

# Waste Remediation Services Ltd

Waikaikai Landfarm

Monitoring Programme

Annual Report

2023/24

Technical Report 2024-12





# **Waste Remediation Services Ltd**

## **Waikaikai Landfarm**

### **Monitoring Programme**

### **Annual Report**

### **2023/24**

### **Technical Report 2024-12**

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## Executive summary

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

This report for the period July 2023 to June 2024 describes the monitoring programme implemented by Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

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

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

The Council's monitoring programme for the year under review included two inspections, fifteen groundwater samples and six composite soil samples collected for physicochemical analysis.

Landfarming continued in spreading area W2305, and once complete spreading was carried out in a new area W2406, adjacent to W2305. Both areas were completed and rehabilitated during this period.

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

During the monitoring year the groundwater samples demonstrated overall stability for the analytes tested, with minor decreases in concentrations.

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

For reference, in the 2023/24 year, consent holders were found to achieve a high level of environmental performance and compliance for 864 (89%) of a total of 967 consents monitored through the Taranaki tailored monitoring programmes, while for another 75 (8%) of the consents a good level of environmental performance and compliance was achieved. A further 26 (3%) of consents monitored required improvement in their performance, while the remaining two (<1%) achieved a rating of poor.

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

This report includes recommendations for the 2024/25 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 2023 to June 2024 by Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Waste Remediation Services Ltd hereafter referred to as the Company. The Company operates a landfarm situated on Lower Manutahi Road at Manutahi, South Taranaki, in the Mangaroa catchment.

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

This report discusses the environmental effects of the Company's use of land and is the 10<sup>th</sup> annual report by the Council for the Waikaikai Landfarm, and the 8<sup>th</sup> with WRS as the consent holder.

### 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 *Resource Management Act 1991* (RMA) and the Council's obligations;
- the Council's approach to monitoring sites through annual programmes;
- the resource consents held by the Company in the Mangaroa catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

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

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

**Section 4** presents recommendations to be implemented in the 2024/25 monitoring year.

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

### 1.1.3 The Resource Management Act 1991 and monitoring

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

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

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

#### **1.1.4 Evaluation of environmental and administrative performance**

Besides discussing the various details of the performance and extent of compliance by the consent holders, this report also assigns a rating as to each Company's environmental and administrative performance during the period under review. The rating categories are high, good, improvement required, and poor for both environmental and administrative performance. The interpretations for these ratings are found in Appendix III.

For reference, in the 2023/24 year, consent holders were found to achieve a high level of environmental performance and compliance for 864 (89%) of a total of 967 consents monitored through the Taranaki tailored monitoring programmes, while for another 75 (8%) of the consents a good level of environmental performance and compliance was achieved. A further 26 (3%) of consents monitored required improvement in their performance, while the remaining two (<1%) achieved a rating of poor.<sup>1</sup>

## **1.2 Process description**

### **1.2.1 Drilling waste**

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

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<sup>1</sup> The Council has used these compliance grading criteria for more than 20 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

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

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

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

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

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

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

### 1.3 Site location and description

The Company operates a drilling waste landfarm off Manutahi Road, Manutahi. The site is owned by P. F. and K. M. Wards, trading under the name Waikaikai Farms Ltd. The predominant land use was previously dairy farming. The site location is detailed in Figure 1. The predominant soil type has been identified as black loamy sand and vegetation growth consists mostly of pasture. Test pitting and the logging of boreholes on site indicated a relatively shallow water table. Test bores were augured to 10m both around the waste holding pit area and to the south-western site boundary, revealing alternating layers of sand and clays. Bore construction also revealed localised peat layers within some augured cores (approximately 4–8m below surface). Average annual rainfall for the site is 1,186mm (long term average to 2023 taken from the nearby Pātea at Bore 3 monitoring station).

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



Figure 1 WRS Waikaikai Landfarm and regional insert

A summary of the site data is provided below:

Site data:	Waikaikai Landfarm
Location:	Lower Manutahi Road, Manutahi, Taranaki
Word descriptor:	
Map reference (NZTM):	E 1720190 N 5605380
Mean annual rainfall:	1,186m
Mean annual soil temperature:	15.1°C
Mean annual soil moisture:	32.9%
Elevation:	~45m
Geomorphic position:	Dune back slope
Erosion / deposition:	Erosion
Vegetation:	Pasture, dune grasses
Parent material:	Aeolian/alluvial deposits
Drainage class:	Free/well-draining

## 1.4 Resource consents

The Company holds one resource consent, the details of which are summarised in the table below.

Summaries of the conditions attached to the permit are set out in Section 3 of this report.

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

Table 1 Consent held by the Company

Consent number	Purpose	Granted	Review	Expires
Discharges of waste to land				
<b>5956-2.0</b>	To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming	2017	2026	2034

## 1.5 Monitoring programme

### 1.5.1 Introduction

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

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

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

### 1.5.2 Programme liaison and management

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

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

- consultation on associated matters.

### 1.5.3 Site inspections

The Waikaikai Landfarm was visited twice during the monitoring period. Sources of data being collected by the Company were identified and assessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### 1.5.4 Chemical sampling

#### Soil sampling

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

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

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



Photo 1 An example of an extracted soil core

#### Soil analysis parameters

- Total heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc) and barium;
- calcium, chloride, conductivity, magnesium, potassium, sodium, total soluble salts and sodium adsorption ratio (SAR);
- total petroleum hydrocarbons (C<sub>7</sub>-C<sub>9</sub>, C<sub>10</sub>-C<sub>14</sub>, C<sub>15</sub>-C<sub>36</sub> and C<sub>7</sub>-C<sub>36</sub>), poly-cyclic aromatic hydrocarbons and mono-cyclic aromatic hydrocarbons;
- BTEX (benzene, toluene, ethylbenzene, m&p-Xylene and o-Xylene); and
- moisture factor.

### **Groundwater monitoring**

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

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

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

### **Groundwater analysis parameters**

- Barium (dissolved and acid soluble), chloride, conductivity (@ 25°C), sodium, total dissolved salts (TDS), pH;
- benzene, toluene, ethylbenzene, meta-xylene, ortho-xylene, total petroleum hydrocarbons (speciated); and
- in-situ readings: pH, conductivity, dissolved oxygen (DO), temperature and water level.

### **1.5.5 Provision of consent holder provided data**

In accordance with conditions 11 and 12 of the consent (5956-2.0), the Company must provide the Council with an annual report on the consent holder's operations in the 2023/24 monitoring period. This report contains information relating to the receipt, handling, storage and disposal of wastes.

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

## 2. Results

### 2.1 Inspections

#### 30 January 2024

Compliance monitoring inspection was undertaken to assess compliance with resource consent conditions. The inspection found that Pit 2 remained empty with no liner. Pit 1 contained solids, and Pit 3 was holding liquids, as previously noted. Spreading in the prepared areas was not occurring at the time of the inspection. There was a maize crop in the landfarmed area south-east of the storage pits. There was good coverage with the crop. Current operations included some spreading in an area between the maize crop and the southern boundary of the property; and some liquids had been spread by means of a supply line through the crop.

#### 9 May 2024

The inspection found conditions similar to the previous inspection. The maize crop had been harvested and there was good grass coverage of the area. Further ground preparation has commenced to provide a substantial spread area. Solids are being spread directly, adjacent to the area being prepared. There was a steady delivery of product at the time of the inspection.

Overall, there were no issues to note during either inspection and the Company was found compliant on both occasions.

### 2.2 Results of receiving environment monitoring

#### 2.2.1 Groundwater monitoring

The Waikaikai Landfarm contains five groundwater monitoring wells. These wells, which were a consent requirement, are situated in two locations (Figure 2). Three wells are located down gradient from the lined storage cells (GND2290, GND2291 and GND2292). The intention of these wells is to assess the groundwater in the immediate vicinity of the storage cells. The remaining two wells (GND2293 and GND2294) are situated on the south western boundary of the landfarm to assess for any potential offsite contaminant migration. The results of the sample analysis for the three monitoring rounds, is provided in Tables 2 to 6.

Where the analyses of total petroleum hydrocarbons (C<sub>7</sub>-C<sub>9</sub>, C<sub>10</sub>-C<sub>14</sub>, C<sub>15</sub>-C<sub>36</sub>) and benzene, toluene, ethylbenzene and xylenes (m, o & p) (collectively termed BTEX), were recorded below the laboratory defined limit of detection (LOD), they have not been tabulated.





Figure 2 WRS Waikakai Landfarm groundwater monitoring well locations

Table 2 GND2290 2023/24 monitoring period

GND2290	Collected	8 Sep 2023	8 Jan 2024	22 May 2024
Parameter	Time	12:35	11:05	16:15
Temperature	°C	15.9	16.8	15.7
Electrical Conductivity (EC)	mS/m	39.3	37.8	37.4
pH	pH Units	6.7	6.6	7.0
Chloride	g/m <sup>3</sup>	23	27	32
Total Sodium	g/m <sup>3</sup>	21	21	21
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	0.036	0.035	0.035
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	270	260	260
Toluene	g/m <sup>3</sup>	0.0021	<0.0010	<0.0010

All analytes remained stable throughout the monitoring period in bore GND2290. Figures 3, 4 and 5 show the long term monitoring records for chloride, TDS and EC respectively at this site, although variable, levels remain fairly stable.

