halliburton	-	168	-	168
Sep-22	Halliburton LBMP	Halliburton	-	24	-	24
Oct-22	Halliburton LBMP	Halliburton	-	42	-	42
Nov-22	Halliburton LBMP	Halliburton	-	126	-	126
Dec-22	Halliburton LBMP	Halliburton	-	120	-	120
Jan-23	Halliburton LBMP	Halliburton	-	144	-	144
Feb-23	Halliburton LBMP	Halliburton	-	48	-	48
Mar-23	Halliburton LBMP	Halliburton	-	142	-	142
Apr-23	Halliburton LBMP	Halliburton	-	48	-	48
May-23	Halliburton LBMP	Halliburton	-	48	-	48
Jun-23	Halliburton LBMP	Halliburton	-	24	-	24
	Halliburton LBMP Total		***-***	***1,104***	***-***	***1,104***
Aug-22	Kupe	Beach	-	124	-	124
Sep-22	Kupe	Beach	-	47	-	47
Oct-22	Kupe	Beach	-	92	-	92
Nov-22	Kupe	Beach	-	23	-	23
Dec-22	Kupe	Beach	-	104	-	104
Jan-23	Kupe	Beach	-	17	-	17
Feb-23	Kupe	Beach	-	97	-	97
Mar-23	Kupe	Beach	-	95	-	95
Apr-23	Kupe	Beach	-	59	-	59
May-23	Kupe	Beach	-	67	-	67
Jun-23	Kupe	Beach	-	61	-	61
		Kupe Total	***-***	***786***	***-***	***786***
Aug-22	MHW C 9&11	Todd	-	10	-	10
		MHW C Total	***-***	***10***	***-***	***10***
Aug-22	MHW G 33	Todd	626	599	-	1,225
Sep-22	MHW G 33	Todd	-	36	-	36
	MHW G 33 Total		***626***	***635***	***-***	***1,261***

Date	Source	Customer	Remediation Site (m3)			
			Manawapou			
			Solid	Liquid	Direct Spread	Total
Sep-22	MHW G 34	Todd	569	459	-	1,028
Oct-22	MHW G 34	Todd	32	315	-	347
	MHW G 34 Total		***601***	***774***	***-***	***1,375***
Oct-22	MHW G 36	Todd	557	357	-	914
1-Nov-22	MHW G 36	Todd	100	321	-	421
	MHW G 36 Total		***657***	***678***	***-***	***1,335***
Nov-22	MHW G 35	Todd	470	540	-	1,010
Dec-22	MHW G 35	Todd	231	297	-	528
	MHW G 35 Total		***701***	***837***	***-***	***1,538***
Jun-23	MHW G Skimmer Pit	Todd	8	-	-	8
	MHW G Skimmer Pit Total		***8***	***-***	***-***	***8***
Aug-22	Kapuni J	Todd	-	4	-	4
Sep-22	Kapuni J	Todd	-	9	-	9
Jan-23	Kapuni J	Todd	-	8	-	8
Feb-23	Kapuni J	Todd	-	28	-	28
Mar-23	Kapuni J	Todd	-	24	-	24
	Kapuni J Total		***-***	***73***	***-***	***73***
Nov 22	Kapuni J KA25	Todd Energy	-	66	-	66
May-23	Kapuni J KA25	Todd Energy	539	268	-	807
Jun-23	Kapuni J KA25	Todd Energy	47	234	-	281
	Kapuni J KA25 Total		***586***	***568***	***-***	***1,154***
Nov-22	Kapuni J KA26	Todd Energy	8	48	-	56
	Kapuni J KA26 Total		***8***	***48***	***-***	***56***
Nov-22	Kapuni J KA27	Todd Energy	8	40	-	48
	Kapuni J KA27 Total		***8***	***40***	***-***	***48***
Nov-22	Kapuni J KA28	Todd Energy	81	187	-	268
Jun-23	Kapuni J KA28	Todd Energy	571	392	-	963
	Kapuni J KA28 Total		***652***	***579***	***-***	***1,231***
Sep-22	OMV MB 05	OMV	-	219	-	219
	OMV MB 05 Total		***-***	***219***	***-***	***219***
May-23	OMV MA 08	OMV	-	142	-	142
Jun-23	OMV MA 08	OMV	-	80	-	80
	OMV MA 08 Total		***-***	***222***	***-***	***222***
Oct-22	Kapuni Production Station	Todd	0	4	0	4
Jan-23	Kapuni Production Station	Todd	0	3	0	3
		KPS Total	***0***	***7***	***0***	***7***
ANNUAL TOTAL TO 30 June 2023 (m3)			**4,035**	**6,829**	**-**	**10,864**

