

Waste Remediation Services (WRS) Ltd

Symes Manawapou Landfarm

Monitoring Programme

Annual Report

2020-2021

Technical Report 2021-79



Working with people | caring for Taranaki

Taranaki Regional Council
Private Bag 713
Stratford

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Executive summary

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

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

This report for the period July 2020 to June 2021 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds one resource consent, which include a total of 31 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to allow it to discharge drilling waste and water treatment sludge to land under the practice known as landfarming.

The Council's monitoring programme for the year under review included six inspections and 18 water samples collected for physicochemical analysis. The monitoring showed that saline impacts were moderate in two monitoring wells. GND2302 has observed a steady rise in chloride concentrations since 2017. While in the case of GDN2303, these have risen since its installation in 2012.

Bore GND2303 was damaged in this monitoring period and will need to be repaired to enable monitoring to continue.

No petroleum related contaminants were recorded in any of the bores during this monitoring period.

The Company accepted material from 17 different sources and received in excess 10,000 m³ of drilling waste. Stage II landfarming commenced during this monitoring year, with area M2110 actively landfarmed during this period. Waste assessment, notifications and the annual report to the Council were supplied by the Company, as required by the consent.

The Company was issued an abatement notice and an infringement notice for accepting treated sawdust mixed with drilling mud. Drilling waste mixed with treated sawdust was landfarmed in area M2110. It is noted that the Company were very transparent with the Council when it discovered that the sawdust was treated and a breach of consent had occurred.

During the year, the Company demonstrated an improvement required level of environmental and high level of administrative performance with the resource consents.

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% of the consents, a good level of environmental performance and compliance was achieved.

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

This report includes recommendations for the 2021-2022 year.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2020 to June 2021 by the Taranaki Regional Council (the Council) on the monitoring programme associated with a resource consent held by Waste Remediation Services Ltd (WRS) (the Company). The Company operates a landfarm, WRS Symes Manawapou Landfarm situated at 156 Manawapou Road, Manutahi, in the Manawapou catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consent held by the Company to discharge drilling waste to land.

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

1.1.2 Structure of this report

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

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

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

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

Section 4 presents recommendations to be implemented in the 2021-2022 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

- a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
- b. physical effects on the locality, including landscape, amenity and visual effects;
- c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
- d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and

- e. risks to the neighbourhood or environment.

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

Improvement required: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self-

reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

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

Administrative performance

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

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

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

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

For reference, in the 2020-2021 year, consent holders were found to achieve a high level of environmental performance and compliance for 86% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 11% of the consents, a good level of environmental performance and compliance was achieved.¹

1.2 Process description

1.2.1 Drilling waste

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

Drilling fluids

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

¹The Council has used these compliance grading criteria for more than 17 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

(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:

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

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



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



Photo 2 WRS Symes Manawapou Landfarm post surrender sampling 2018

Site location and description

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

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



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



Figure 1 WRS Symes Manawapou Landfarm extent and regional location

Site data

Location

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

1.3 Resource consents

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

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

Table 1 Consent held by the Company

Consent number	Purpose	Granted	Review	Expires
Discharge of wastes to land				
7795-1.1	To discharge drilling wastes (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities; and Sediment retention pond sludge from water treatment plants onto and into land via landfarming	(May 2012) December 2020	June 2022/2025	June 2028

1.4 Monitoring programme

1.4.1 Introduction

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

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

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

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

The Symes Manawapou Landfarm was visited six 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. This included for any potential impacts to air through odour, which may have been generated as a process of the exercise of this consent.

1.4.4 Chemical sampling

Soil, groundwater and surface water monitoring form part of the annual compliance monitoring programme for the Manawapou Landfarm. Landfarming was occurring throughout the monitoring period. As such no soil samples were collected. Soil will be collected once areas farmed have been sown into pasture.

Groundwater monitoring

The facility, as part of its consented obligations contains an active groundwater monitoring network which is comprised of four active groundwater monitoring bores². 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, and³
- In-situ readings: pH, conductivity, dissolved oxygen (DO), oxidation and reduction potential (ORP) and temperature.

Soil monitoring

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

Soil analysis parameters

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

Surface water monitoring

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

- Total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylenes (BTEX).

² Monitoring well GND2303 was damaged by heavy hedge cutting machinery under contract to the farmer in this monitoring period. It requires maintenance for it to be operational again. In its current form it is an uncontrolled conduit for pollutants to enter groundwater.

³ Organonitro and phosphorous (ONP) pesticide screen was added to the final monitoring round. In addition a spot sample from each storage cell was also assessed for ONP.

- Temperature, electrical conductivity, chloride, sodium, pH, total dissolved solids and acid soluble barium.

1.4.5 Provision of consent holder provided data

As required by resource consent (7795-1.1, condition 13), the Company provided the Council with an annual report on the consent holder's operations in the 2020-2021 monitoring period. A copy of the annual report can be found in appendix II of this compliance monitoring report.

2 Results

2.1 Inspections

27 July 2020

During the inspection it was noted that no recent storage or landfarming activities had occurred. The previously landfarmed area to the west of the storage pit area contained some barren patches, but pasture growth was otherwise healthy.

The storage pits contained stormwater only. Pit 3 with the compromised liner, was still fenced off. No odour was noted on or offsite.

No issues were noted at the time of inspection.

9 October 2020

During an inspection it was noted that deliveries of material had occurred and had been discharged into pits 1, 2, and 4.

Pit 3, with the compromised liner, contained stormwater only. At the time, a small delivery of roading gravel which was unable to be stored in the pits, was located adjacent to the storage area.

A digger was in operation, flattening the area to the south of the storage area. A small amount of liquid and solid waste had been discharged to land, adjacent to the pit area to the south.

No issues were noted during the inspection.

4 March 2021

During an inspection it was noted that further deliveries of material had occurred into pits 1 and 2. It was noted that pit 3 contained sand. Spreading had continued onsite since late last year and contractors were onsite spreading at the time of inspection.

The material was still to be raked and incorporated into the soil. Some spreading and incorporation looked to have occurred at the far end of the site. Run off to the wetland was prevented by a bund.

A delivery into pit 2 was received while on site. It was communicated to the Company to make sure that the application rates of material to land was compliant with special condition 16 of consent 7795-1.1.

20 May 2021

An additional inspection was undertaken due to increased activity at the site. Recent deliveries of material had occurred into pit 1, 2 and 4. The sand from pit 3 had been dug out and removed.

Pit 1 contained sawdust. Spreading was noted to be continuing on the site and was taking place during the inspection. The contractors conveyed that the material would be raked and incorporated into the sand. The Company was asked to confirm whether or not the sawdust was treated.

Some areas had been seeded, and some pasture strike was evident. No evidence of ponding or pooling, or runoff was observed.

31 May 2021

Confirmation was received from the Company that treated sawdust in the form of Light Organic Solvent Preserved (LOSP) preservatives had been discharged into pits as a drilling waste additive. The sawdust observed to be in the pit 1 during the previous inspection had been discharged to land via landfarming.

08 June 2021

A follow up inspection was undertaken after it was conveyed by the Company to the Council that LOSP treated sawdust had been disposed of in one the pits, and subsequently discharged to land.

Samples were collected from all 3 pits used to store drilling waste. Sawdust was noted only to be in pit 1, and some was noted in a pile next to the storage area. A solvent odour was evident in the vicinity of pit 1.

The previously landfarmed area (M1804) was inspected, there was no evidence of ponding or pooling. The old landfarmed area (M1610) was also inspected, both held good pasture growth.

2.2 Results of receiving environment monitoring

2.2.1 Results of the discharge monitoring

2.2.1.1 Groundwater monitoring

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

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



Figure 2 WRS Symes Manawapou Landfarm groundwater monitoring locations

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

Table 2 GND2300 2020-2021 monitoring period

GND2300	Collected	17 Aug 2020	10 Nov 2020	19 Feb 2021	29 Jun 2021
Parameter	Time	11:35	11:30	09:30	10:55
TEMP	°C	14.9	14.7	15.5	14.6
Electrical Conductivity (EC)	µS/cm	2,240	599	958	1,719
	mS/m	224	59.9	95.8	171.9
Total Dissolved Solids (TDS)	g/m ³	1,460	360	570	1,090
Acid Soluble Barium	g/m ³	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m ³	0.052	0.017	0.035	0.054
Chloride	g/m ³	630	90	220	460
Total Sodium	g/m ³	133	64	93	145
pH	pH Units	6.2	6.3	6.4	6.5
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010

- Temperature remained relatively stable, ranging 14.6-15.5 °C.
- Electrical conductivity (EC) demonstrated a reduction in concentration during the summer months, prior to increasing in the final monitoring round. When compared to the long term record, there has been a general reduction in EC since 2019 (Figure 3).
- Total dissolved solids (TDS), in similarity to the EC results, demonstrated a reduction in concentration over the summer months prior to doubling in concentration in the final monitoring round. Over the long term record this parameter has recorded a reduction in concentration since 2019 (Figure 4).
- Acid soluble barium remained below the laboratory defined limit of detection (LOD), across all four monitoring rounds this period.
- Dissolved barium remained of low concentration across all four samples analysed.
- Chloride results ranged 90-630 g/m³. This analyte reduced in the summer months prior to increasing in the final monitoring round. Echoing both the EC and TDS results over time (Figure 5).
- Sodium results ranged 64-145 g/m³.
- pH results remained quite stable and weakly acidic, ranging 6.2-6.5 pH.