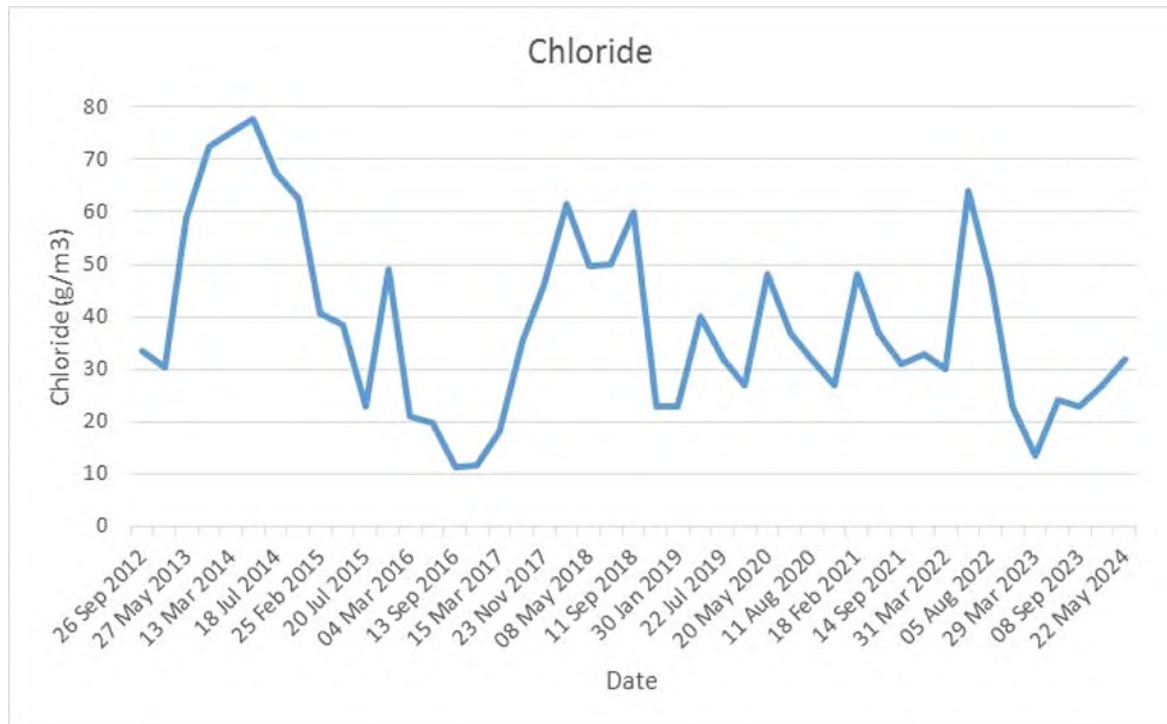


Figure 3 Long term chloride monitoring GND2290 2012-2024

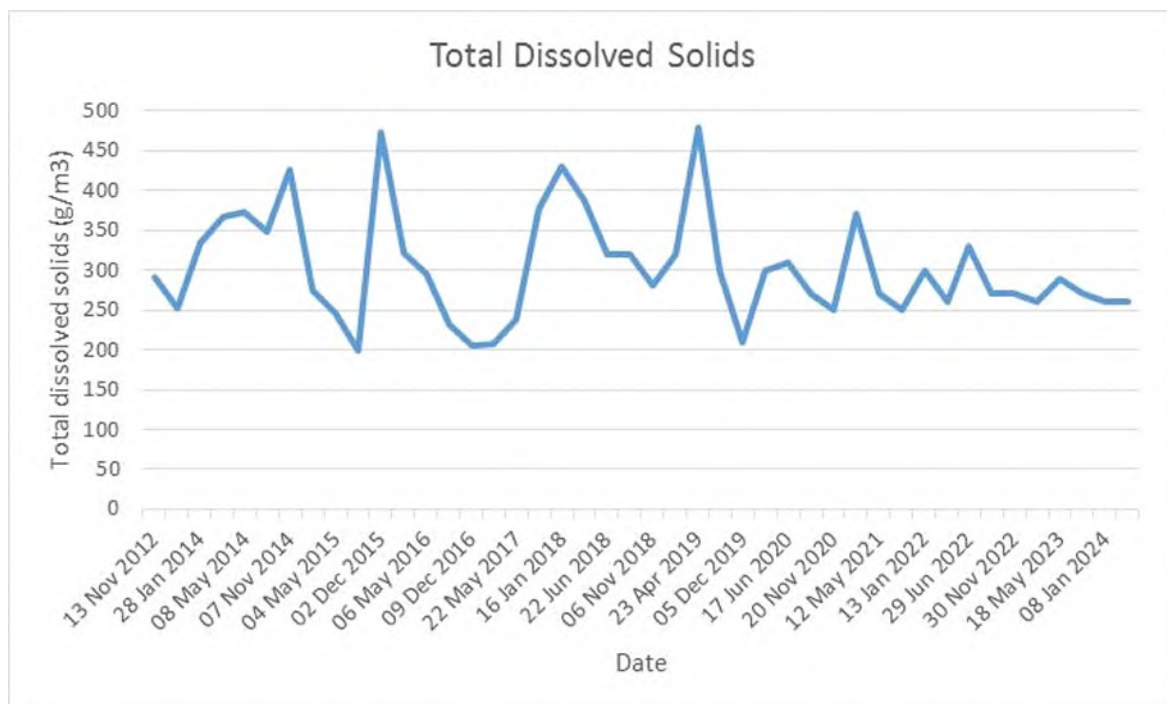


Figure 4 Long term TDS monitoring GND2290 2012-2024

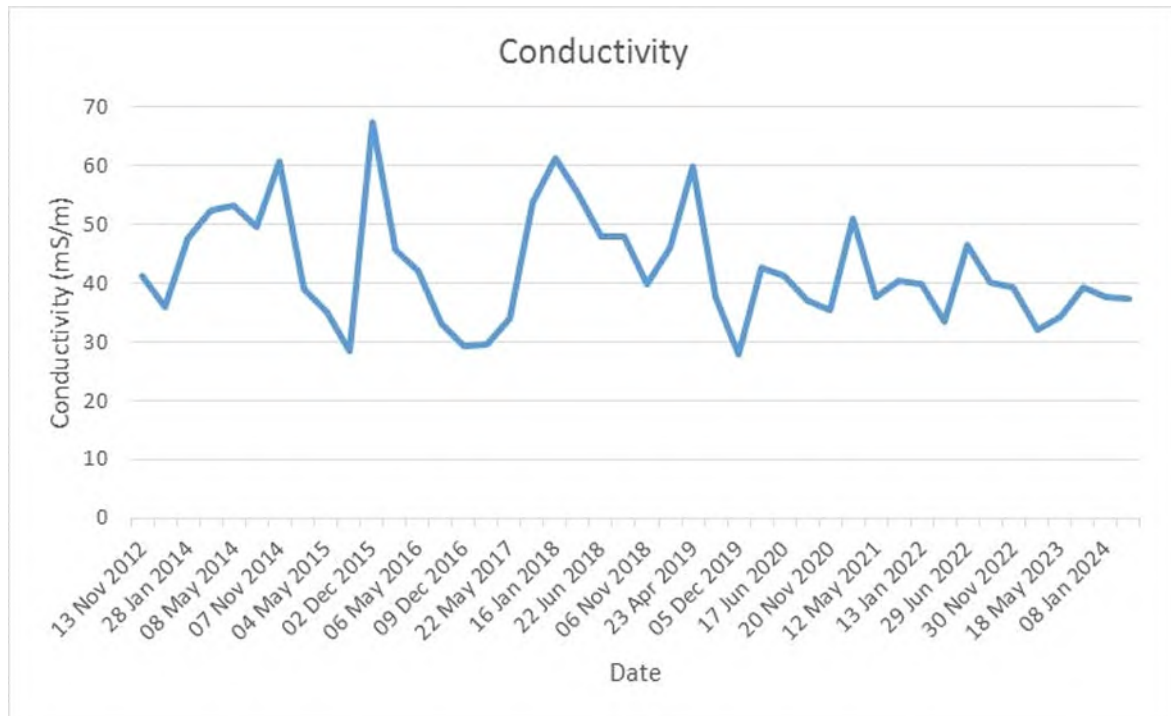


Figure 5 Long term EC monitoring GND2290 2012-2024

Table 3 GND2291 2023/24 monitoring period

GND2291	Collected	8 Sep 2023	8 Jan 2024	22 May 2024
Parameter	Time	11:50	10:20	15:40
Temperature	°C	16.1	17.0	15.1
Electrical Conductivity (EC)	mS/m	94.7	77.6	40.9
pH	pH Units	6.3	6.5	6.8
Chloride	g/m <sup>3</sup>	89	53	47
Total Sodium	g/m <sup>3</sup>	78	74	48
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	0.019	0.015	<0.005
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	640	700	250
Toluene	g/m <sup>3</sup>	<0.0010	0.0013	<0.0010

All analytes displayed a relatively stable trend for the first part of the monitoring period for bore GND2291, with an overall slight downward trend. The last monitoring round in May 2024 recorded lower concentrations of chloride, TDS, total sodium, dissolved barium and EC. Figures 6, 7 and 8 show the long term monitoring record for these parameters at this site.

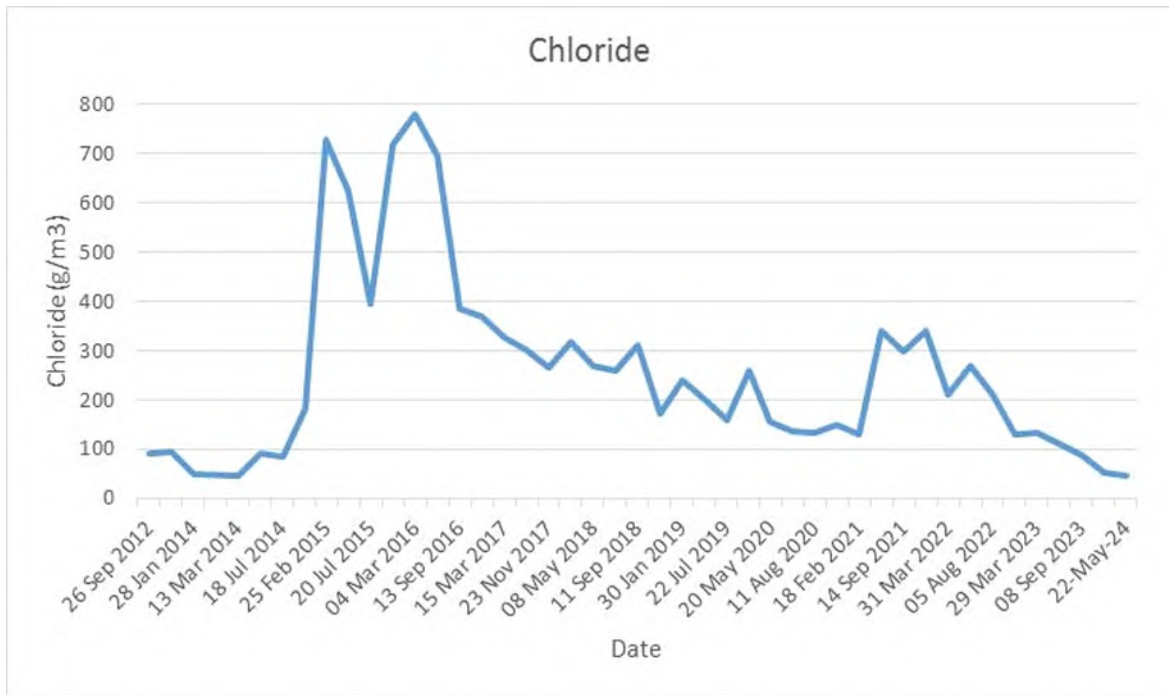


Figure 6 Long term chloride monitoring GND2291 2012-2024

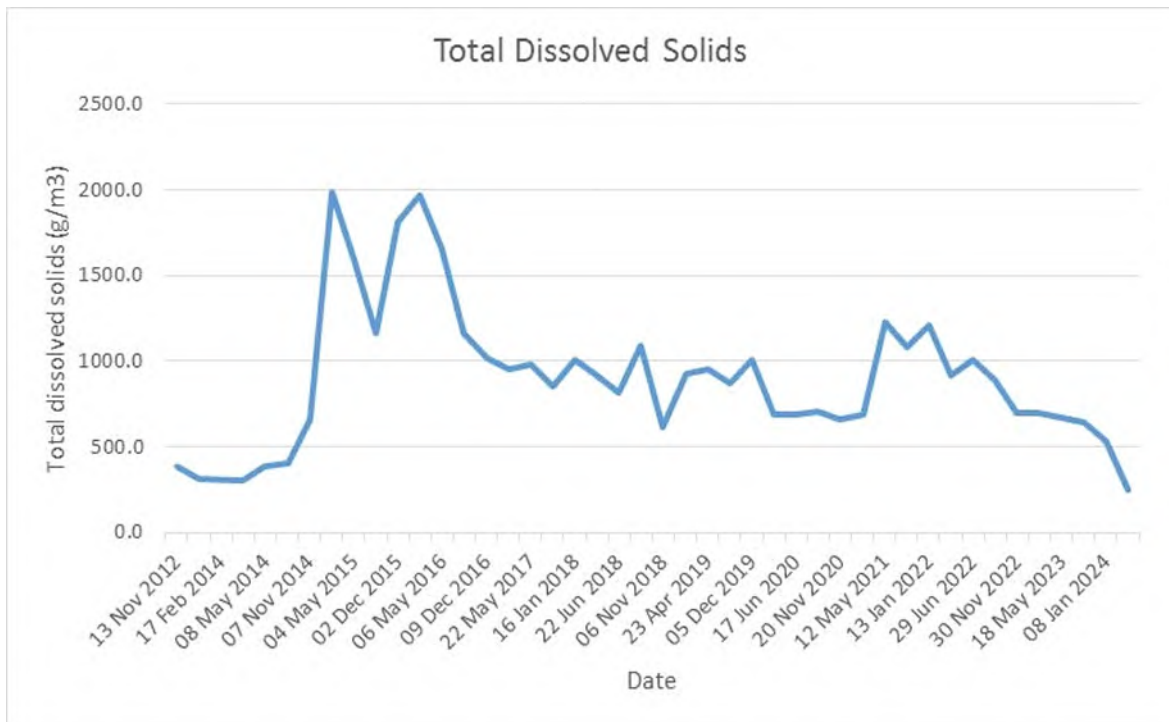


Figure 7 Long term TDS monitoring GND2291 2012-2024



Figure 8 Long term EC monitoring GND2291 2012-2024

Table 4 GND2292 2023/24 monitoring period

GND2292	Collected	8 Sep 2023	8 Jan 2024	22 May 2024
Parameter	Time	10:55	09:28	14:40
Temperature	°C	16.2	17.1	15.6
Electrical Conductivity (EC)	mS/m	40.7	44.1	43.9
pH	pH Units	6.5	6.7	6.6
Chloride	g/m <sup>3</sup>	39	40	42
Total Sodium	g/m <sup>3</sup>	46	51	56
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	0.024	0.028	0.018
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	270	290	380
Toluene	g/m <sup>3</sup>	0.0021	<0.0010	<0.0010

All analytes demonstrated general stability throughout the monitoring period, with slightly higher concentrations of chloride and TDS recorded in the May 2024 sample at bore GND2292. When compared to the long term trends, as demonstrated by Figures 9 to 11, the levels have shown an overall decreasing trend and have more recently stabilised.