Appendix B - Manawapou Site Map



Appendix C - Field Photographs


Photograph 1 and 2: 29/7/22 Stripping Topsoil. Stage 11/Phase 3


Photographs 3 and 4: 2/8/22 Formation of bunds around the spread area. Stage 11/Phase 3


Photograph 5: Formation of bunds around the spread area. Photograph 6: Stripping Topsoil
Both photos 2/8/22 - Stage 11/Phase 3


Photographs 7 and 8: 7/9/22 Recovering soil mud for spreading from Pit 1, discharging liquid mud into Pit 3 from tube


Photographs 9 and 10: 19/10/22 Topsoiling Stage 11/Phase 2 from stockpiles to the north


Photographs 11 and 12: 19/10/22 Topsoiling Stage 11/Phase 2 from stockpiles to the north


Photographs 13 and 14: 19/10/22 Topsoiling Stage 11/Phase 2 from stockpiles to the north

Photograph 15: 19/10/22 Topsoiling Stage 11/Phase 2 from stockpiles to the north

Photographs 16 and 17: 1/11/22 Topsoiling completed, awaiting sowing

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 I Land Discharge I Manawapou Rd Ichange
Contact Name:	Waste Remediation Services Limited
Postal Address:	PO Box 7150, New Plymouth 4341
Site Location Address:	156 Manawapou Road, Manutahi
Inspection Number:	OBS-2022-106492
Inspection Type:	Compliance Monitoring Insp.
Inspection Date:	20 Oct 2022
Inspection Time:	09:51
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 1/3. 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 growth. Land spreading activities are still being undertaken on the seaward side of this area but were not occurring today. An almost continuous stream of waste has been received and discharged on site in the last couple of months. Pit 2 has recently been ripped. Repair will be undertaken end of this week. Integrity inspection of liners will be undertaken and submitted to TRC 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.

WRS

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 I Land Discharge I Manawapou Rd Ichange
Contact Name:	Waste Remediation Services Limited
Postal Address:	PO Box 7150, New Plymouth 4341
Site Location Address:	156 Manawapou Road, Manutahi
Inspection Number:	OBS-2023-111708
Inspection Type:	Compliance Monitoring Insp.
Inspection Date:	06 Mar 2023
Inspection Time:	12:13
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:	9 of 144
Overall Compliance Status:	Compliance
Inspection Comments:	Inspection 2/3. Inspection undertaken to assess compliance with Resource Consent conditions. Pits 4 contained liquid. Pit one contained some solids, pit 2 and 3 contained some liquids. Very good pasture growth on one of the recently landfarmed areas. The most seaward area was still exposed, and no spreading looks to have occurred in the last 2 or so months. No issues to note. Please submit integrity report of the pit liners. 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.