- No total petroleum hydrocarbons (TPH) or benzene, toluene, ethylbenzene or xylenes (BTEX) were recorded above the LOD this monitoring period.
- An organonitro and phosphorus (ONP) pesticide screen was undertaken on the final monitoring round of the monitoring period (June 2021). No analytes (88) were recorded above the LOD and have not been tabulated. Please read section 3.2 for more discussion on these compounds.

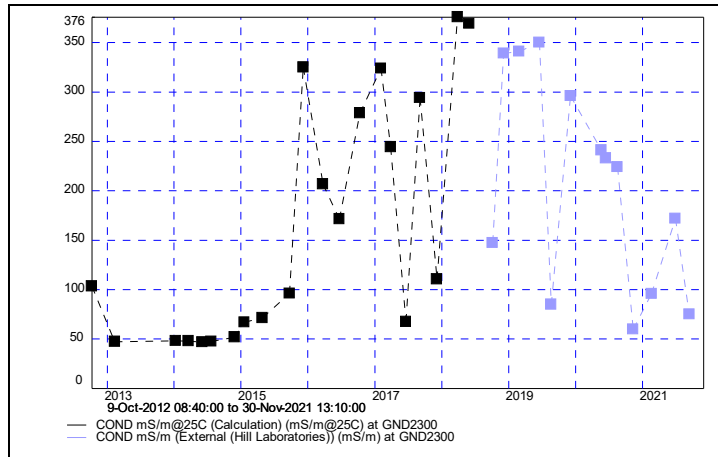


Figure 3 Long term EC mS/m @ 25°C monitoring GND2300 2012-2021

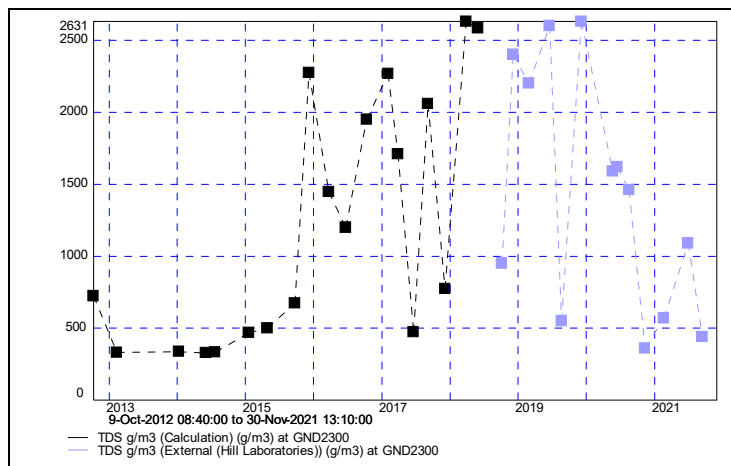


Figure 4 Long term TDS g/m³ GND2300 2012-2021

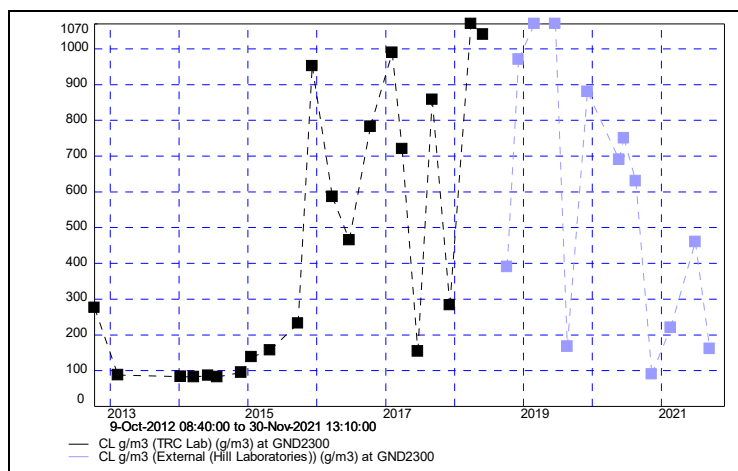


Figure 5 Long term chloride g/m³ results GND2300 2012-2021

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

Table 3 GND2301 2020-2021 monitoring period

GND2301	Collected	17 Aug 2020	10 Nov 2020	19 Feb 2021	29 Jun 2021
Parameter	Time	12:15	12:05	10:10	11:30
TEMP	°C	15.7	15.1	16.6	14.6
Electrical Conductivity (EC)	µS/cm	691	691	734	Well ran dry
	mS/m	69.1	69.1	73.4	-
Total Dissolved Solids (TDS)	g/m ³	500	430	460	-
Acid Soluble Barium	g/m ³	0.13	0.21	0.64	-
Dissolved Barium	g/m ³	0.129	0.28	0.61	-
Chloride	g/m ³	88	57	73	-
Total Sodium	g/m ³	79	61	50	-
pH	pH Units	6.6	6.4	6.7	-
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	-
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	-
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	-
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	-
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	-
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	-
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	-
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	-
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	-

The monitoring of GND2301 is provided in Table 3.

- Temperature remained relatively stable, ranging 14.6-16.6 °C.
- EC results remained relatively stable, ranging 69.1-73.4 mS/m.
- TDS also remained stable, ranging 430-500 g/m³.
- Acid soluble and dissolved barium remained relatively stable and of low concentrations across the three monitoring rounds.
- Chloride ranged 57-88 g/m³.
- Sodium ranged 50-79 g/m³.
- pH remained weakly acidic, ranging 6.4-6.7 pH.
- No TPH or BTEX were recorded above the LOD.
- An ONP pesticide screen was collected from the June 2021 monitoring round, prior to the bore running dry. No analytes (88) were recorded above the LOD. These results were not tabulated. Please read section 3.2 for more discussion on these compounds.

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 2020-2021 monitoring period

GND2302	Collected	17 Aug 2020	10 Nov 2020	19 Feb 2021	29 Jun 2021
Parameter	Time	13:40	12:55	11:00	12:10
TEMP	°C	15.5	15	17.1	14.8
Electrical Conductivity (EC)	µS/cm	1,354	1,007	891	1,709
	mS/m	135.4	100.7	89.1	170.9
Total Dissolved Solids (TDS)	g/m ³	850	720	600	1070
Acid Soluble Barium	g/m ³	< 0.11	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m ³	0.062	0.041	0.034	0.078
Chloride	g/m ³	310	200	177	400
Total Sodium	g/m ³	82	63	63	99
pH	pH Units	6.5	6.3	6.6	6.5
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m ³	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m ³	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m ³	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010

The monitoring of GND2302 is provided in Table 4.

- Temperature ranged 14.8-17°C.
- EC has recorded an annual increase in this parameter since 2017. The results in this period recorded a reduction in concentration during the summer months. The annual peak in concentration (July 2021) within this monitoring period (170.9 mS/m) was less than the previous monitoring period (184.2 mS/m, May 2021). Over the long term record this parameter has recorded a steady increase in concentration over time, Figure 6. The results from this monitoring period suggest that the peak concentration has been reached. However, further monitoring will assess for this over time.
- TDS in similarity to EC, demonstrated a reduction during the summer months, prior to an increase in the final monitoring round. The long term record (Figure 7) suggests a steady increase in this parameter. The results do not exceed the consent condition 22, which allows up to 2,500 g/m³ of this analyte. TDS, in comparison to EC has recorded a reducing peak concentration since June 2019. Further monitoring will assess this location over time.
- Acid soluble barium did not record an analyte above the LOD this monitoring period.
- Dissolved barium remained of low concentration, ranging 0.034-0.078 g/m³.

- Chloride monitoring, in similarity to EC and TDS, demonstrated a reduction during the summer months, prior to an increase (ranging 177-400 mg/kg) in the final monitoring round. The long term record indicates a steady increase over time (Figure 8). However, also in similarity to the previous mentioned parameters of EC and TDS. The annual peak in concentration (400 g/m³, June 2021) was of lesser concentration than in the previous monitoring period (450.1 g/m³, May 2020). This may suggest that peak concentrations have been reached in this well, however, further monitoring will assess for this over time.
- Sodium ranged 63-99 g/m³.
- pH remained relatively stable and weakly acidic, ranging 6.3-6.6 pH.
- No TPH or BTEX were recorded above the LOD in any of the four monitoring rounds this monitoring period.
- An ONP pesticide screen was conducted during the June 2021 monitoring round. All analytes (88) remained below the LOD and have not been tabulated. Please read section 3.2 for more discussion on these compounds.