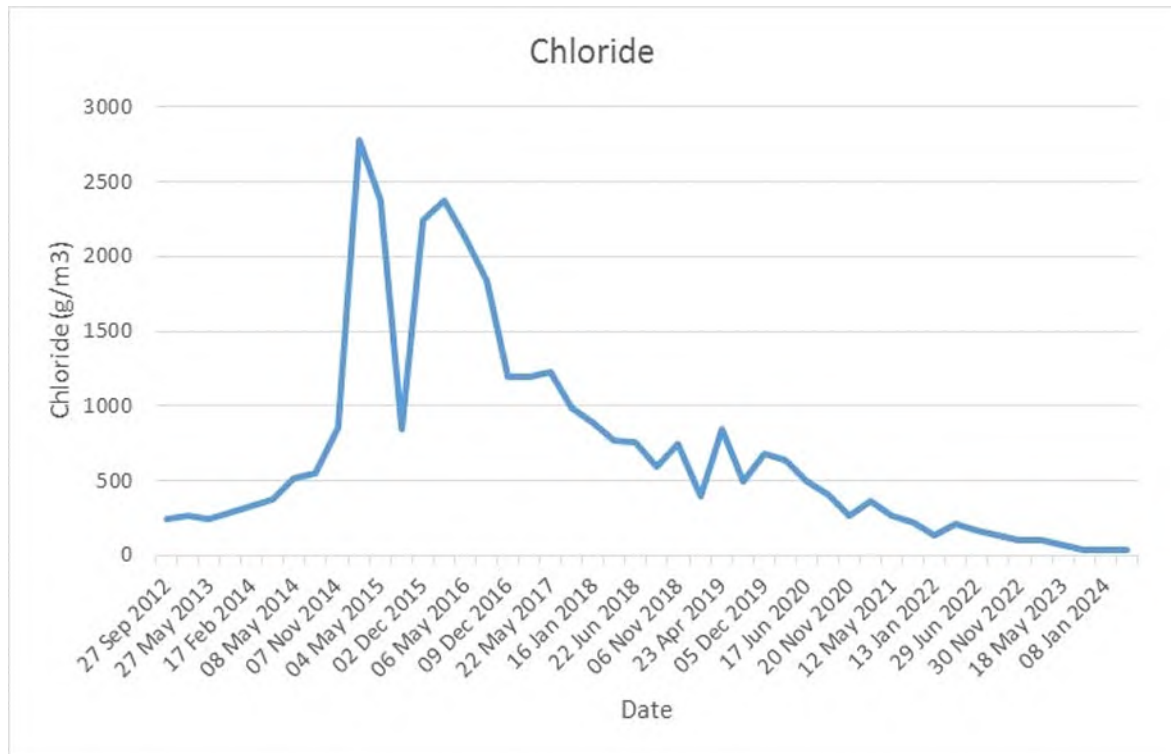


Figure 9 Long term chloride monitoring GND2292 2012-2024

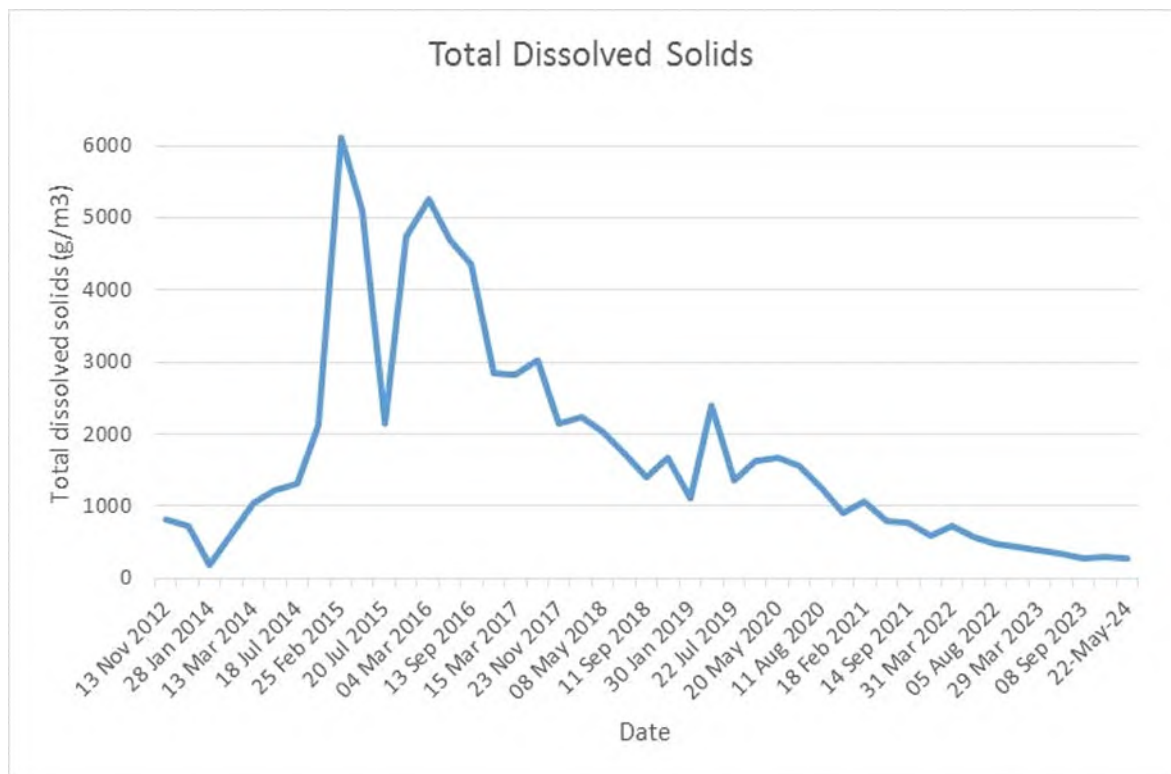


Figure 10 Long term TDS monitoring GND2292 2012-2024



Figure 11 Long term EC monitoring GND2292 2012-2024

Table 5 GND2293 2023/24 monitoring period

GND2293	Collected	8 Sep 2023	8 Jan 2024	22 May 2024
Parameter	Time	13:30	12:15	13:20
Temperature	°C	16.2	17.7	15.6
Electrical Conductivity (EC)	mS/m	26.5	81.8	77.5
pH	pH Units	7.3	7.1	7.0
Chloride	g/m <sup>3</sup>	28	163	151
Total Sodium	g/m <sup>3</sup>	36	58	56
Acid Soluble Barium	g/m <sup>3</sup>	<0.11	<0.11	<0.11
Dissolved Barium	g/m <sup>3</sup>	0.047	0.090	0.084
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	137	520	470

All analytes remained relatively stable throughout the monitoring period for bore GND2293. Slightly lower concentrations of TDS, total sodium, chloride, dissolved barium and EC were recorded at the beginning of the monitoring period during September 2023. Overall the results were lower for TDS and chloride to the previous monitoring period, but were similar for the other parameters. Concentrations for chloride, TDS and EC remain stable as shown in Figures 12, 13 and 14.