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 I Land Discharge I Manawapou Rd Ichange
Contact Name:	Waste Remediation Services Limited
Postal Address:	PO Box 7150, New Plymouth 4341
Site Location Address:	156 Manawapou Road, Manutahi
Inspection Number:	OBS-2023-114500
Inspection Type:	Compliance Monitoring Insp.
Inspection Date:	26 Jun 2023
Inspection Time:	11:20
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:	0
Overall Compliance Status:	Compliance
Inspection Comments:	Inspection 3/3. Inspection undertaken to assess compliance with Resource Consent conditions. Pit 2 is decommissioned. The inspection found that the large area in front of the pits that was most recently land farmed has good pasture growth. Land spreading activities are still being undertaken on the seaward side of this area but were not occurring today. A pit has been constructed at the low point of this site to capture any overland flow as this is at risk of over topping the bund. This is pumped out within 2 to 3 days and discharged back to land. Suggest that the pit be clay lined and the management plan updated. 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 E - Soil Monitoring Results

TRC Soil results, all monitoring bores 2022-23 – all samples collected 16 June 2023

Parameter	Consent Limit	Sample Area	TRC2313015 M2110	TRC2313016 M2110	TRC2313017 M2110	TRC2313018 M2110	TRC2313019 M2110	TRC2313020 M2110
1-Methylnaphthalene	NS	mg/kg dry wt	0.043	0.030	0.012	0.018	0.011	< 0.011
2-Methylnaphthalene	NS	mg/kg dry wt	0.046	0.030	0.016	0.018	0.011	0.014
Acenaphthene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Acenaphthylene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Acetochlor	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Alachlor	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Anthracene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Atrazine	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Atrazine-desethyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Atrazine-desisopropyl	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Azaconazole	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Azinphos-methyl	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Benalaxyl	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Benzene	NS	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[a]anthracene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Benzo[a]pyrene (BAP)	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	NS	mg/kg dry wt	< 0.028	< 0.027	< 0.028	< 0.027	< 0.027	< 0.027
Benzo[a]pyrene Toxic Equivalence (TEF)	NS	mg/kg dry wt	< 0.028	< 0.027	< 0.028	< 0.027	< 0.027	< 0.027
Benzo[b]fluoranthene + Benzo[j]fluoranthene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Benzo[e]pyrene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Benzo[g,h,i]perylene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Benzo[k]fluoranthene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Bitertanol	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Bromacil	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Bromopropylate	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Butachlor	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
C10 - C14	NS	mg/kg dry wt	1450	1610	460	910	990	1460
C15 - C36	NS	mg/kg dry wt	6400	7000	4400	5600	6600	8900
C7 - C9	NS	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20	< 20
Calcium (Sat Paste)	NS	mg/L	195	351	217	179	311	141
Captan	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14

Carbaryl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Carbofuran	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Chlorfluazuron	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Chloride	700	mg/kg dry wt	128	370	105	134	350	147
Chlorothalonil	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Chlorpyrifos	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Chlorpyrifos-methyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Chlortoluron	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Chrysene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Conductivity from soluble salts	2.9	mS/cm	0.2	0.4	0.2	0.3	0.4	0.3
Cyanazine	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Cyfluthrin	NS	mg/kg dry wt	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.16
Cyhalothrin	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Cypermethrin	NS	mg/kg dry wt	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.16
Cyproconazole	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Deltamethrin (including Tralomethrin)	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Diazinon	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Dibenzo[a,h]anthracene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Dichlofluanid	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dichloran	NS	mg/kg dry wt	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17
Dichlorvos	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Difenoconazole	NS	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dimethoate	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Diphenylamine	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Diuron	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Dry Matter (Env)	NS	g/100g as rcvd	86	87	87	88	87	89
Ethylbenzene	NS	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fenpropimorph	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Fluazifop-butyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Fluometuron	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Fluoranthene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Fluorene	NS	mg/kg dry wt	0.016	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Flusilazole	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Fluvalinate	NS	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Furalaxyl	NS	mg/kg	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04