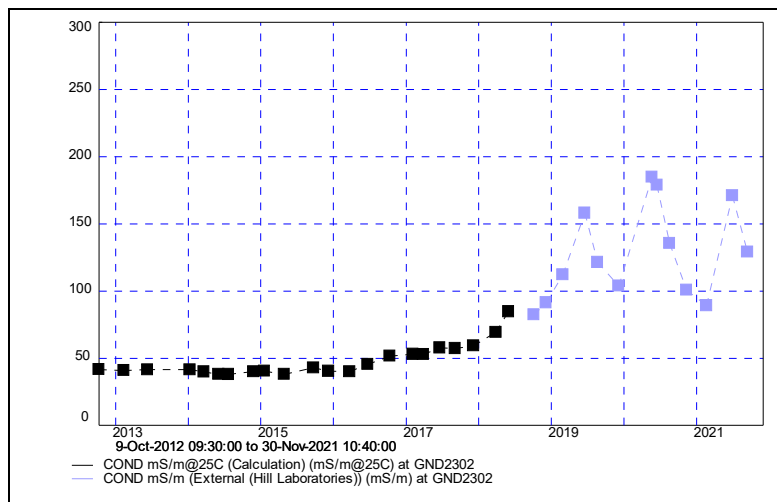


Figure 6 Long term EC mS/m @ 25°C monitoring GND2302 2012-2021

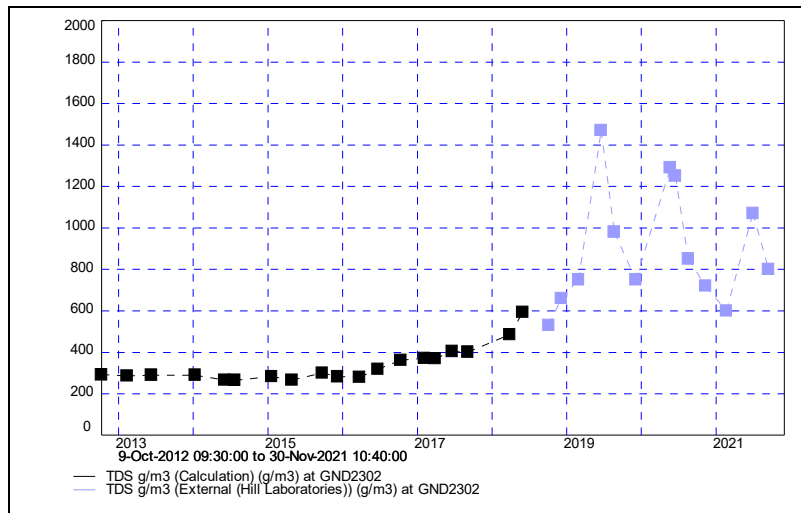


Figure 7 Long term TDS g/m³ monitoring GND2302 2012-2021

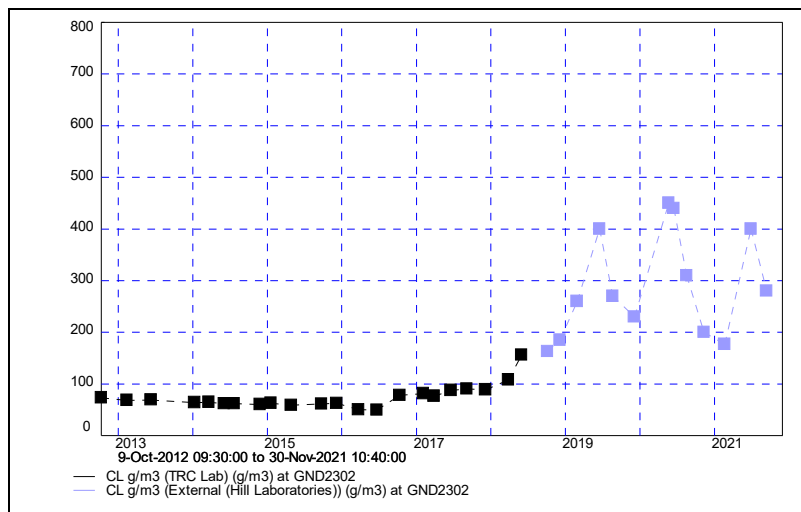


Figure 8 Long term chloride g/m³ monitoring GND2302 2012-2021

GND2303 is located on the north eastern side of the site, close to the older landfarmed areas of the site and area M1408. The singular result is provided in the following Table 5. This well was damaged by heavy hedge cutting machinery during this monitoring period, and the Company have yet to repair the well⁴.

Table 5 GND2303 2020-2021 monitoring period

GND2303	Collected	17 Aug 2020	10 Nov 2020	29 Jun 2021	19 Feb 2021
Parameter	Time	12:55	No sample	No sample	No sample
TEMP	°C	14.6	-	-	-
Electrical Conductivity (EC)	µS/cm	3,410	-	-	-
	mS/m	341	-	-	-

⁴ The Company communicated that the damaged bore GND2303 will be fixed by the end February 2022.

GND2303	Collected	17 Aug 2020	10 Nov 2020	29 Jun 2021	19 Feb 2021
Parameter	Time	12:55	No sample	No sample	No sample
Total Dissolved Solids (TDS)	g/m ³	2,300	-	-	-
Acid Soluble Barium	g/m ³	0.22	-	-	-
Dissolved Barium	g/m ³	0.22	-	-	-
Chloride	g/m ³	1060	-	-	-
Total Sodium	g/m ³	183	-	-	-
pH	pH Units	6.2	-	-	-
C7 - C9	g/m ³	< 0.10	-	-	-
C10 - C14	g/m ³	< 0.2	-	-	-
C15 - C36	g/m ³	< 0.4	-	-	-
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	-	-	-
Benzene	g/m ³	< 0.0010	-	-	-
Toluene	g/m ³	< 0.0010	-	-	-
Ethylbenzene	g/m ³	< 0.0010	-	-	-
m&p-Xylene	g/m ³	< 0.002	-	-	-
o-Xylene	g/m ³	< 0.0010	-	-	-

This monitoring well has recorded some elevated saline impacts to groundwater over the past ten years (Figures 9-11). TDS in particular (Figure 10) has been found to be in breach of consent 7795-1.1, condition 22 on seven occasions in the past 20 monitoring rounds (peaking at 3,900 g/m³ in June 2019).

The previous five monitoring rounds have been below this limit, however, the last monitoring round recorded a concentration (2,300 g/m³) very close to the limit (2,500 g/m³). It is noted that subsequent sampling rounds have not been possible due to the damaged well.

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

With the monitoring well currently damaged, it represents an uncontrolled conduit for pollutants to enter groundwater.

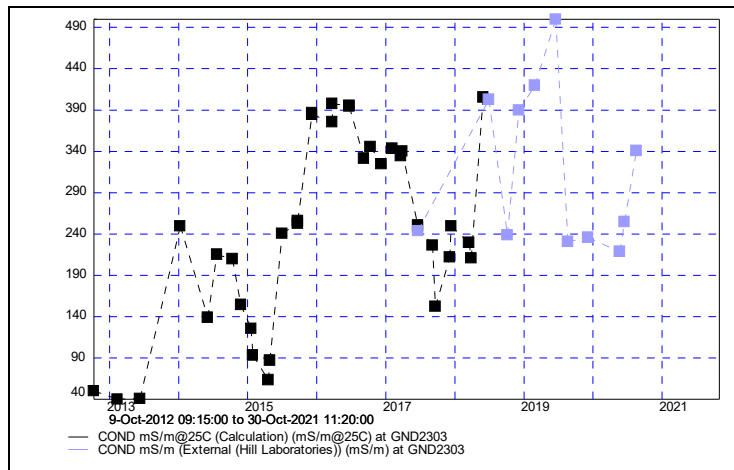


Figure 9 Long term EC mS/m @25°C monitoring GND2303 2012-2021

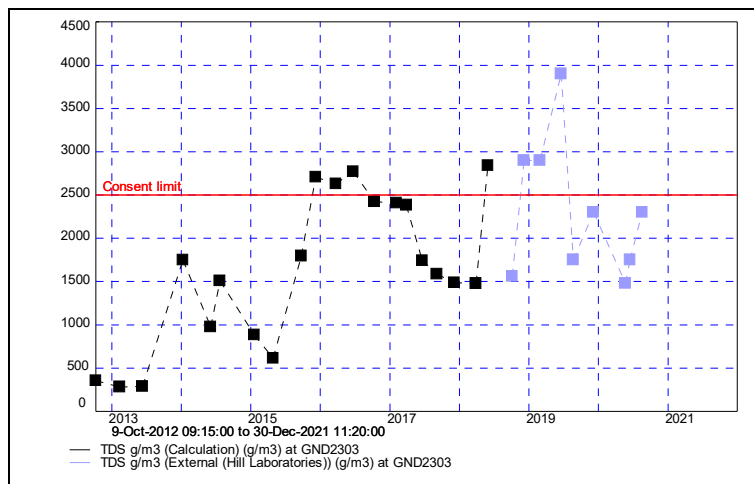


Figure 10 Long term TDS g/m³ monitoring GND2303 2012-2021

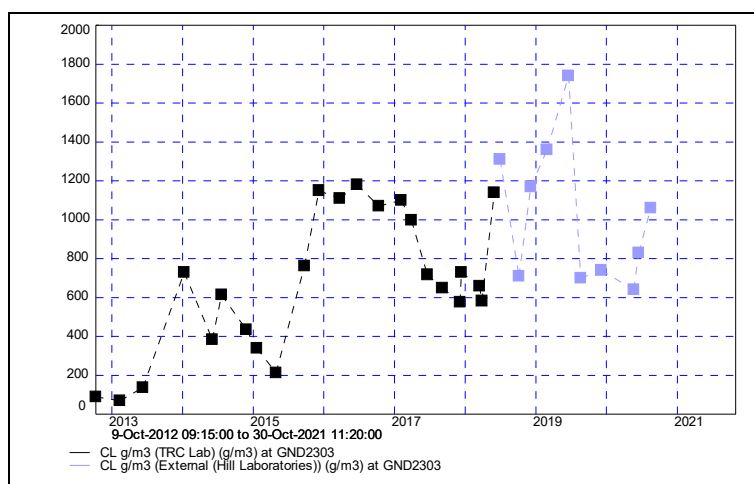


Figure 11 Long term chloride g/m³ monitoring GND2303 2012-2021

Lake Taumaha surface water sample

A surface water sample (Table 6) was collected from Lake Taumaha (Figure 12) this monitoring period.