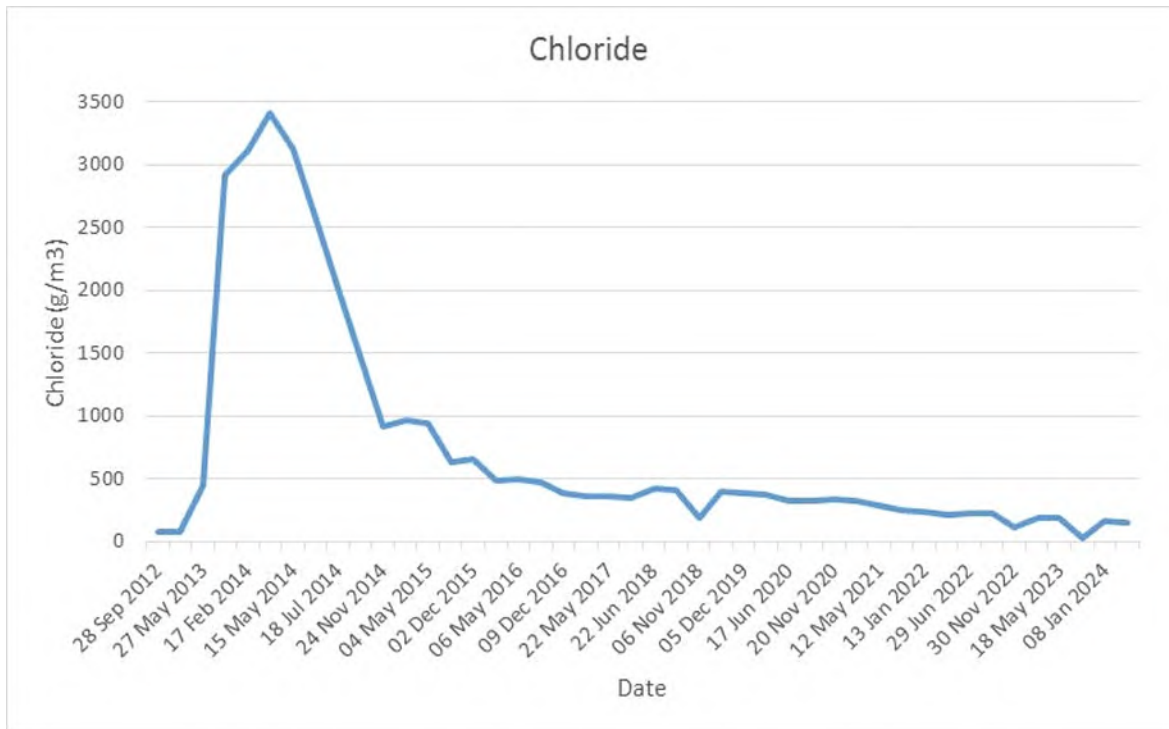


Figure 12 Long term chloride monitoring GND2293 2012-2024

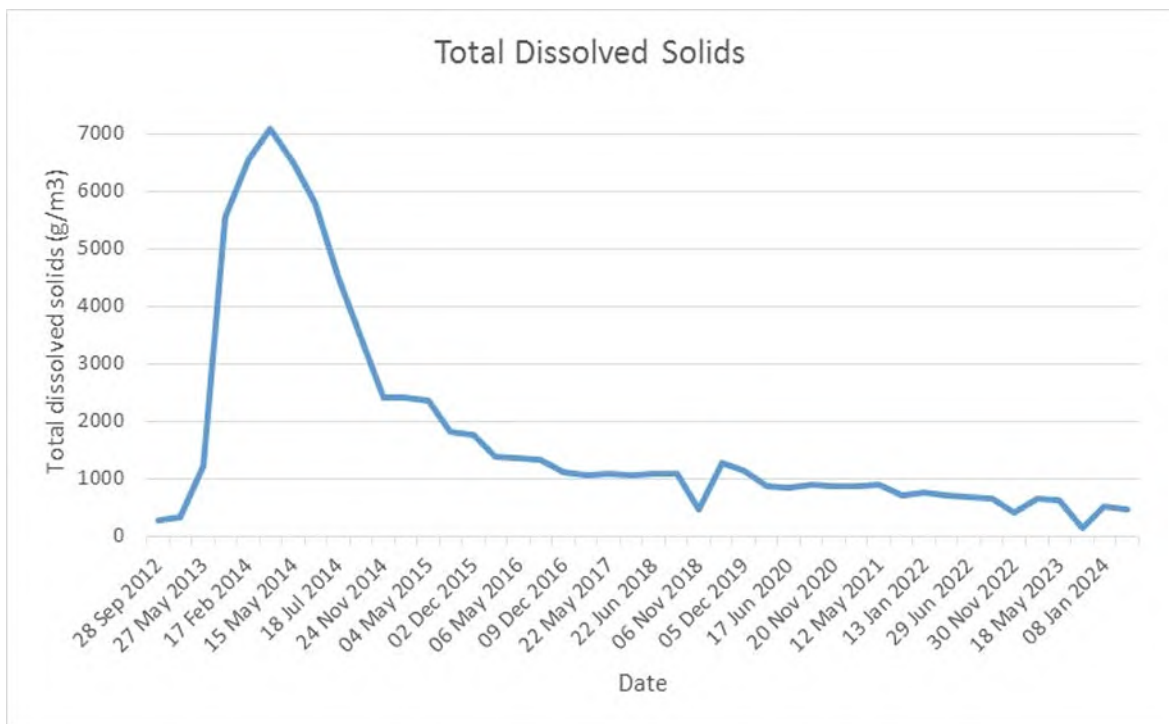


Figure 13 Long term TDS monitoring GND2293 2012-2024



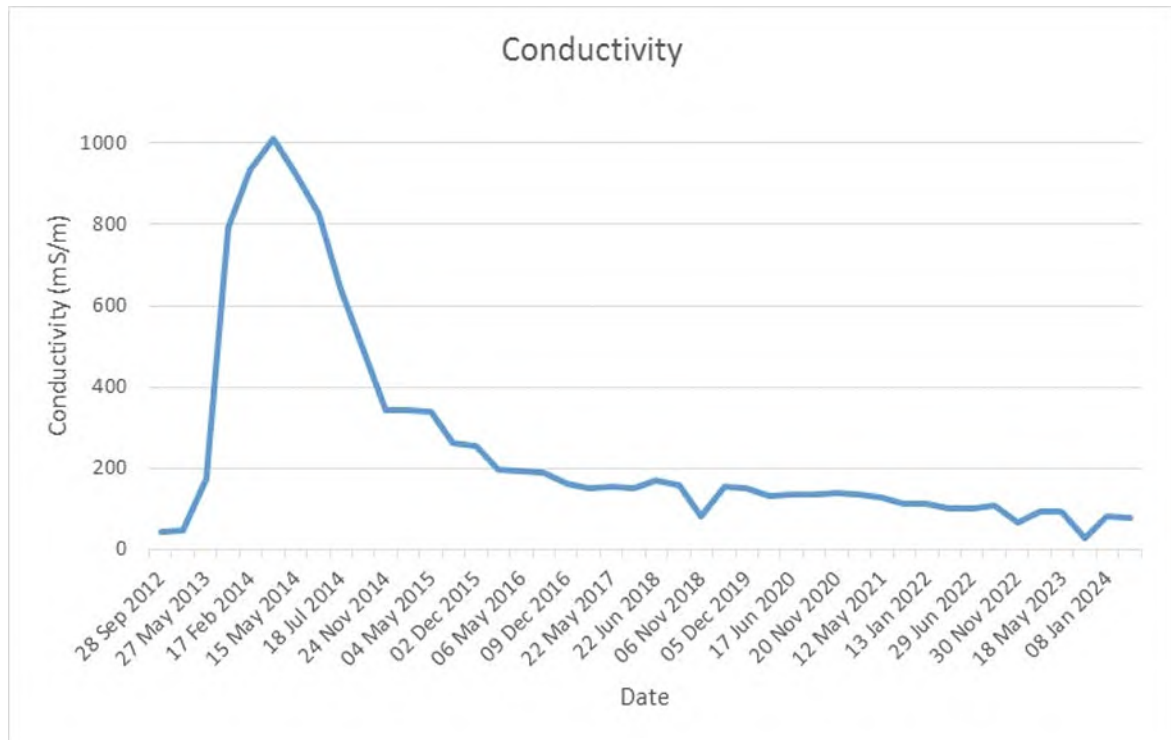


Figure 14 Long term EC monitoring GND2293 2012-2024

Table 6 GND2294 2023/24 monitoring period

GND2294	Collected	8 Sep 2023	8 Jan 2024	22 May 2024
Parameter	Time	14:20	13:05	14:10
Temperature	°C	15.7	17.1	15.0
Electrical Conductivity (EC)	mS/m	108.7	88.1	79.0
pH	pH Units	6.7	6.9	7.0
Chloride	g/m <sup>3</sup>	230	191	158
Total Sodium	g/m <sup>3</sup>	51	49	44
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11
Dissolved Barium	g/m <sup>3</sup>	0.028	0.022	0.019
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	720	560	520

The monitoring of GND2294 indicated a slight downward trend of all analytes throughout the monitoring period. Although trending downward, the levels remain elevated compared to the baseline as shown in Figures 15, 16 and 17 for chloride, TDS and EC respectively. It is likely that the ongoing decrease in analyte concentrations is associated with reduced landfarming activity, and completion of landfarming area W2205.

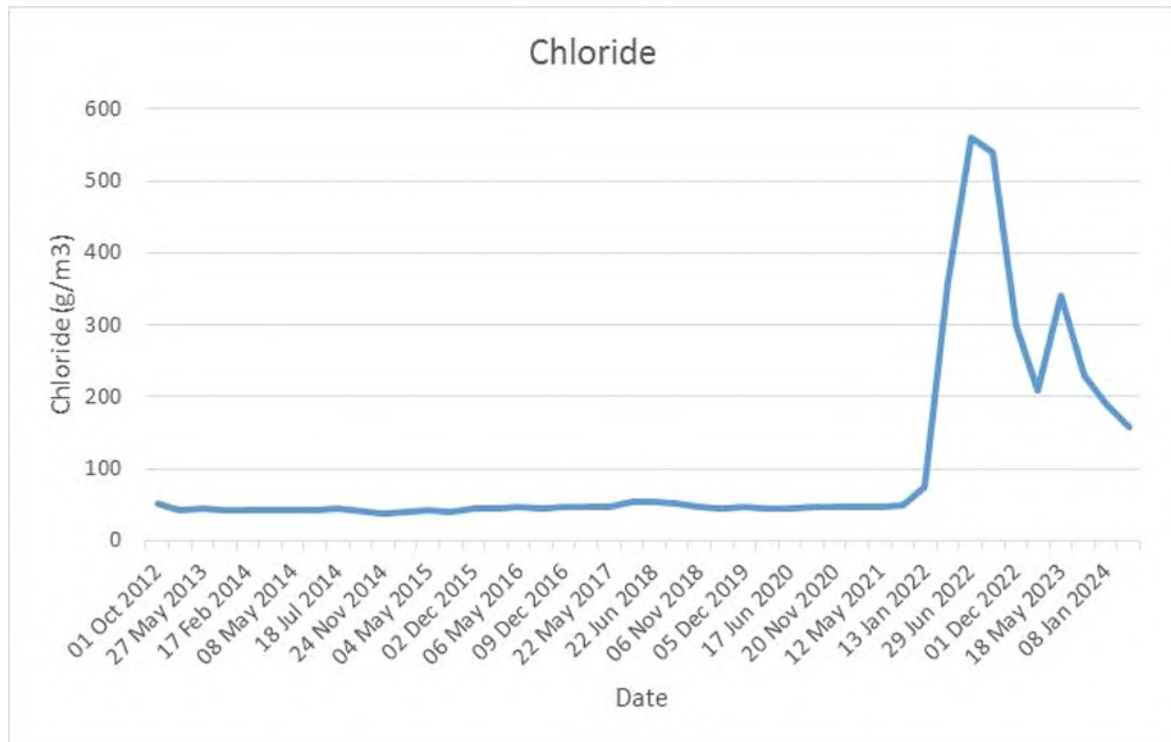


Figure 15 Long term chloride monitoring GND2294 2012-2024

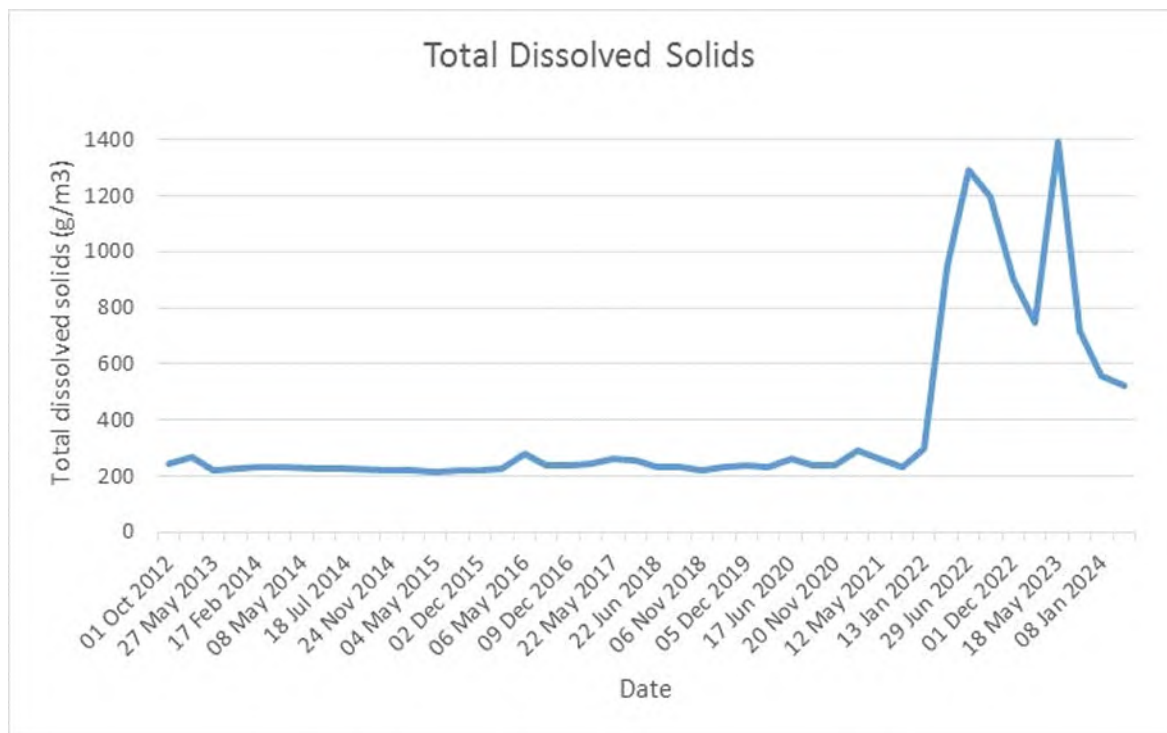


Figure 16 Long term TDS monitoring GND2294 2012-2024

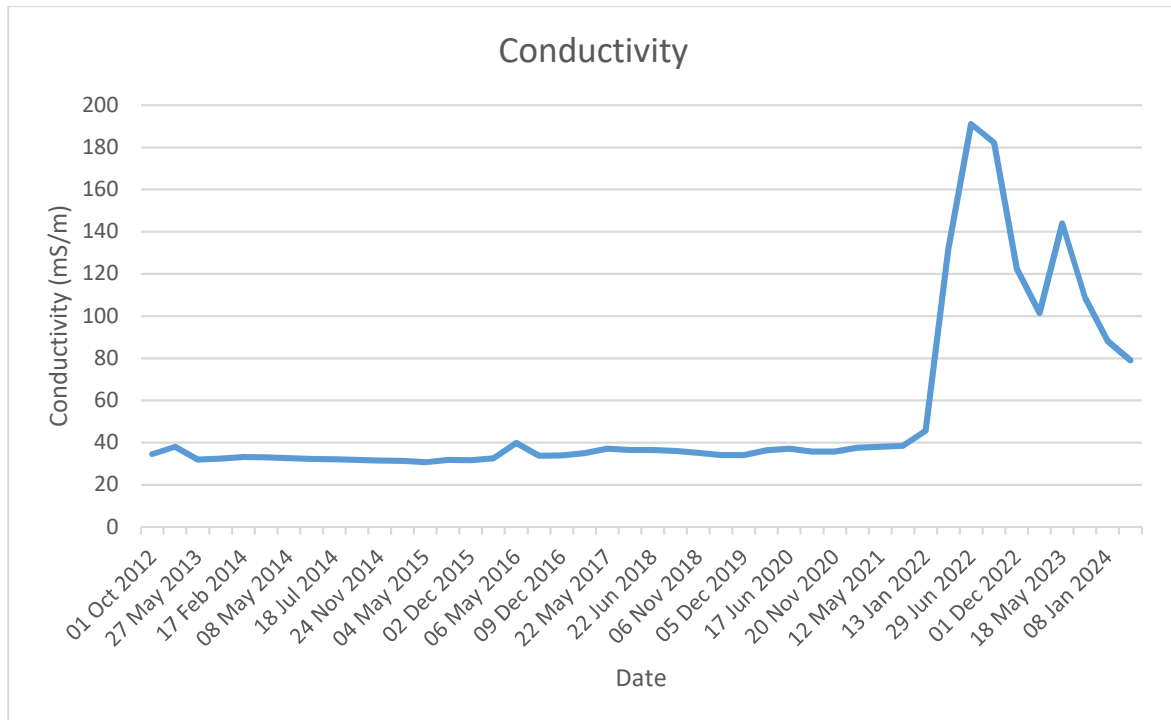


Figure 17 Long term EC monitoring GND2294 2012-2024

The analysis of the groundwater monitoring network at Waikaikai landfarm indicated results were within consent condition limits for the 2023/24 monitoring period. For most of the bores, the analytes remain stable or slightly decreasing during the monitoring period. It is important to continue monitoring the trend of analytes in the bores during the 2024/25 period.