		dry wt						
Haloxyfop-methyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Hexaconazole	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Hexazinone	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Indeno(1,2,3-c,d)pyrene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Kresoxim-methyl	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Linuron	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
m&p-Xylene	NS	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Magnesium (Sat Paste)	NS	mg/L	25	53	27	22	44	22
Malathion	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Metalaxyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Methamidophos (including Acephate)	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Metolachlor	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Metribuzin	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Molinate	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Myclobutanil	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Naled	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Naphthalene	NS	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Norflurazon	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Oxadiazon	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Oxyfluorfen	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
o-Xylene	NS	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Paclobutrazol	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Parathion-ethyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Parathion-methyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Penconazole	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Pendimethalin	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Permethrin	NS	mg/kg dry wt	1.14	1.70	0.70	1.63	0.53	0.86
Perylene	NS	mg/kg dry wt	< 0.012	0.014	< 0.012	0.011	0.015	0.012
pH	NS	pH Units	8.9	8.9	8.4	8.4	9.0	9.3
Phenanthrene	NS	mg/kg dry wt	0.021	0.015	< 0.012	0.013	0.015	0.011
Pirimicarb	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Pirimiphos-methyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Prochloraz	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4

Procymidone	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Prometryn	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Propachlor	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Propanil	NS	mg/kg dry wt	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14
Propazine	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Propiconazole	NS	mg/kg dry wt	1.27	1.40	0.71	1.48	0.47	0.62
Pyrene	NS	mg/kg dry wt	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.011
Pyriproxyfen	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Quizalofop-ethyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Sample Registration	NS							
Simazine	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Simetryn	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Sodium (Sat Paste)	NS	mg/L	105	198	129	118	322	252
Sodium Absorption Ratio (SAR)	18.0		1.9	2.6	2.2	2.2	4.5	5.2
Soluble Salts	2.5	g/100g dry wt	0.07	0.15	0.07	0.09	0.15	0.09
Sulfentrazone	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
TCMTB [2-(thiocyanomethylthio)benzothiazole,Busan]	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Tebuconazole	NS	mg/kg dry wt	2.6	2.8	1.51	2.6	0.77	1.13
Terbacil	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Terbumeton	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Terbuthylazine	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Terbuthylazine-desethyl	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Terbutryn	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Thiabendazole	NS	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Thiobencarb	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Toluene	NS	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Tolylfluanid	NS	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Total hydrocarbons (C7 - C36)	NS	mg/kg dry wt	7900	8600	4900	6500	7600	10400
Total of Reported PAHs in Soil	NS	mg/kg dry wt	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Total Recoverable Arsenic	20	mg/kg dry wt	4	4	5	3	3	3
Total Recoverable Barium	NS	mg/kg dry wt	3000	3400	2800	2400	2900	3400
Total Recoverable Cadmium	1	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Calcium	NS	mg/kg dry wt	6200	9900	7300	5500	13400	13300
Total Recoverable Chromium	600	mg/kg dry wt	21	19	22	19	20	21
Total Recoverable Copper	100	mg/kg dry wt	11	13	14	12	15	14
Total Recoverable digestion	NS							

Total Recoverable Lead	300	mg/kg dry wt	3.2	5.7	4.4	3.2	6.5	5.6
Total Recoverable Magnesium	NS	mg/kg dry wt	2200	2300	2200	2000	2600	2600
Total Recoverable Mercury	1	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	60	mg/kg dry wt	9	9	9	8	10	10
Total Recoverable Potassium	NS	mg/kg dry wt	600	1090	610	520	1110	1070
Total Recoverable Sodium	460	mg/kg dry wt	290	320	330	310	390	410
Total Recoverable Zinc	300	mg/kg dry wt	59	59	62	64	60	66
Triazophos	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Trifluralin	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Vinclozolin	NS	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07