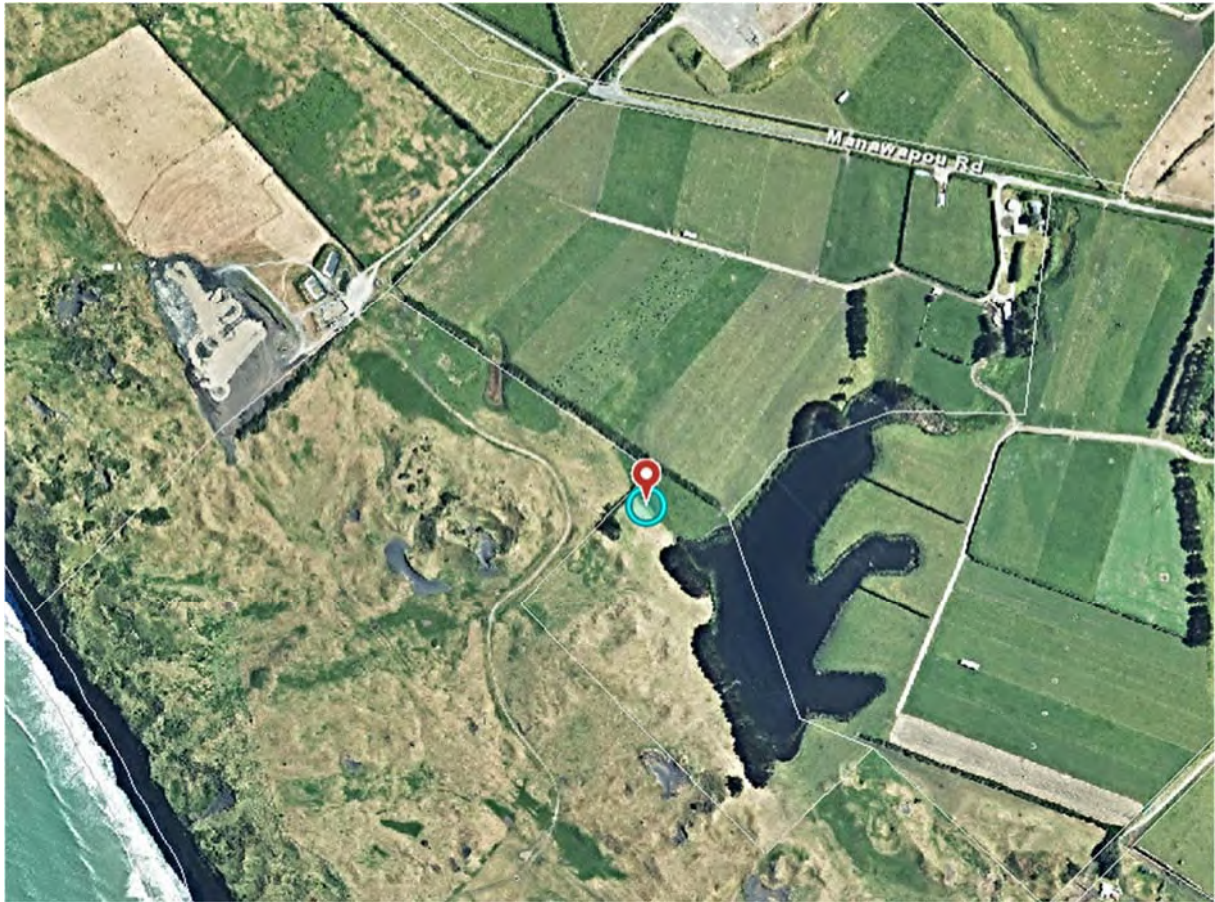


Figure 12 Sample location Lake Taumaha

Table 6 Lake Taumaha surface water sample

LTM00001	Collected	29 Jun 2021
Parameter	Time	10:20
TEMP	°C	10.4
Electrical Conductivity (EC)	µS/cm	392
	mS/m	39.2
Total Dissolved Solids (TDS)	g/m ³	220
Acid Soluble Barium	g/m ³	< 0.11
Chloride	g/m ³	70
Total Sodium	g/m ³	39
pH	pH Units	8
C7 - C9	g/m ³	< 0.10
C10 - C14	g/m ³	< 0.2
C15 - C36	g/m ³	< 0.4
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7

LTM00001	Collected	29 Jun 2021
Parameter	Time	10:20
Benzene	g/m ³	< 0.0010
Toluene	g/m ³	< 0.0010
Ethylbenzene	g/m ³	< 0.0010
m&p-Xylene	g/m ³	< 0.002
o-Xylene	g/m ³	< 0.0010

- Water temperature of Lake Taumaha was recorded at 10.4°C.
- EC was recorded at 39.2 mS/m, which is within range of the previous two monitoring periods (38.7-41.2 mS/m).
- TDS was recorded at 220 g/m³, which is equal to the previous monitoring period. But slightly higher than in 2019 (199 g/m³).
- Acid soluble barium remains below the LOD.
- Chloride was recorded at 70 g/m³. Which is within range of the previous two sample periods, ranging 69-74 g/m³.
- Sodium was recorded at 39 g/m³, which is within range of the previous two monitoring periods, ranging 40-41 g/m³.
- No TPH or BTEX were recorded above the LOD this monitoring period.

2.2.1.2 Pit samples

Sawdust was identified in pit 1 during the May 2021 inspection. Analysis provided by the Company indicated the sawdust was light organic solvent preserved wood sawdust (LOSP treated). There is no allowance for accepting and discharging to land LOSP treated saw dust under consent 7795-1.1.

LOSPs are preservatives that contain combinations of fungicides and insecticides for timbers used in internal and external situations. All of these preservative components are incorporated in a solvent carrier such as white spirit⁵.

The Council collected additional samples from all storage pits on site to confirm the extent of the LOSP. Permethrin, propiconazole and tebuconazole, was confirmed by the Council to have been discharged into storage pit 1. There was also a trace of propiconazole within storage pit 4. Table 7.

Table 7 Organonitro and phosphorus pesticide screen WRS Symes pit samples

Sample location		Pit 1	Pit 2	Pit 4
	Collected	08 Jun 2021	08 Jun 2021	08 Jun 2021
Parameter	Time	13:14	13:20	13:31
Permethrin	g/m ³	0.56	< 1.5	< 0.006
Propiconazole	g/m ³	0.6	< 4	0.014
Tebuconazole	g/m ³	0.8	< 5	< 0.02

⁵ New Zealand Timber Preservation Council <https://www.nztpc.co.nz/lospSafety.php>

The pit 2 sample did not return any concentrations above the LOD⁶.

Enforcement was undertaken by the Council and this is discussed further in Section 2.3.

2.2.1.3 Soil samples

No landfarmed areas were been completed during the current monitoring period. As such, no soil samples were collected.

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

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

One area (M2110, 5.35 ha, Figure 13) was landfarmed during this monitoring period. This remains under operation as noted by the inspector during the 2021-2022 monitoring period. Once this area has been completed and seeded, soils samples will be collected.

2.2.2 Provision of consent holder data

The Company provided the Council with an annual report, as required by condition 13, of consent 7795-1.1. A copy of the Company report is attached in Appendix II. Table 8 contains the delivery record for material accepted by the landfarm during this monitoring period. Figure 13, 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 2020-2021 in m³

Date	Source	Customer	Solid	Liquid	Direct spread	Total
Jul, Aug, Oct, Nov, Dec 2020 and Feb, Mar, May and Jun 2021	Haliburton LMP	Halliburton	-	695	21	716
Sep, Nov, Dec 2020 and Jan, Feb, Mar, Apr, Jun 2021	Kupe Production Station	C/R Beach	-	753	-	753
Sep and Oct 2020	KA21, KA22, KA-24, KA-23	Todd Kapuni	506		42	548
Oct, Nov and Dec 2020	McKee Site Toetoe 2D	Todd McKee ToeToe 2D	-	516	38	554
Oct-20	Mangaone WTP silt pond	Todd Generation	-	320	-	320
Oct-20	Mangahewa G	Todd PS	17	-	-	17

⁶ RJ Hill analyst's comments: It should be noted that the volume of sample extracted was much less than the default amount due to the matrix of the sample, hence the elevated detection limits reported.