## 2.2.2 Soil monitoring

During this monitoring period periodic spreading and incorporation of waste material into the iron sands in a contingency spreading area within area W2305 continued. Once completed, a new area, W2406, adjacent to the north of W2305 was utilised for waste. Area W2406 was completed, rehabilitated and grassed in June 2024 with additional adjoining areas in preparation.

The areas farmed, including previously landfarmed areas are depicted in the consent holder provided map (Figure 18).

Six soil samples were collected from the site during this monitoring period. Two transects were taken from the previously landfarmed area W1911. Area W1911 was farmed during the 2019/20 monitoring period. Four transects were taken from area W2205 which was farmed during 2021-2023. Figure 19 shows the location of the soil transects for the 2023/24 monitoring period.

The analysis is provided in Table 7. Please note that analytes which did not record results above the LOD were not tabulated except for those with specific consent limits.

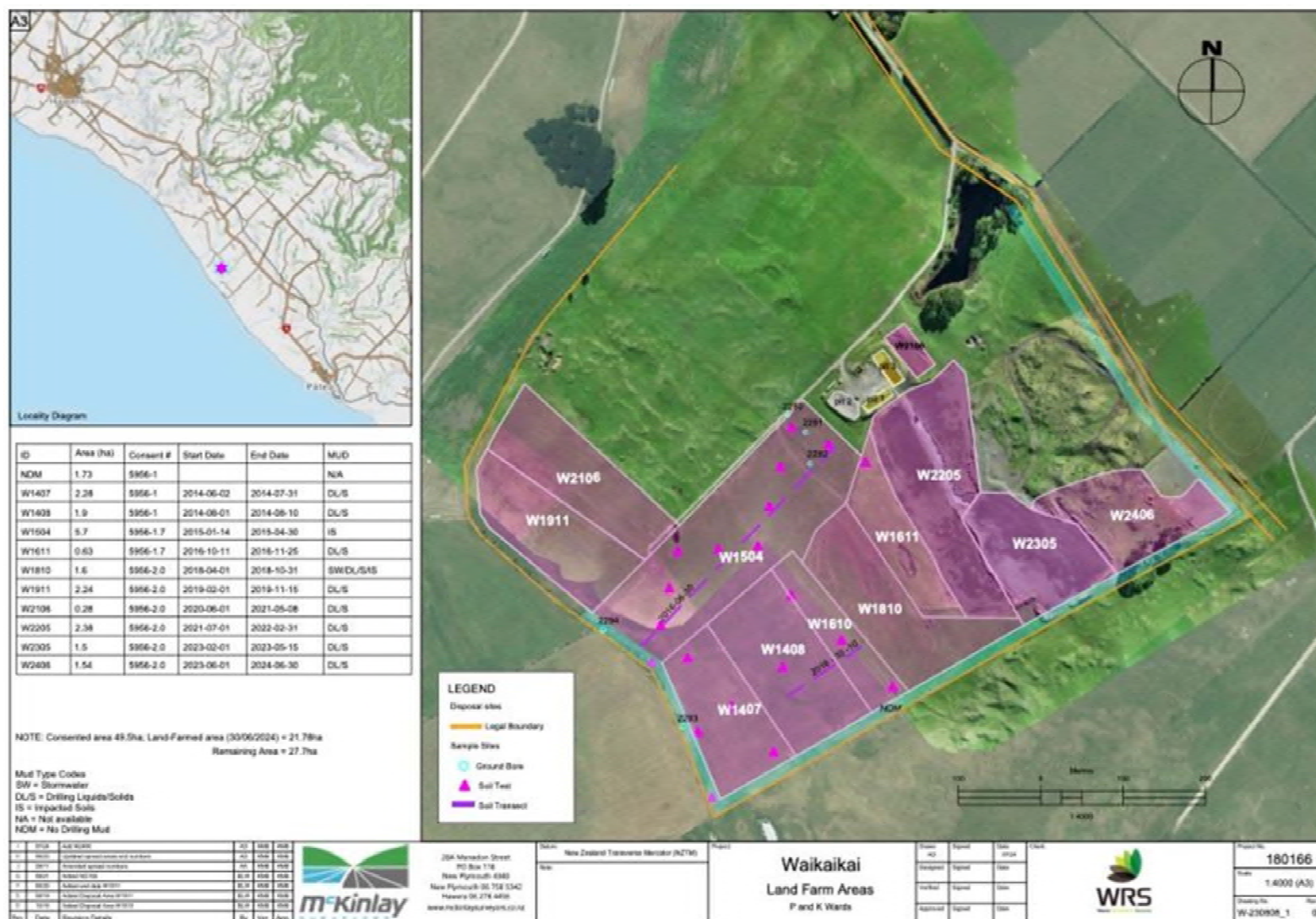


Figure 18 WRS Waikakai Landfarm landfarmed areas in 2024 (image provided by WRS)\*

\*(Note that the soil transects and soil samples are not from monitoring period 2023/24, but from a previous period – current transects are shown in Figure 19)

Table 7 WRS Waikaikai Landfarm soil monitoring 2023/24 monitoring period

WRS Waikaikai soil	Site	Consent surrender limit 5956-2.0	Transect 1 W1911	Transect 2 W1911	Transect 3 W2205	Transect 4 W2205	Transect 5 W2205	Transect 6 W2205
2023/24	Collected		6 June 2024	6 June 2024	6 June 2024	6 June 2024	6 June 2024	6 June 2024
Parameter	Unit/Time		10:30	11:00	11:35	11:55	12:25	12:50
Dry Matter (Env)	g/100 g as rcvd		90	92	90	92	89	88
Naphthalene	mg/kg dry wt	7.2	<0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Total of Reported PAHs in soil	mg/kg dry wt		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
pH	pH Units		7.9	7.2	7.5	7.1	7.3	7.5
Calcium (Sat Paste)	mg/L		206	137	165	286	856	331
Magnesium (Sat Paste)	mg/L		37	14	18	30	52	31
Sodium (Sat Paste)	mg/L		63	42	37	60	162	83
Conductivity from soluble salts	mS/cm	2.9	0.2	<0.2	< 0.2	<0.2	0.4	< 0.2
Sodium Absorption Ratio (SAR)		18	1.1	0.9	0.7	0.9	1.5	1.2
Soluble Salts	g/100 g dry wt	0.25	0.07	< 0.05	< 0.05	<0.05	0.15	0.07
C10 - C14	mg/kg dry wt	150	460 <sup>2</sup>	<20	250	390	1250	820
C15 - C36	mg/kg dry wt	1,300	2400	230	1610	1310	3800	3000
Total hydrocarbons (C7 - C36)	mg/kg dry wt		2800	250	1860	1710	5100	3900
Chloride	mg/kg dry wt	700	47	15	42	103	670	159
Total Recoverable Barium	mg/kg dry wt	10,000	5700	2300	1600	670	2000	1750
Total Recoverable Calcium	mg/kg dry wt		8900	7000	3800	4500	8100	5400
Total Recoverable Chromium	mg/kg dry wt	600	21	17	14	13	16	15
Total Recoverable Copper	mg/kg dry wt	100	16	14	9	10	13	11
Total Recoverable Lead	mg/kg dry wt	160	5.1	2.0	3.3	2.1	3.9	3.1
Total Recoverable Magnesium	mg/kg dry wt		3100	2600	1870	1890	2400	2200
Total Recoverable Nickel	mg/kg dry wt	60	12	9	7	7	8	7
Total Recoverable Potassium	mg/kg dry wt		780	370	270	290	650	390

<sup>2</sup> Figures in red are above the consent surrender limit.

WRS Waikaikai soil	Site	Consent surrender limit 5956-2.0	Transect 1 W1911	Transect 2 W1911	Transect 3 W2205	Transect 4 W2205	Transect 5 W2205	Transect 6 W2205
2023/24	Collected		6 June 2024	6 June 2024	6 June 2024	6 June 2024	6 June 2024	6 June 2024
Parameter	Unit/Time		10:30	11:00	11:35	11:55	12:25	12:50
Total Recoverable Sodium	mg/kg dry wt	460	580	690	240	320	480	380
Total Recoverable Zinc	mg/kg dry wt	300	93	83	56	58	61	62

The analysis of the soil samples indicated the following:

- Sodium absorption ratio (SAR) was below 1.1 for area W1911 and less than 1.5 for area W2205, the consent surrender limit is set at <18.
- In terms of petroleum hydrocarbons:
  - C<sub>7</sub>-C<sub>9</sub> was not recorded above the LOD and was not tabulated.
  - C<sub>10</sub>-C<sub>14</sub> ranged from <20-460mg/kg for area W1911 and 250-1250mg/kg for area W2205. The limit for surrender is set at <150mg/kg. Five out of the six transects are currently above the limit for surrender for this analyte however, the concentrations have reduced since the previous year.
  - C<sub>15</sub>-C<sub>36</sub> ranged 230-2,400mg/kg for area W1911 and 1,310-3,800mg/kg for area W2205, the limit for surrender is <1,300mg/kg. The only transect below the limit is Transect 2 in area W1911. The range for area W1911 is greater than the previous year with a higher concentration for Transect 1 and a lower concentration for Transect 2, demonstrating the potential variability in sampling. The concentration levels for area W2205 are substantially less than the previous year (2,300-11,900mg/kg), showing the likelihood of degradation with time.
- Soil chloride ranged 15-47mg/kg for area W1911 and 42-670mg/kg for area W2205. The consent surrender limit is below 700mg/kg. All transects were below this limit. Area W1911 had similar concentrations to previous results, and area W2205 results were lower overall.
- Total recoverable sodium ranged from 580-690mg/kg in area W1911 and 240-480mg/kg in area W2205, the surrender limit is 460mg/kg. Both transects in area W1911 were above the limit with a similar range to the previous year. One transect in area W2205 was above the surrender limit, generally with similar concentrations.

The resampling of area W1911 occurred in 2023/24 due to concentrations of TPH C<sub>10</sub>-C<sub>14</sub> & C<sub>15</sub>-C<sub>36</sub>, and sodium concentrations being above the consent criteria of surrender. The current results from 2023/24 indicate that area W1911 still cannot be surrendered mainly due to concentrations of TPH C<sub>10</sub>-C<sub>14</sub> & C<sub>15</sub>-C<sub>36</sub> remaining above the consent criteria for surrender. Sodium concentrations have marginally increased in 2023/24 since the previous monitoring period and do not meet the limit of surrender. Disposal at this site occurred from February – November 2019. Results have shown an overall decline in TPH levels in comparison to the previous year's concentrations, and it is anticipated that TPH levels will continue to decline with time.

Resampling of area W2205, landfarmed in 2021/22, occurred due to concentrations of TPH C<sub>10</sub>-C<sub>14</sub> & C<sub>15</sub>-C<sub>36</sub>, chloride, soluble salts and total recoverable sodium being above the consent surrender criteria. The current results from 2023/24 indicate that area W2205 still cannot be surrendered due to concentrations of TPH C<sub>10</sub>-C<sub>14</sub> & C<sub>15</sub>-C<sub>36</sub>, and total recoverable sodium (in one transect) remaining above the consent criteria for surrender. Transect 5 generally has higher concentration levels for all parameters when compared to the other three transects for this area. Rehabilitation of the site was completed in 2022 and it is anticipated with adequate aerobic soil conditions, with time these levels will continue to decline.