** NS – Not Specified*

Appendix F - Groundwater Results

TRC Groundwater results, all monitoring bores 2022-23

Parameter	Consent Limit	Bore	GND2300				GND2301				
		Date	25/8/22	30/11/22	30/3/23	18/5/23	25/8/22	1/12/22	29/3/23	18/5/23	13/6/23
		Sample Number	TRC227702	TRC229233	TRC2311662	TRC2312620	TRC227703	TRC229234	TRC2311663	TRC2312621	TRC2312874
CONDF	NS	µS/cm	686	773	1138	1357	1111	797	1525	2310	2690
CONDSPF	NS	µS/cm	835	824	1366	1470	1340	952	1727	2495	3142
DO	NS	g/m3	0.53		0.25	0.11	0.61		0.71	1.70	0.03
DOF	NS	g/m3		0.18				0.17			
LEVEL	NS	m	6.38	6.695	7.37	7.30	6.53	7.08	7.06	7.79	7.57
PERSAT	NS	%	5.4	2.0	2.5	1.1	6.3	1.8	7.4	17.6	0.3
PHF	NS	pH	6.12	5.93	6.08	6.06	6.40	6.37	6.32	6.46	6.32
TEMP	NS	Deg.C	15.6	16.9	16.2	16.0	16.1	16.6	16.2	16.1	17.4
Acid Soluble Barium	NS	g/m3	< 0.11	< 0.11	< 0.11	< 0.11	0.83	0.58	1.09	1.79	2.1
Benzene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C10 - C14	NS	g/m3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	NS	g/m3	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
C7 - C9	NS	g/m3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chloride	NS	g/m3	141	144	310	330	154	87	680	1040	880
Dissolved Barium	NS	g/m3	0.031	0.031	0.048	0.060	0.80	0.59	1.16	1.39	2.3
Electrical Conductivity (EC)	NS	µS/cm	833	832	1291	1447	1212	939	2820	4030	3710
Electrical Conductivity (EC)	NS	mS/m	83.3	83.2	129.1	144.7	121.2	93.9	282	403	371
Ethylbenzene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	NS	g/m3	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
pH	NS	pH Units	6.7	6.3	6.9	6.4	6.9	7.2	6.5	6.5	6.5
Sample Temperature	NS	°C			16.2						17.4
Toluene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0128	< 0.0010	0.0142
Total Dissolved Solids (TDS)	2,500	g/m3	460	470	860	1150	700	600	1760	3000	2200
Total hydrocarbons (C7 - C36)	NS	g/m3	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Total Sodium	NS	g/m3	115	114	139	133	56	45	93	135	192

Parameter	Consent Limit	Bore	GND2302				GND2303	
		Date	25/8/22	30/11/22	29/3/23	18/5/23	25/8/22	30/11/22
		Sample Number	TRC227704	TRC229235	TRC2311664	TRC2312622	TRC227705	TRC229236
CONDF	NS	µS/cm	894	937	886	858	398.1	492.1
CONDSPF	NS	µS/cm	1095	1017	1092	953	491.3	534.9
DO	NS	g/m3	6.98		6.63	6.63	8.93	
DOF	NS	g/m3		6.66				6.37
LEVEL	NS	m	6.905	7.035	7.27	7.41	4.01	4.14
PERSAT	NS	%	70.5	69.1	66.6	66.3	89.9	65.5
PHF	NS	pH	6.24	6.10	6.18	6.26	6.34	6.12
TEMP	NS	Deg.C	15.4	15.8	15.1	14.9	15.1	15.8
Acid Soluble Barium	NS	g/m3	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Benzene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C10 - C14	NS	g/m3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	NS	g/m3	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
C7 - C9	NS	g/m3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chloride	NS	g/m3	195	230	198	171	72	76
Dissolved Barium	NS	g/m3	0.041	0.050	0.045	0.036	0.037	0.044
Electrical Conductivity (EC)	NS	µS/cm	1063	1136	1054	949	504	538
Electrical Conductivity (EC)	NS	mS/m	106.3	113.6	105.4	94.9	50.4	53.8
Ethylbenzene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	NS	g/m3	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
pH	NS	pH Units	6.7	6.4	6.5	6.6	6.8	6.5
Sample Temperature	NS	°C						
Toluene	NS	g/m3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Dissolved Solids (TDS)	2,500	g/m3	630	480	810	860	300	260
Total hydrocarbons (C7 - C36)	NS	g/m3	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Total Sodium	NS	g/m3	77	78	74	70	58	64

NS - Not Specified

……END

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.