Date	Source	Customer	Solid	Liquid	Direct spread	Total
Oct, Nov 2020 and Mar. Apr 2021	Amtec spill contaminants, SBM and wash down water, Symons waste silo	Symons	-	63	7	70
Nov-20	Manutahi D	Westside	14	-	-	14
Jan-21	Kauri D	Westside	-	16	-	16
Dec-20	Mud and waste water	Todd Energy	-	56	-	56
Dec-20	McKee D 9A	Todd	-	265	-	265
Dec 2020 and Jan 2021	Turangi B 10	GMP Turangi B 10	134	54	-	188
Dec 2020 and Jan, Feb, Mar 2021	Turangi B 11	GMP Turangi B 11	1,222	314	-	1,536
Jan, Feb 2021	MHW G 31	Todd Energy MHW G 31	631	430	-	1,061
Feb, Mar, Apr 2021	MHW G 32	Todd Energy MHW G 32	777	774	-	1,551
Feb, Mar, Apr, May, Jun 2021	Maui A	OMV Maui A	144	1,411	-	1,555
Mar, Jun 2021	KW 03	Todd KW 03	286	687	-	973
Mar-21	Boyd's Surrey Road	Schlumberger	-	245	-	245
Total m ³			3,731 m ³	6,599 m ³	108 m ³	10,438 m ³

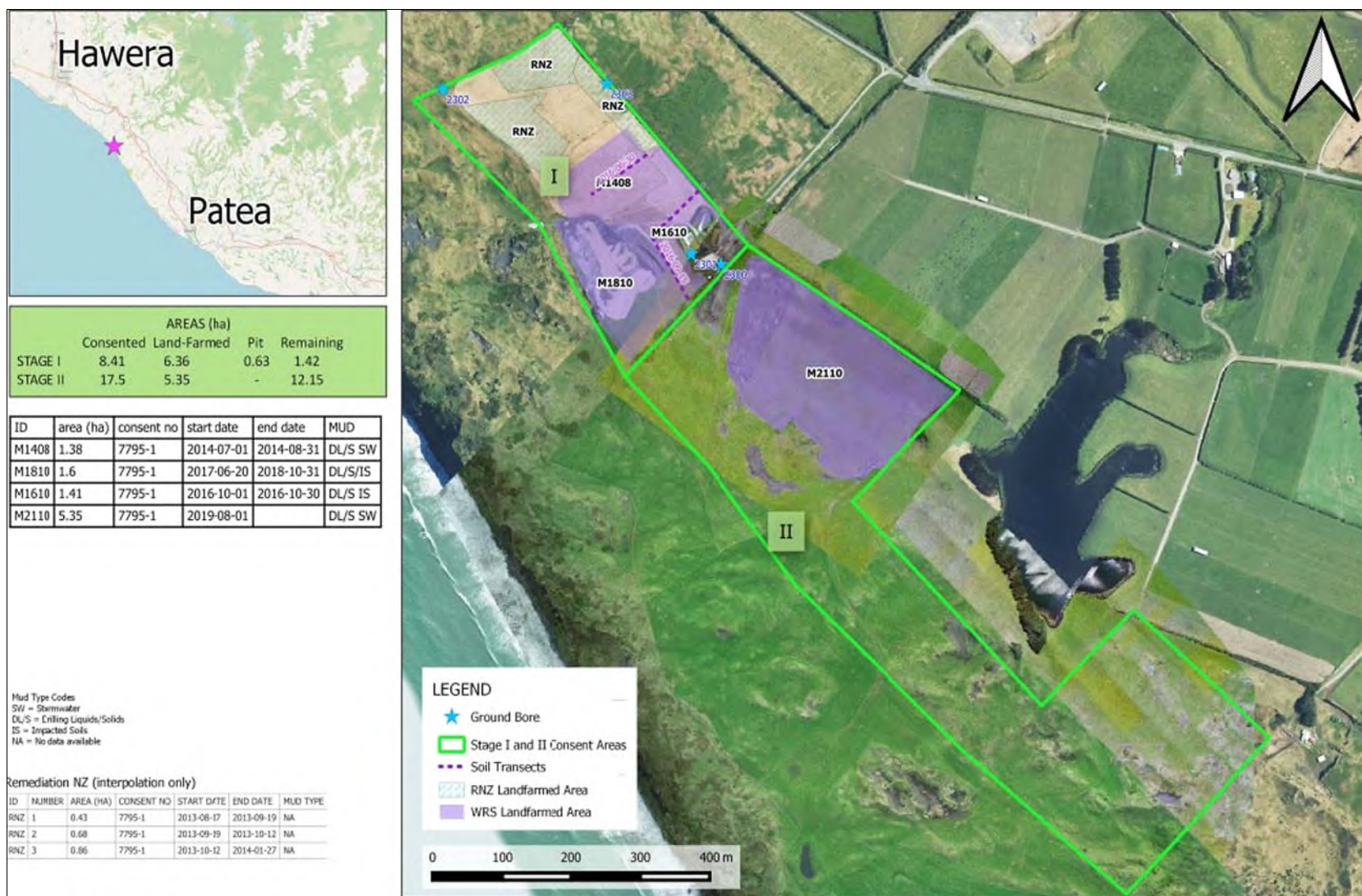


Figure 13 WRS provided map of landfarmed areas

2.3 Incidents, investigations, and interventions

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

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

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

Table 19 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the Company activities during the 2020-2021 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
20 May 2021	Discharge of contaminant, namely LOSP treated sawdust, from an industrial or trade premises onto or into land. The discharge was not expressly allowed by a national environmental standard or other regulations, a rule in a regional plan, or a resource consent.	N	Abatement notice Infringement notice	All stockpiled LOSP material removed from site. Ceased acceptance of LOSP material

3 Discussion

3.1 Discussion of site performance

The Symes Manawapou Landfarm observed its busiest year to date, with 10,435 m³ of drilling waste from 17 sources accepted to site. The Company has landfarmed the site in two stages, which are illustrated in Figure 13 and discussed below.

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

Stage II has 17.5 ha available, with the Company commencing landfarming during this monitoring period. Area M2110 at 5.36 ha is the largest landfarmed by the Company at the site to date. Landfarming operations were continuing in this area (M2110) throughout the monitoring period and remain active at the time of report composure.

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 during this monitoring period.

In May 2021 it was identified that the Company had accepted drilling waste which included sawdust mixed with the drilling waste. The rationale for sawdust inclusion was due to the ability of the sawdust to make the transportation of used drilling fluids easier. It also allowed for a more controlled load of fluid within the associated transport and delivery trucks. Gas companies have used sawdust around well sites, to soak up spills.

Following acceptance of the material, the Company discovered that the sawdust was treated. There was no specific allowance for treated sawdust to be accepted and discharged to land by the consent. The Council issued an abatement notice to cease the acceptance and discharge of this material. This was undertaken by the Company. The Company were also issued an infringement notice.

It is noted that the Company was very transparent with the Council in regard to the treated sawdust acceptance, enabling follow-up investigations and monitoring to be undertaken. A small area of M2110 has been landfarmed with LOSP treated sawdust and this will be monitored by the Council over time.

Groundwater monitoring bore GND2303 remains damaged and requires repair to become operational again. In its current form it is an uncontrolled conduit to groundwater and requires attention. The Company have communicated that the damaged bore will be fixed by the end of February 2022.

3.2 Environmental effects of exercise of consents

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

Salts mobilise in water; the elevations observed are likely a result of salts leaching from previous landfarmed areas into the groundwater and these salts gradually moving towards the coast. It is noted that no petroleum hydrocarbon-related impacts have been found within the groundwater. Bore GND2303 was damaged during the monitoring year and has yet to be repaired by the Company. This bore also indicated saline impacts, which have been increasing since its installation in 2012. The elevations appear to correspond with landfarming dates undertaken by the Company over time. As discussed in the previous

section, the well remains an uncontrolled conduit to groundwater. Given that the previous results indicated it is impacted, repairing it and monitoring it should be undertaken with some urgency.

It is noted that following the application of LOSP treated sawdust to land during the monitoring period the groundwater was also analysed for LOSP treatment chemicals (permethrin, propiconazole and tebuconazole). No compounds were recorded above the LOD in any of the three wells assessed. This further suggests that the pits which held the material are fit for purpose and do not leak to groundwater. However, without GND2303 in operation, this is not conclusive. While there were no detections of LOSP chemicals in the final monitoring round of groundwater. Drilling waste mixed with it was discharged to land, and landfarmed within area M2110.

In December 2022, the Company will need to demonstrate to the Council that the liners within the pits/cells remain fit for purpose. Pit 3 currently has a compromised liner, while the sand which was observed within it during inspections had been removed.