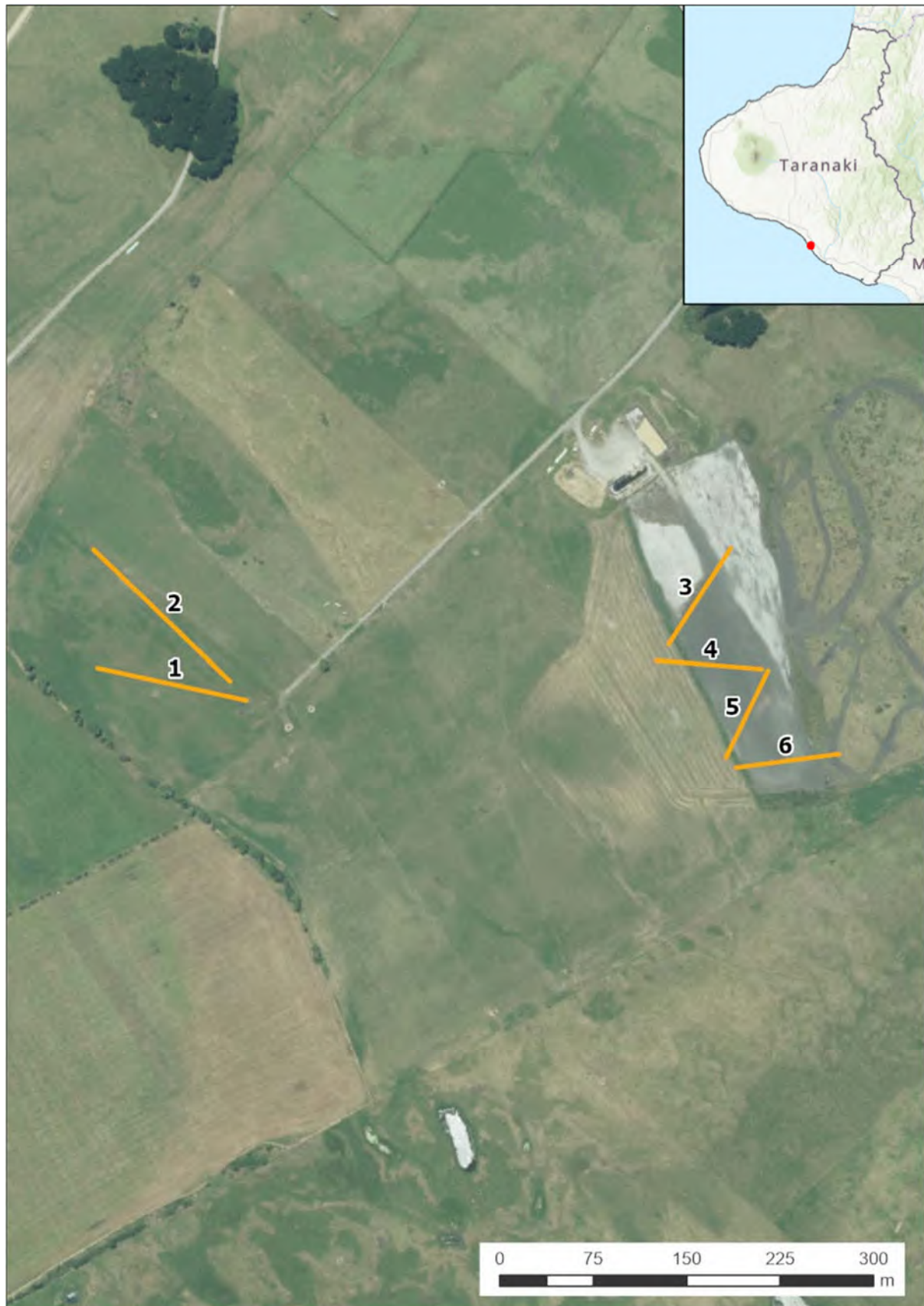


Figure 19 Location of soil transects in relation to WRS Waikaikai Landfarm for 2023/24



## 2.3 Consent holder provided information

As required by their consent, the Company provided the Council with an annual report of operations undertaken at the Waikaikai Landfarm during this monitoring period. This is attached in Appendix II. Table 8 contains the delivery record for material accepted by the landfarm during this monitoring period. Figure 18, also provided by the Company, is a map of the previous and current landfarming operations.

During 2023/24 a total of 5,238m<sup>3</sup> of both solid and liquid waste were received onsite from Greymouth Petroleum, Beach Energy and Todd Energy.

In addition, the Company have been proactive in communications with the Council, including providing associated analysis of material accepted at the landfarm. They also undertake the necessary notification of deliveries and landfarming operations.

Table 8 WRS Waikaikai Landfarm drilling waste register 2023/24 in cubic metres

Date	Source	Customer	Solid	Liquid	Total
September 2023	Kupe PS	Beach Energy	4	-	4
March 2024	Kupe	Beach Energy	3	-	3
October to December 2023	Intergroup/Kingston/Q7000	Beach Energy	-	303	303
December 2023 to January 2024	Kupe/Amttec Yard KS9	Beach Energy	51	-	51
January to May 2024	Kaimiro 20	Greymouth Petroleum	1058	1178	2236
April to June 2024	Tūrangi T-17	Greymouth Petroleum	1140	697	1837
April 2024	Todd KGTP	Todd Energy	-	4	4
June 2024	Tūrangi T-21	Greymouth Petroleum	492	308	800
<b>Annual Total to 30 June 2024 (m<sup>3</sup>)</b>			<b>2748</b>	<b>2490</b>	<b>5238</b>

(adapted from the Company annual report)

## 2.4 Incidents, investigations, and interventions

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

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

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

In the 2023/24 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

## 3. Discussion

### 3.1 Site performance

The Waikaikai Landfarm observed a reasonable level of activity, with 5,238m<sup>3</sup> of both solid and liquid waste from several sources accepted to site.

Until the allowable spreading rate had been attained, periodic spreading and incorporation of materials received into the iron sands was undertaken in a contingency spreading area within W2305 (Figure 18). Once this area had been fully utilised, a new adjoining area to the south-east and east of W2305 was prepared, namely W2406. This area was completed, rehabilitated and graded in June 2024 with additional adjoining areas in preparation.

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

There were two inspections carried out by the Council during this monitoring period, and the Company was compliant on both occasions.

Pit 2 was decommissioned in 2021, the liner removed and a layer of clay placed to reduce the mobilisation of sand on the pit walls and floor. This pit has been unused since for the entire monitoring period, and will be modified when mud volumes received increase in the future and the need arises. Both operational Pits 1 and 3 were utilised for this monitoring period and were visually inspected during April 2023 by Red Jacket Engineering. Minor liner repair at the north-eastern end of Pit 1 was required and undertaken during the previous monitoring period.

In addition, the Company continue to be proactive in communications with the Council, including providing associated analysis of material accepted at the landfarm. The Company also undertake the necessary notification of deliveries and landfarming operations.



Photo 2 Preparation of spread area W2406 (left); and being prepared for sowing (right)  
(Provided by WRS, 2024)



Photo 3 Pit 3 stirring and pumping  
(Provided by WRS, 2023)

### 3.2 Environmental effects of exercise of consents

Environmental effects associated with Waikaikai Landfarm were mainly related to moderate saline impacts to groundwater, as recorded in the monitoring bores.

Groundwater monitoring for wells GND2290, GND2292 and GND2293 recorded relatively stable chloride, electrical conductivity (EC) and TDS concentrations. For wells GND2291 and GND2294 there was a general decreasing trend for analytes chloride, EC and TDS concentrations. There were traces of toluene recorded in GND2290 and GND2292 during September 2023; and GND2291 during January 2024. There were no traces of toluene in wells GND2293 and 2294 (the bores on the boundary). No other petroleum related compounds were recorded above the LOD in any of the site monitoring wells this period.

Soil analysis of the previously landfarmed area W1911 was performed again this monitoring period. The corresponding results indicated that the parcel of land is still above surrender criteria for mid to high range petroleum hydrocarbons and total recoverable sodium. The total recoverable sodium concentrations have marginally increased in 2023/24 since the previous monitoring period, and do not meet the limit of surrender. Rainfall has been lower than the long-term average during this monitoring year, and the prevailing onshore winds are often salt water laden, both factors potentially contributing to the slightly higher sodium levels.

Area W2205 was also sampled again this monitoring period, and the results indicate that this land area remains above surrender criteria for mid to high range petroleum hydrocarbons and total recoverable sodium. Although it is noted that three out of the four transects were within surrender limits for total recoverable sodium.

Landfarmed areas, W1504, W1810, W1611, W1408 and W1407 have met their limit for surrender. If the consent holder intends to return these areas back to their former land use (agriculture) they will need to apply for a variation of consent 5956-2.0. Once this has been undertaken, the consent holder must then supply the District Council with the associated surrender analysis and the updated varied consent, for a removal of the temporary industrial zoning.

During the previous monitoring period, the Company demonstrated to the Council that the liners within the pits/cells in use remain fit for purpose. Any recommendations from the pit liner report have been completed.

### 3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review and previous years is set out in Tables 9 and 10.

Table 9 Summary of performance for consent 5956-2.0

Purpose: 5956-2.0 To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's and contaminated soil onto and into land via landfarming		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Definitions of material	N/A	Yes
2. Application area detailed on attached map	Landfarming occurred in specific area	Yes
3. Adoption of Best Practicable Option (BPO)	Inspections	Yes
4. Groundwater monitoring well installation	Inspections and sampling	Yes
5. Cell lined with fit for purpose liner	All pits are compliant. Pit 2 remains decommissioned and empty.	Yes
6. Storage cell integrity check every 24 months	Pit integrity report received June 2023 One cell liner remains decommissioned	Yes
7. Operation in accordance with management plan	Inspections, annually reviewed management plan received June 2024	Yes
8. Notify TRC 48 hours prior to transfer of waste to disposal site	Notifications received	Yes
9. Notify TRC 48 hours prior to landfarming wastes	Notifications received	Yes
10. Representative waste sample from each source and each type of waste and have it analysed for the following: a. total petroleum hydrocarbons (C <sub>6</sub> -C <sub>9</sub> , C <sub>10</sub> -C <sub>14</sub> , C <sub>15</sub> -C <sub>36</sub> ); b. benzene, toluene, ethylbenzene, and xylenes; c. polycyclic aromatic hydrocarbons screening; d. barium, calcium, chloride, magnesium, sodium, potassium, sodium adsorption ratio, nitrogen and pH, and e. heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.	Submitted	Yes
11. Record keeping	Annual report provided and mud delivery log provided. All consent notifications provided by consent holder this period	Yes
12. Annual Report due by 31 August	Report received	Yes
13. No discharge within 25m of surface water or property boundaries	Inspections	Yes
14. No hydraulic fracturing fluids	Record check	Yes
15. Contaminated soil may only be brought to site after it has been assessed by condition 10 of this consent and by the Chief Executive	Contaminated soil assessed and agreed prior to being brought to site	Yes

Purpose: 5956-2.0 To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's and contaminated soil onto and into land via landfarming		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
16. All waste brought to site must be landfarmed as soon as practicable but no later than 24 months after delivery date	Inspections and liaison with Company	Yes
17. Application of drilling material thickness	Inspections and review of consent holder data	Yes
18. No ponding or overland flow after one hour of application	Inspections	Yes
19. As soon as practicable after landfarming the consent holder shall mix the wastes with native topsoil with a minimum of 250mm	Company records and inspections	Yes
20. Maximum application rate of 20,000mg/kg (TPH) at any point after incorporation	Company records and Inspections	Yes
21. Secondary application of material is permitted if the standards of condition 29 have been met and the Chief Executive has considered this analysis appropriate	Not required this period	N/A
22. Revegetation as soon as practicable	Company records and inspections	Yes
23. Shall not exceed a value of 2,500g/m <sup>3</sup> TDS within any groundwater or surface water	Monitoring	Yes
24. Consent shall not lead or be liable to lead to contaminants entering a surface water body	Monitoring	Yes
25. Shall not result in any adverse impacts on groundwater and or surface water	Minor short term impacts in terms of salinity, and TDS although well below consent conditions for TDS	Yes
26. Conductivity must be less than 400mSm <sup>-1</sup> . If background soil has an conductivity greater than 400mSm <sup>-1</sup> , then conductivity after disposal shall not exceed original conductivity by more than 100mSm <sup>-1</sup>	Inspections and sampling	Yes
27. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Inspections and sampling	Yes
28. The concentration of metals and salts in the soil layer containing the discharge shall comply with certain criteria	Sampling	Yes
29. Prior to expiry/cancellation of consent these levels must not be exceeded: a. Conductivity, 290mSm <sup>-1</sup> b. Chloride, 700g/m <sup>3</sup> c. Total dissolved salts, 2,500g/m <sup>3</sup> d. Sodium, 460g/m <sup>3</sup> e. MAH's/PAH MfE 1999 CS NZ Table 4.12 f. TPH CCME 2008 Table 5.2 Ecological direct contact	Current soil samples indicate area W1911 remains above the surrender limit for C10-C14, C15-C36 and sodium.  Current soil samples indicate area W2205 is above the surrender limit for C10-C14, C15-C36 and sodium.	N/A
30. Consent cannot be surrendered until standards in condition 29 have been met	No consent surrender	N/A
31. Notification of discovery of archaeological remains	None this monitoring period	N/A

Purpose: 5956-2.0 To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsite's and contaminated soil onto and into land via landfarming		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
32. Optional review	June 2026	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 10 Evaluation of environmental performance over time

Year	Consent numbers	High	Good	Improvement required	Poor
2019/20	5956-2.0	-	1	-	-
2020/21	5956-2.0	1	-	-	-
2021/22	5956-2.0	1	-	-	-
2022/23	5956-2.0	1	-	-	-
2023/24	5956-2.0	1	-	-	-

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

### 3.4 Recommendations from the 2022/23 Annual Report

In the 2022/23 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at Waikaikai Landfarm in the 2023/24 year continue at the same level as in 2022/23.
2. THAT should there be issues with environmental or administrative performance in 2023/24, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Prior to the beginning of the monitoring year in review due to reduced activity a decision was determined between the Company and Council to reduce the frequency of groundwater monitoring and inspections to three sampling rounds and two inspections, respectively. This was duly carried out.