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 soils⁷. Propiconazole (fungicide) has a half-life ranging between 40-315 days⁸. While in the case of tebuconazole (fungicide), its half-life ranges from 20-912 days⁹. Soil sampling in the upcoming monitoring period will 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 Acceptance of LOSP treated sawdust not allowed under the consent Abatement notice and infringement notice issued GND2303 currently damaged	No

⁷ <http://npic.orst.edu/factsheets/half-life.html>

⁸ 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

⁹ 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?
3. The consent holder shall provide a stockpiling and landfarming management plan prior to the exercise of the consent	Management plan received and approved, updated annually, plan received 12/07/2020 for the following 2020-21 year	Annual review provided in 2021
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 well currently damaged and in need of repair
6. Any pits utilised for the storage of solid or liquid waste shall be lined with fit for purpose synthetic liners or equivalent	Inspections noted one pit is off line and was further worked on by the consent holder It remains roped off	Yes
7. Integrity check of pit liners to be conducted per 24 month period	Notification will be required by December 2022	N/A
8. Notify TRC 48 hrs prior to stockpiling	Notifications 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

Purpose: To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. The consent holder to take a representative sample of each disposal of sediment retention pond sludge and analyses for the following <ul style="list-style-type: none"> - 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	No
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
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: <ul style="list-style-type: none"> a. 100 mm TPH <5% b. 50 mm TPH >5% c. No ponded liquids 1 hr after application 	Company records, inspection and sample	Yes
17. Incorporation into soil as soon as practicable to a depth of at least 250 mm	Inspection and sampling	Yes
18. Hydrocarbon concentrations in soil shall not exceed 50,000 mg/kg dry weight	Sampling	Yes

Purpose: To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming

Condition requirement	Means of monitoring during period under review	Compliance achieved?
19. Landfarming areas to be used in accordance with conditions 14 and 15 and shall not be used for any subsequent discharges of drilling wastes	Inspection	Yes
20. All material to be landfarmed as soon as practicable and no later than 12 months	Company records and inspections	Yes
21. Re-vegetate landfarmed areas as soon as practicable	Company records and inspections Inspections indicated the odd barren patch though minor	Yes
22. Total dissolved salts in any fresh water body shall not exceed 2,500 g/m ³	Sampling indicated that GND2303 is close to the limit at 2,300 g/m ³ . However this well is damaged and up to date monitoring is not possible	Yes
23. Disposal of waste shall not lead to contaminants entering surface water or ground water exceeding background concentrations	Sampling indicated that saline impacts are slowly trending up at monitoring well GND2302. GND2303 which is currently untestable and should be fixed by the Company as this is the most saline impacted well	No Saline impacts in two wells If further elevations in TDS continue, in breach of condition 22, the Company will be required to investigate the cause of the elevations
24. Conductivity must be less than 400 mS/m. If background conductivity exceeds 400 mS/m, then increase shall not exceed 100 mS/m	No soil samples collected this monitoring period as landfarming on going and areas not sown into pasture	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	No soil samples collected this monitoring period	N/A
26. Concentrations of heavy metals in the soil shall at all times comply with MfE guidelines	No soil samples collected this monitoring period	N/A

Purpose: To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids from water based muds and synthetic based muds), from hydrocarbon exploration and production activities, onto and into land via landfarming

Condition requirement	Means of monitoring during period under review	Compliance achieved?
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 June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Improvement required
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					
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	-	-	-
Totals	-	1	6	0	1

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

3.4 Recommendations from the 2019-2020 Annual Report

In the 2019-2020 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at WRS Symes Manawapou Landfarm in the 2020-2021 year be amended from that undertaken in 2019-2020, by making the two soil samples provisional, unless new areas are landfarmed by the consent holder. If so, these samples will be collected.
2. Groundwater monitoring will remain at quarterly.
3. Single surface water sample from Lake Taumaha will continue.
4. THAT should there be issues with environmental or administrative performance in 2020-2021, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

In terms of the recommendations: The two soil samples were made provisional as no landfarmed areas were completed. Groundwater was undertaken quarterly. The spot sample of Lake Taumaha was collected. Organonitro and phosphorus pesticide screen was added to the groundwater monitoring in the final monitoring round of the period (June 2021).

3.5 Alterations to monitoring programmes for 2021-2022

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

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

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

Planned changes for 2021-2022 monitoring programme include the addition of six soil samples to the provisional two, bringing the total number to eight soil samples. As it is assumed that area M2110 will be completed and seeded in the upcoming monitoring period. The rest of the compliance programme will remain unchanged

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2021-2022.

3.6 Exercise of optional review of consent

Resource consent 7795-1.1 provides for an optional review of the consent in June 2022. Condition 31 allows the Council to review the consent, if there are grounds to warrant a review.

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

4 Recommendations

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

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 $\mu\text{S}/\text{cm}$.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second ($1 \text{ m}^3\text{s}^{-1}$).
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.
$\text{g}/\text{m}^2/\text{day}$	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	<i>Resource Management Act 1991</i> 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 a Science Services 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 (2020): Waste Remediation Services Ltd (WRS) Symes Manawapou Landfarm Monitoring Programme Annual Report 2018-2019. Technical Report 202-88.
- 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 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.

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: <ul style="list-style-type: none">• 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*

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.

Consent 7795-1.1

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 (C₆-C₉, C₁₀-C₁₄, C₁₅-C₃₆);
 - 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.

Consent 7795-1.1

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.

Consent 7795-1.1

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:

<u>Constituent</u>	<u>Standard (mg/kg dry weight)</u>
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:

<u>Constituent</u>	<u>Standard</u>
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 - naphthalene, non-carc. (pyrene), benzo(a)pyrene eq.
TPH - total petroleum hydrocarbons (C7-C9, C10-C14, C15-C36)

The requirement to meet these standards shall not apply if, before 1 March 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 handwritten signature in black ink, appearing to read 'A D McLay', with a long horizontal flourish underneath.

A D McLay
Director - Resource Management

Appendix II

Company provided annual report



1 October 2021

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

Dear Nathan

RE: Resource Consent 7795-1 - Manawapou (Symes) - 156 Manawapou Road, RD 2, Patea

As required under special condition 9 of resource consent 7795-1, please find all relevant information recorded from the operational period 1 July 2020 to 30 June 2021 relating to stockpiling and landspreading activities undertaken at Waste Remediation Services (WRS) Manawapou disposal site. It is the seventh report completed by WRS following the previous periods;

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

This report is designed to follow on from the previously submitted 2019-20 consent monitoring report and is as such focussed on activities, records and results from the 2020-21 period. This report is structured into seven sections, as per the following:

1. Overview and Background
2. Wastes Received for Disposal

3. Disposal and Rehabilitation Operations (preparatory earthworks, landspreading/ incorporation and rehabilitation - comprising topsoil application, sowing, additional works)
4. Monitoring
5. Additional Consent Requirements
6. Incident Summary
7. Summary

1. OVERVIEW AND BACKGROUND

WRS began operating the Manawapou disposal site in 2014, replacing the original site operators Remediation NZ Ltd, who were issued resource consent 7795-1 in 2012. Between 2014 and the currently reported on year, there have been intermittent periods of activity at the site, reflecting fluctuating levels of activity within the local drilling industry.

During 2020-21 there has been a reasonable amount of activity at the Manawapou site. The site has received drilling/production wastes from Halliburton, Todd Energy, Beach Energy, Westside, Greymouth Petroleum, OMV and Schlumberger. Preparation of a new spreading area in stage 2 of the site (M2110) was undertaken, and disposal of the aforementioned waste commenced and was continuing at the conclusion of the monitoring period.

Monitoring of the site undertaken in the 2020-21 year by both the Taranaki Regional Council (TRC) and WRS management has shown the operations undertaken at Manawapou to be generally compliant with consent conditions; however, one incident was recorded against the site in 2020-21.

2. WASTES RECEIVED FOR DISPOSAL

Waste Types and Volumes

During the 2020-21 year, a total of 10,435m³ of both solid and liquid wastes were received onsite from the following sources:

- Todd Energy's Mckee D, Kapuni KA-22, 23, 24, Toetoe 2D, KW-03, Mangahewa G Production Station and MHW-31 and 32 wells
- Todd Generation's Mangaone WTP silt pond
- Halliburton's Liquid Mud Plant supplying Todd Energy drilling
- Westside's Manutahi D and Kauri D well sites,
- Greymouth Petroleum's Turangi B10 and B11
- Beach Energy's Kupe Production Station
- OMV's Maui A MACI programme
- Waste from Boyd's Surrey Road stockpiling facilities.

Further details of quantities of material are provided in an updated mud register attached as Appendix C.

Waste Characterisation

Consent 7795-1 requires the site operator to sample and keep records of waste chemical composition. Composite samples are taken (generally by wellsite staff prior to transport) across each waste stream before materials leave the well/source site for delivery. WRS also takes pre-spreading samples from the pits prior to landspreading for further waste characterisation. All samples are sent to RJ Hill Laboratories for analyses. Results are forwarded directly 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 to ensure the hydrocarbon limit in condition 14 is adhered to. As TRC have been directly forwarded all pre-disposal results, in the interest of avoiding duplication, PDF copies will not be attached to this report.

3. DISPOSAL AND REHABILITATION OPERATIONS

During the 2020-21 operational period spreading operations commenced in a new 5.35ha area (Phase 1) in Stage 2 of the Manawapou site (as identified on the updated site map, Appendix B). Disposal in this area was still underway at the end of the operational period.

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

4. MONITORING

Site Inspections - WRS

WRS closely supervise site operations to ensure all contractors are following best practice as per the site operation management plan and conditions specified in consent 7795-1. Regular site inspections are also undertaken during periods of inactivity at the site.

Site Inspections – TRC

WRS has received six inspection notices from the TRC for the 2020-21 year. Notices 1-4 indicated the TRC inspector was satisfied with the physical state of the site, and with operations being undertaken around the time of inspection. During the fifth inspection, (20 May 2021) the inspecting officer had queried the presence of sawdust as noted in Pit 1. A follow-up inspection was conducted on 8 June 2021, where a potential non-compliance was identified, samples were taken and the inspecting officer advised that an abatement notice would be issued. This is discussed further in Section 6, below. Copies of the TRC inspection notices are attached as Appendix D.

Receiving Environment Sampling

Composite soil sampling and groundwater sampling is now undertaken exclusively by TRC staff, with all samples being sent to RJ Hill Laboratories for the full suite of analyses required under consent 7795-1. Correspondence with TRC has indicated that the next round of soil sampling will be undertaken in 2021-22; however, groundwater samples have been collected in 2020-21, the results of which are presented below.

Groundwater monitoring results

TRC have completed quarterly groundwater monitoring at the Manawapou site and have supplied all results to WRS, as per the agreed monitoring programme. Consent 7795-1 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/m³. Condition 19 has a relatively broad requirement around the exercising of the consent not resulting in any other contaminant concentrations above background levels.

WRS have reviewed these supplied results and have not identified any non-compliances with condition 19. The full range of groundwater results will likely be included in the TRC Annual Report (as has been done in previous years), so these will not be presented in this report in full. The TDS results, however, will be presented and discussed below, in relation to condition 18. The TDS results for 2019-20 are presented below in Table 3.

Table 1 TRC Groundwater TDS results, all monitoring bores 2020-21

Bore	Date	TDS g/m ³	Bore	Date	TDS g/m ³
GND2300	17 Aug 2020	1460	GND2302	17 Aug 2020	1354
	10 Nov 2020	360		10 Nov 2020	720
	13 Apr 2021	440		13 Apr 2021	800
	30 Jun 2021	1090		30 Jun 2021	1070
GND2301	17 Aug 2020	500	GND2303	17 Aug 2020	2300
	10 Nov 2020	430		10 Nov 2020	-
	13 Apr 2021	560		13 Apr 2021	-
	30 Jun 2021	Dry bore		30 Jun 2021	-

For the current monitoring period, the results have all been compliant with the TDS consent limit. It should however be noted that GND2303 was damaged during the monitoring period and sampling could not be conducted for this bore during the last three sampling runs.

5. ADDITIONAL CONSENT REQUIREMENTS

As per condition 3 of consent 7795-1, the site management plan has been reviewed for the period July 2020 to June 2021. Operations at the Manawapou disposal 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. In 2020-21 no significant changes were made to the LMP. The current plan is available upon request.

6. INCIDENT SUMMARY

As stated in Section 4 of this report, during the 20 May 2021 inspection, TRC's inspecting officer had queried the nature of some sawdust that was present onsite in storage pit 1, which led to an

investigation including a follow-up inspection in June 2021. Below is a summary and timeline of events as was provided to the TRC as part of their investigation:

Early December 2020

WRS has had a service agreement with Greymouth Petroleum for approximately 18 months, which was not activated until early December 2020 when GMPL's Operations Manager approached WRS about receiving Turangi-10 drilling waste. Another three weeks had passed before WRS was contacted again, with some urgency regarding taking Turangi-10 waste immediately from 24 December 2020. The urgency arose because of the impending stop on Remediation NZ (RNZ) accepting drilling waste at their Uruti site. The transition was seamless with BCCL providing all transport of solid and liquid drilling waste, including the collection of sawdust from RNZ's large stockpile at their Uruti site. This practice has been followed for several years with GMPL's cartage contractor uplifting sawdust, (as the truck returned to the rig site) from a very large (pers comm) stockpile that had been in existence for years.

January 2021

WRS investigated the use of sawdust as a materials handling improvement tool and were advised by various GMPL staff that it was a long-standing practice and was very effective. As both WRS Waikakai and Manawapou landfarming consents were silent on the use of sawdust it was logical to understand how this practice was regulated at other landfarms. WRS obtained from the TRC copies of several other operating landfarms including RNZ's consent 5838-2.2 composting facility at Uruti being the most pertinent. This too was silent on the receipt of sawdust, discharge to ground and particularly storage. As the practice had occurred for many years and the WRS/GMPL contract bedded in, WRS took this as standard TRC regulated, acceptable practice and did not question the uplifting of sawdust from Uruti.

February 2021

GMPL became concerned that continuing to source the sawdust from Uruti as a special out and back trip was both time and cost consuming. To overcome this inefficiency GMPL asked WRS to provide the sawdust, and a buffer stockpile away from the rig site (the Turangi-B lease is small and confined), that could be either uploaded, upon their truck/s return from Manutahi, or delivered by Symons Transport direct to the rig from one of their existing Uruti suppliers, Cleland's Timber. Following informal agreements with Cleland's Timber, Symons Transport established a surge stockpile enclosed by 40' containers and with a water irrigation dust suppression system. The shavings flakes/sawdust being delivered to the surge pile by Cleland's contractor regularly in 20' purpose built containers.

March 2021

The supply system continued seamlessly through the completion of Turangi-10 and 11 in mid-March. It was during the early drilling of T-11 that WRS noticed the discolouration of sawdust sourced from Uruti, thought it atypical of recently sawn sawdust, and arranged for these to be SPLP leach tested at Hills Laboratories following telephone discussions with Koppers and Clelands Timber.

April 2021

In early April, drilling activity sector-wide slowed and WRS took the opportunity to sample and send off for SPLP leaching and analysis samples of both sawdust and wood shavings supplied to Uruti

by Cleland's Timber. This sampling was routine for any waste received for land farming. Results following leaching and analysis were received on 29 April 2021. The results reported very low levels of light oil-supported preservatives typical of a proprietary wood treatment brew manufactured by Koppers, Auckland. Following receipt of the analysis, WRS contacted Koppers for comment on the very low levels of the active preservatives, likely effects and consequences. They said the levels were low and the likelihood of measurable consequences were very low, far less than the effect on soils of CCA preservatives. Again (not as a result of any queries or discussion with the TRC, but as a matter of routine) WRS forwarded the results to the TRC.

May 2021

Based on the interpretation of results and a very conservative approach, WRS notified Cleland's Timber by phone and email 7 May 2021 that we would no longer be able to take their sawdust waste once the existing surge pile was emptied. The last loads were delivered approximately mid/late May. In late May, WRS received a telephone call from the TRC inspecting officer advising that the TRC was going to issue an abatement notice to stop the discharge of sawdust at Manawapou, and there would be no further action taken as WRS had already stopped receiving sawdust from Cleland's Timber. WRS are now sourcing untreated sawdust from Tim pack for both Todd Energy and GMPL as of early June. As per routine, this has also been sampled for leach testing, and results have shown the sawdust to be untreated. This was conveyed to the TRC and agreement reached to allow drilling companies to continue using saw dust as a materials handling additive.

June 2021

No further sawdust was delivered to Manawapou except minor amounts mixed in with clean-up gravels and detritus from the Turangi-B lease. The surge pile has been completely remediated with all the remaining sawdust to be trucked to and disposed of at Bonny Glen landfill near Marton.

An abatement notice was issued from the TRC as advised.

7. SUMMARY

During 2020-21 there has been a reasonable amount of activity at the Manawapou site. The site has received drilling/production wastes from Halliburton, Todd Energy, Beach Energy, Westside, Greymouth Petroleum, OMV and Schlumberger. Preparation of a new spreading area in stage 2 of the site (M2110) was undertaken, and disposal of the aforementioned waste commenced and continues at the conclusion of the monitoring period. Monitoring results from TRC sampling have indicated that no significant adverse effects have occurred from the exercise of consent 7795-1 during the monitoring period under review. However, one incident was recorded at the site, resulting in the issuing of an abatement notice. No environmental effects have been identified relating to this incident.