It was not necessary to implement recommendation 2.

### 3.5 Alterations to monitoring programmes for 2024/25

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

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

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

It 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 2024/25.

## 4. Recommendations

1. THAT in the first instance, monitoring of consented activities at Waikaikai Landfarm in the 2024/25 year continue at the same level as in 2023/24.
2. THAT should there be issues with environmental or administrative performance in 2024/25, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.



## Glossary of common terms and abbreviations

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

Al*	Aluminium.
As*	Arsenic.
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.
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.
F	Fluoride.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$\text{g}/\text{m}^2/\text{day}$	grams/metre <sup>2</sup> /day.
$\text{g}/\text{m}^3$	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
LOD	Limit of detection: the lowest measurement that analysis can differentiate from a non-detectable result.
L/s	Litres per second.
$\text{m}^2$	Square Metres.
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.
$\mu\text{S}/\text{cm}$	Microsiemens per centimetre.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.

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

## 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.
- Cavanagh, J E, (2015) Land application of waste from oil and gas wells. Landcare Research. May 2015.
- Department of Health (1992): Public health guidelines for the safe use of sewage effluent and sewage sludge on land. Department of Health.
- Ministry for the Environment (1999) Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand, (Revised 2011) Ministry for the Environment.
- Ministry for the Environment (2003) Guidelines for the safe application of biosolids to land in New Zealand, Ministry for the Environment.
- Taranaki Regional Council (2014): Waikaikai Farms Ltd Drilling Waste Disposal Monitoring Programme Biennial Report 2011-2013. Technical Report 2013-68.
- Taranaki Regional Council (2015): Waikaikai Farm Ltd Monitoring Programme Annual Report 2013-14. Technical Report 2014-77.
- Taranaki Regional Council (2015): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2014-2015. Technical Report 2015-95.
- Taranaki Regional Council (2016): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2015-2016. Technical Report 2016-91.
- Taranaki Regional Council (2017): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2016-2017. Technical Report 2017-41.
- Taranaki Regional Council (2018): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2017-2018. Technical Report 2018-63.
- Taranaki Regional Council (2019): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2018-2019. Technical Report 2019-70.
- Taranaki Regional Council (2020): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2019-2020. Technical Report 2020-91.
- Taranaki Regional Council (2021): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2020-2021. Technical Report 2021-50.
- Taranaki Regional Council (2022): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2021-2022. Technical Report 2022-27.
- Taranaki Regional Council (2023): Waste Remediation Services Ltd Waikaikai Landfarm Monitoring Programme Annual Report 2022-2023. Technical Report 2023-24.
- Waste Remediation Services (WRS) Waikaikai (Wards) Remediation Site Annual Report 2023/24.
- Waste Remediation Services (WRS), Waikaikai (Wards) & Manawapou (Symes) Landfarm Management Plan 2023/24.



## Appendix I

### Resource consents held by Waste Remediation Services

(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: 19 April 2017

Commencement Date: 19 April 2017

**Conditions of Consent**

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

Expiry Date: 1 June 2034

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

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

Grid Reference (NZTM) 1720190E-5605380N

Catchment: Mangaroa

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



### **General condition**

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

### **Special conditions**

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

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

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

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

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

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

### **Monitoring and reporting**

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

### **Discharge Limits**

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

### Receiving environmental limits for water

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

### Receiving environmental limits for soil

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

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

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

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

MAHs - benzene, toluene, ethylbenzene, xylenes

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

TPH - total petroleum hydrocarbons (C<sub>7</sub>-C<sub>9</sub>, C<sub>10</sub>-C<sub>14</sub>, C<sub>15</sub>-C<sub>36</sub>)

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

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

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

Signed at Stratford on 19 April 2017

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**

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

Advice Note (included at the request of DITAG)

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

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

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





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



## Appendix II

Company provided annual report





29 July 2024

Chief Executive  
Taranaki Regional Council  
Private Bag 713  
47 Cloten Road Stratford  
Attention: Chania Hattle

Dear Chania

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

As required under special condition 12 of resource consent 5956-2.0, please find all relevant information recorded from the operational period 1 July 2023 to 30 June 2024 relating to receipt and landspreading activities undertaken at Waste Remediation Services (WRS) Waikaikai remediation site. This is the tenth annual report completed by WRS for this site covering the previous periods:

2014-15  
2015-16  
2016-17  
2017-18  
2018-19  
2019-20  
2020-21  
2021-22  
2022-23

This report follows on from the previously submitted 2022-23 consent monitoring report and as such is focused on activities, records, and results from the 2023-24 period. This report is structured into six sections, as per the following:

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

## 1. OVERVIEW AND BACKGROUND

WRS took over operating the Waikaikai remediation site in 2014, after the original remediation consent 5956-1 was transferred to them by the landowner of the site, following an unsuccessful attempt at operating the site by a third party operator. Between 2014 and the currently reported on year (2023-24), operations at the site have improved, as reflected in the TRC consent compliance ratings for these years. Somewhat dissimilar to WRS's other site (Manawapou, consent 7795-1.1 ) there has been a reasonably consistent period of activity at the site from 2014 to present, reflecting consistent levels of activity within the local drilling industry. During the 2016-17 period, consent 5956-1.1 was superseded by the current consent, 5956-2.0 on 19 April 2017

During 2023-24, the site has received drilling/production material for remediation from material from Greymouth Petroleum's wells Kaimiro 20, Turangi T-17 and Turangi T-21 and Beach's Kupe Production Station, Kupe Yard KS9 and Kingston Q7000. A small volume of material from Todd's KGTP was also received.

Monitoring of the site undertaken in the 2023-24 year by both the Taranaki Regional Council (TRC) and WRS management has shown the operations undertaken at Waikaikai to be compliant with consent conditions.

## 2. WASTES RECEIVED FOR REMEDIATION

### Waste Types and Volumes

WRS' Waikaikai site is consented to dispose of a wider range of petrochemical industry material for remediation than the Manawapou site, including oily fractions, provided TPH levels are < 250,000 ppm or volumes are very small. During the 2023-24 year, a total of 5,238m<sup>3</sup> of both solid and liquid wastes were received onsite from Greymouth Petroleum's wells Kaimiro 20, Turangi T-17 and Turangi T-21 and Beach's Kupe Production Station, Kupe Yard KS9 and Kingston Q7000. This also includes a small volume ( 4m<sup>3</sup>) of material from Todd's KGTP.

An updated mud register is attached as [Appendix A](#) for reference.

### Waste Characterisation

Consent 5956-2.0 requires the site operator to sample and keep records of the waste's chemical composition. Samples are taken (generally by well site staff prior to transport or by WRS staff at the landfarm). WRS, following discussion with the TRC, no longer takes composite pre-spreading samples from the pits prior to landspreading for further waste characterization as 1) the waste is only stored for short periods of time and 2) there is mixing of waste in the pits before incorporation into the sand horizons of the spread area.

With the significantly increased volume material for remediation now being directed to WRS's operations (Waikaikai and Manawapou are the only two remaining sites able to accept oilfield waste in the region) storage

pits that originally enabled the accumulation of both liquid wastes for campaign spreading, now operate as transit facilities enabling the transfer of waste from road haulage to agricultural machinery; material for remediation is being continually delivered and then removed for spreading and remediation, with very little storage involved.

All samples are sent to RJ Hill Laboratories (now “Hill Labs”) for analyses. Results are all sent directly and simultaneously by Hill Labs to WRS and the TRC for their records and for cross-referencing purposes. Results are used by WRS to calculate the required spreading areas as per condition 17 of consent 5956-2.0 ensuring the hydrocarbon limits in condition 20 are adhered to. Additionally, consent 5956-2.0 condition 15 requires WRS to present pre-remediation results to the TRC for any contaminated soil, to assess on a case-by-case, its suitability for spreading. This is typically undertaken and provided by the owner/source of the waste and supplied to the TRC directly when the delivery notification to the TRC is negotiated and undertaken. WRS will only accept delivery of impacted soils if analysis provided to TRC are OK’ed by the TRC for remediation

As TRC have been provided directly with all analyses of incoming material for remediation sampling; in the interest of avoiding duplication and confusion, PDF copies of analyses will not be attached to this report.

### **3. REMEDIATION AND REHABILITATION OPERATIONS**

In the 2023-24 until the allowable spreading rate had been attained, periodic spreading and incorporation of materials received into the iron sands was undertaken in a contingency spreading area within W2305, as indicated on the site map (Appendix B). Once this area had been fully utilized, a new adjoining area to the south-east and east of W2305 was prepared. Spread material included the liquid/solid wastes received from Greymouth Petroleum’s wells Kaimiro 20, Turangi T-17 and Turangi T-21 and Beach’s Kupe Production Station, Kupe Yard KS9 and Kingston Q7000 plus a small volume of material from Todd’s KGTP. The new area W2406 adjacent and to the north of W2305 was completed, rehabilitated and grassed in June 24 with additional adjoining areas in preparation. Deliveries from Greymouth were continuing at the close of the reporting period and will do so for possibly the next year and beyond.

#### Appendix B: Site Map

The landspreading processes employed at this site are detailed further in the site management plan. WRS closely monitors spreading operations to ensure contractors practices are consistent with the procedures outlined in the management plan and to ensure application thickness and ponding consent conditions are adhered to. The inspection notices received from the TRC imply these processes were implemented satisfactorily during 2023-24. Photographs of spreading and rehabilitation operations at the Waikaikai site are attached as Appendix C .

#### Appendix C: Photographs

### **4. MONITORING**

#### **Site Inspections - WRS**

WRS closely supervises site operations to ensure all contractors are following best practice as per the site operation management plan and conditions specified in consent 5956-2.0. WRS has two nominated On-Site Persons (OSP’s) who are contracted to supervise every visit to the land farms by vehicles delivering materials for remediation. It is their responsibility to open the sites locked gate and ensure unloading is into the specified



pits, activities are undertaken in a safe and efficient manner and all documentation is provided by the delivery driver. If any aspect of the delivering company does not comply with WRS procedures then discharge of materials is on hold until compliance with WRS's processes is attained.

Regular site inspections are also undertaken by either the OSP's or Operations Manager during periods of inactivity at the site.

### Site Inspections – TRC

WRS has received two inspection notices from the TRC for the 2023-24 year. No issues with the state of the site or practices were noted and/or required any further action by the TRC or WRS.

Appendix D: TRC site inspection notices.

### Receiving Environment Sampling

Composite soil sampling and groundwater sampling is now managed and undertaken exclusively by TRC scientific and field staff, with all samples being sent to Hill Labs for the full suite of analyses required under consent 5956-2.0. At the time of reporting, WRS has received both soil sample and groundwater results from the TRC, but has not undertaken any in depth interpretation of the soil results that have, in previous years, been undertaken by the TRC. It is noted however that the only parameter exceeded for all samples and analytes is total recoverable sodium in three of the six composite samples. These exceedances are 580, 690, 480 mg/kg against the consent limit of 460 mg/kg. This mimics the 3 exceedances for Total Recoverable Sodium observed in 2022-23 from the same areas. It is highly likely that the prevailing onshore salt water laden winds are a contributing factor in maintaining higher than normal sodium levels.

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Soil sample results are presented below Appendix E.

Groundwater results are presented below Appendix F.