Waste Remediation Services Ltd

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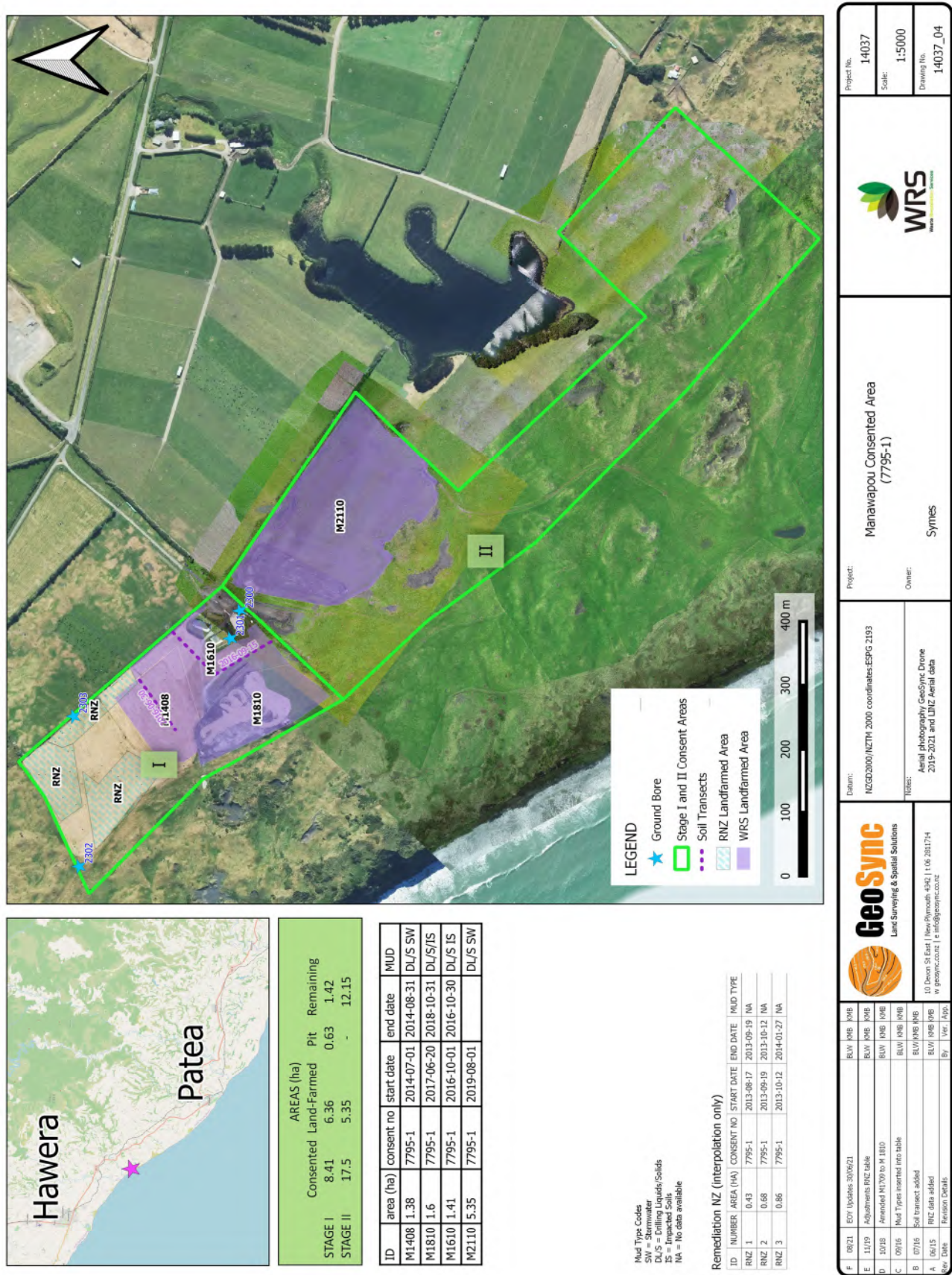
Appendix A Field Photographs

During and after waste application and incorporation, Manawapou disposal site spreading area M2110





Appendix B Manawapou Site Map



Appendix C Mud Register

Date	Source	Customer	Disposal Site m3			Total
			Solid	Liquid	Direct Spread	Total
7-23 July 2020	Halliburton LMP	Halliburton	-	80	-	80
5-15 Aug 2020	Halliburton LMP	Halliburton	-	67	-	67
9-30 Oct 2020	Halliburton LMP	Halliburton	-	185	-	185
4 Nov 2020	Halliburton LMP	Halliburton	-	20	-	20
7-16 Dec 2020	Halliburton LMP	Halliburton	-	40	-	40
16 Feb 2021	Halliburton LMP	Halliburton	-	61	21	82
22-24 Mar 2021	Halliburton LMP	Halliburton	-	32	-	32
17-18 May 21	Halliburton LMP	Halliburton	-	155	-	155
2-3 Jun 21	Halliburton LMP	Halliburton	-	55	-	55
		Halliburton LMP TOTAL	-	695	21	716
21-30 Sep 2020	Kupe Production Stn	C/R Beach	-	83	-	83
Nov-20	Kupe Production Stn	C/R Beach	-	8	-	8
21 Dec 20	Kupe Production Stn	C/R Beach	-	59	-	59
5-28 Jan 21	Kupe Production Stn	C/R Beach	-	196	-	196
15-19 Feb 21	Kupe Production Stn	C/R Beach	-	113	-	113
1-23 Mar 21	Kupe Production Stn	C/R Beach	-	152	-	152
27-30 Apr 21	Kupe Production Stn	C/R Beach	-	88	-	88
24-Jun 21	Kupe Production Stn	C/R Beach	-	54	-	54
		Kupe PS TOTAL	-	753	-	753
Sep-20	KA-21	Todd	139	-	-	139
Sep-20	KA-22	Todd	121	-	24	145
Sep-20	KA-24	Todd	76	-	19	95
Sep-20	KA-23	Todd	26	-	-	26
1-5 Oct 20	KA-23	Todd	144	-	-	144
		Kapuni (KAP-J) TOTAL	506	-	42	548
6-31 Oct 20	McKee Site Toetoe 2D	Todd	-	76	38	114
8-25 Nov 20	McKee Site Toetoe 2D	Todd	-	245	-	245
2-9 Dec 20	McKee Site Toetoe 2D	Todd	-	195	-	195
		McKee ToeToe 2D TOTAL	-	516	38	554
6-9 Oct 20	Mangaone WTP Silt Pond	Todd Gen	-	320	-	320
		Todd Generation TOTAL	-	320	-	320
8 Oct 20	Mangahewa G	Todd PS	17	-	-	17
		Todd PS TOTAL	17	-	-	17
15 Oct 20	Amtec Spill Contaminants	Symons	-	-	7	7
2 Nov 2020	SBM + Wash down water	Symons	-	16	-	16
4 Mar 2021	Symons Waste Silo	Symons	-	16	-	16
1, 12 Apr 2021	Symons Waste Silo	Symons	-	31	-	31
		MISC TOTAL	-	63	7	70
24 Nov 2020	Manutahi D	Westside	14	-	-	14
		WESTSIDE Manutahi D TOTAL	14	-	-	14
15 Jan 21	Kauri D	Westside	-	16	-	16
		WESTSIDE Kauri D TOTAL	-	16	-	16
9-30 Dec 2020	Mud and Waste Water	Todd Energy	-	56	-	56
		Todd Energy - Misc TOTAL	-	56	-	56
13-27 Dec 2020	McKee D 9A	Todd	-	265	-	265
		Todd McKee D 9A TOTAL	-	265	-	265
24-27 Dec 2020	Turangi B 10	GMP	-	54	-	54
6-13 Jan 21	Turangi B 10	GMP	134	-	-	134
		GMP Turangi B 10 TOTAL	134	54	-	188

17-31 Jan 21	Turangi B 11	GMP	979	108	-	1,087
1-28 Feb 21	Turangi B 11	GMP	192	136	-	328
1-5 Mar 21	Turangi B 11	GMP	51	70	-	121
		GMP Turangi B 11 TOTAL	1,222	314	-	1,536
12-31 Jan 2021	MHW G 31	Todd Energy	418	182	-	600
1-26 Feb 2021	MHW G 31	Todd Energy	213	248	-	461
		Todd Energy MHW G 31 TOTAL	631	430	-	1,061
28 Feb 2021	MHW G 32	Todd Energy	17	-	-	17
1-26 Mar 2021	MHW G 32	Todd Energy	696	698	-	1,394
Apr 2021	MHW G 32	Todd Energy	64	76	-	140
		Todd Energy MHW G 32 TOTAL	777	774	-	1,551
10-23 Feb 2021	Maui A	OMV	-	205	-	205
4-25 Mar 2021	Maui A	OMV	90	236	-	326
Apr 2021	Maui A	OMV	-	368	-	368
5-25 May 21	Maui A	OMV	-	202	-	202
2-22 Jun 21	Maui A	OMV	54	400	-	454
		OMV Maui A TOTAL	144	1,411	-	1,555
25-26 Mar 2021	KW 03	Todd	-	80	-	80
15-25 Jun 21	KW 03	Todd	286	607	-	893
		KW 03 TOTAL	286	687	-	973
29-31 Mar 2021	Boyd's Surrey Road	Schlumberger?	-	245	-	245
		Boyd's TOTAL	-	245	-	245
		2020-21 ANNUAL TOTAL m3	3,728	6,599	108	10,435

Appendix D TRC Inspection Notices

.....END