Only two rounds of groundwater sampling were scheduled in the TRC's monitoring programme for 2023-24. These were completed on the 8 Jan and 22 May 2024. The groundwater results show compliance with the groundwater conditions 23-25 of consent 5956-2.0. No hydrocarbons have been detected in any of the samples, salinity is stable, or declining in keeping with the overall site trend in all bores over time and well within the consented TDS limit (2500 g/m<sup>3</sup>) given in condition 23.

## 5. ADDITIONAL CONSENT REQUIREMENTS

As per condition 3 of consent 5956-2.0, the site management plan is a live document which is reviewed constantly. Operations at the Waikakai landfarm are all undertaken generally in accordance with the WRS' Landfarm Management Plan (LMP) that covers both the Manawapou and Waikakai 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 2020-23 period no significant changes were made to the LMP. The current (2023-24, dated 24 July 24) plan will be reviewed again in Q4/24.

Consent 5956-2.0 condition 6 requires WRS to assess pit liner integrity at regular intervals. Pit 2 was decommissioned in 2021, the liner removed and a layer of clay placed to reduce the mobilization of sand on pit

walls and floor. This pit has been unused for the entire monitoring period, and will be modified in the following year if mud volumes received increase and the need arises. As previously mentioned both operational pits 1 and 3 were being utilized at the end of the monitoring period and were visually inspected by RedJacket Engineering. Their report was provided to the TRC in May 2023; the next inspection is scheduled for the 2025-26 monitoring year.

Drilling cuttings being received from Greymouth are now very dry and are being direct spread, thus no longer requiring discharge into a pit. Liquids, unchanged in their handling properties, are continuing to be discharged into Pit 3 and spread by pumped irrigation techniques.

Pasture establishment and ongoing vegetation coverage are monitored by TRC and by WRS in partnership with the landowner at the Waikaikai site. If either the landowner or the TRC are not satisfied with vegetation coverage at the site, WRS will work with the landowner to address any issues. In 2023- 24, neither written nor verbally has there been any concerns noted during or following field inspections by the TRC. Similarly, no rehabilitation issues were raised.

Only one area was rehabilitated in the 2023-04 monitoring year, viz W2406, by owner Peter Wards using local contractors. As this was the land owners decision; WRS has made it very clear that WRS will not accept any responsibility for the quality and pasture development of any areas undertaken by the land owner; the land owner accepts this responsibility without reservation.

## 6. SUMMARY AND COMMENT

As in the previous year, there was a reasonable level of activity at the Waikaikai site in 2023-24. Earlier in the operational period, moderate quantities of material were received from Greymouth Petroleum's wells Kaimiro 20, Turangi T-17 and Turangi T-21 and Beach's Kupe Production Station, Kupe Yard KS9 and Kingston Q7000. A small volume of material from Todd's KGTP was also received.

All of the waste received for remediation during the 2023-24 monitoring year has been spread and successfully rehabilitated.

No incidents or significant issues have been identified at the site during 2023-2024. Any queries raised by the TRC re operations at the site appear to have been answered satisfactorily by email or verbally and accepted.

As noted in previous years WRS continues to be asked by the major oil and gas operators in the region what is the expected life of both WRS's landfarms. This is a conundrum dependent upon national and local political decisions, the price of wholesale gas, the volume and rate of drilling required to meet the gas demand and the volumes of material produced for remediation. In addition the ongoing implications through 2023-24 of the Waste Minimisation Act (WMA) 2008 registration and reporting requirements have presented considerable uncertainty for all, especially the land owners who were not contacted at all by MfE regarding the risks associated with registration, the stigma attached to having private land registered as a land fill and the enduring legacy that this places upon agricultural land and the methodology to have the land returned to unrestricted private agricultural use. Finally after a period of some 18 months plus WRS was offered registration of its sites as Industrial Monofills carrying reporting requirements only. WRS accepted this decision, but remain adamant that our remediation operation does not conform to any type or form of land fill. The situation with MfE remains unresolved and in WRS's view counter-productive to the intent of the Waste Management Act (2008).

In effect the countdown of remaining acreage for land farming in the region (ie Manawapou and Waikaikai ) is underway; once this is exhausted, the operational areas - turnarounds and pits- will be returned to functional farmable paddocks by removing the pits recontouring the ground and spreading the last of the material accepted. At this point the efforts undertaken by the consent holder to construct and maintain the impermeability of the storage pits, now transfer points, will have immediately become a futile exercise in respect of avoiding discharge to ground, costs to maintain this, and efforts by all during the entire operational life of the land farm.

It should also be noted WRS's Waikaikai remediation operation alone has prevented 5,238 m<sup>3</sup> (approx. 7,857 tonne) of incompressible liquids and solids going to land fill at facilities several hundred km outside of the rohe from where they were generated.

As in 2022-23 WRS would again welcome constructive comment on this aspect of the consent holders' views and the sector's future options for disposal of oilfield wastes by well managed remediation activities that are undertaken in full compliance with consents and with positive outcomes for the oil and gas operators, and landowner, all of which contribute to the continuing support of livelihoods in the region and beyond.

**Waste Remediation Services Ltd**

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**Address 141 – 143 Connett Road East, Bell Block 4312, New Zealand Post**

**PO Box 7150, New Plymouth 4341, New Zealand**

**Email: [keith@wrsLtd.co.nz](mailto:keith@wrsLtd.co.nz)**

## Appendix A - Mud Register

Date	Source	Customer	Remediation Site m3			
			Waikaikai			
			Solid	Liquid	Direct Spread	Total
Mar-24	Kupe	Beach	3			3
		<b>Kupe Total</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
Sept-23	Kupe PS	Beach	4	-	-	4
	<b>Kupe Production Station Total</b>		<b>4</b>	<b>-</b>	<b>-</b>	<b>4</b>
Oct-23	Intergroup / Kingston / Q7000	Beach	-	128	-	128
Nov-23	Intergroup / Kingston / Q7000	Beach	-	90	-	90
Dec-23	Intergroup / Kingston / Q7000	Beach	-	85	-	85
	<b>Kingston Q7000 Total</b>		<b>-</b>	<b>303</b>	<b>-</b>	<b>303</b>
Dec-23	Kupe / Amtec Yard KS9	Beach	40	0	0	40
Jan-24	Kupe / Amtec Yard KS9	Beach	11	0	0	11
	<b>Kupe Amtec KS9 Total</b>		<b>51</b>	<b>-</b>	<b>-</b>	<b>51</b>
Jan-24	Kaimiro 20	GPL	601	464	0	1065
Feb-24	Kaimiro 20	GPL	162	382	0	544
Mar-24	Kaimiro 20	GPL	252	332	0	584
May-24	Kaimiro 20	GPL	43	0	0	43
	<b>GPL Kaimiro 20 Total</b>		<b>1,058</b>	<b>1,178</b>	<b>-</b>	<b>2,236</b>
Apr-24	Turangi T-17	GPL	510	258	0	768
May-24	Turangi T-17	GPL	468	263	0	731
Jun-24	Turangi T-17	GPL	162	176	0	338
	<b>GPL Turangi 17 Total</b>		<b>1,140</b>	<b>697</b>	<b>-</b>	<b>1,837</b>
Jun-24	Turangi T-21	GPL	492	308	0	800
	<b>GPL Turangi 21 Total</b>		<b>492</b>	<b>308</b>	<b>-</b>	<b>800</b>
Apr-24	Todd KGTP	Todd	-	4	-	4
	<b>Todd MHW/MMPS Stream Total</b>		<b>0</b>	<b>4</b>	<b>0</b>	<b>4</b>
<b>ANNUAL TOTAL TO 30 JUNE 2024 (m3)</b>			<b>2,748</b>	<b>2,490</b>	<b>-</b>	<b>5,238</b>

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







## Appendix C - Field Photographs



Photograph 1: New pasture area W2205 SW of Pit 3



Photograph 2: light oil slick on surface of Pit 3



Photograph 3: Removal of oil slick by air diaphragm vacuum pump



Photograph 4: Spread area W2406 being prepared for sowing



Photograph 5: Preparation of new spread area to the N of w2406



Photograph :6 New spread area N of W2406 in progress

## Appendix D - TRC Inspection Notices



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

### Inspection Notice

Under section 332 of the Resource Management Act 1991

<b>Consent Number:</b>	R2/5956-2.0
<b>Consent Name:</b>	Waste - discharge landfarming
<b>Contact Name:</b>	Waste Remediation Services Limited
<b>Postal Address:</b>	PO Box 7150, New Plymouth 4341
<b>Site Location Address:</b>	Lower Manutahi Road, Manutahi (Property owner: Waikakai Farms Limited)
<b>Inspection Number:</b>	OBS-2024-120703
<b>Inspection Type:</b>	Compliance Monitoring Insp.
<b>Inspection Date:</b>	30 Jan 2024
<b>Inspection Time:</b>	13:20
<b>Weather Details:</b>	Rainfall: Wind Direction: Wind Strength:
<b>Samples Taken:</b>	No
<b>Consent Purpose:</b>	To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming
<b>Conditions Assessed:</b>	0
<b>Overall Compliance Status:</b>	
<b>Inspection Comments:</b>	Inspection 1/2. Inspection undertaken to assess compliance with resource consent conditions. The inspection found that Pit 2 still had no liner and remained empty. Pit 1 contained solids and pit 3 contained liquids. Spreading in the prepared area was not occurring at the time, there is no vehicle access due to a maize crop having been planted on the land farmed area directly in front of the pits. There was good coverage with the crop. Having contacted the consent holder to confirm current operations there is some spreading in an area between the maize and the southern boundary of the property; and some liquids have been spread by means of a supply line through the maize. This area was not inspected at the time. No issues to note. Compliant at the time of inspection.
<b>Further Actions Advice:</b>	
<b>Signed:</b>	
<b>Council Officer:</b>	Chanis Hattie
<b>Officer Warrant Number:</b>	494

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



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## Inspection Notice

Under section 332 of the Resource Management Act 1991

**Consent Number:** R2/5956-2.0  
**Consent Name:** Waste - discharge landfarming  
**Contact Name:** Waste Remediation Services Limited  
**Postal Address:** PO Box 7150, New Plymouth 4341  
**Site Location Address:** Lower Manutahi Road, Manutahi (Property owner: Waikakai Farms Limited)  
**Inspection Number:** OBS-2024-123676  
**Inspection Type:** Compliance Monitoring Insp.  
**Inspection Date:** 09 May 2024  
**Inspection Time:** 12:40  
**Weather Details:**  
Rainfall:  
Wind Direction:  
Wind Strength:  
**Consent Purpose:** To discharge drilling wastes from hydrocarbon exploration and production activities, oily wastes from wellsites, and contaminated soil onto and into land via landfarming  
**Conditions Assessed:** 0  
**Overall Compliance Status:** Compliance  
**Inspection Comments:** Inspection 2/2. Inspection undertaken to assess compliance with resource consent condition. The inspection found that Pit 2 remained empty. Pit 1 contained solids and pit 3 contained liquids, as previously. The maize crop has since been harvested and there was good grass coverage of the area. Further ground preparation has commenced to provide a substantial spread area. Solids are being direct spread adjacent to the area being prepared. There is a steady delivery at the moment. No issues to note. Compliant at the time of inspection.  
**Further Actions Advice:**  
**Signed:**   
**Council Officer:** Chania Hattle  
**Officer Warrant Number:** 494

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

## Appendix E – Soil Sample Results

Hill Labs soil sample results, Waikakai site 2023-24

Parameter	Consent Limit	Area	W1911		W2205			
		Name	W01	W02	W03	W04	W05	W06
		Sample No	3601065.1	3601065.2	3601065.3	3601065.4	3601065.5	3601065.6
		Date	6/6/24	6/6/24	6/6/24	6/6/24	6/6/24	6/6/24
Individual Tests								
Dry Matter	NS	g/100g as rcvd	90	92	90	92	89	88
Soluble Salts	2.5	g/100g dry wt	0.07	<0.05	<0.05	<0.05	0.15	0.07
Electrical Conductivity (EC)	2.9	mS/cm	0.2	<0.2	<0.2	<0.4	0.4	<0.2
Total Recoverable Barium	NS	mg/kg dry wt	5,700	2,300	1,600	670	2,000	1,750
Total Recoverable Calcium	NS	mg/kg dry wt	8,900	7,000	3,800	4,500	8,100	5,400
Total Recoverable Magnesium	NS	mg/kg dry wt	3,100	2,600	1,870	1,890	2,400	2,200
Total Recoverable Potassium	NS	mg/kg dry wt	780	370	270	290	650	390
Total Recoverable Sodium	460	mg/kg dry wt	580	690	240	320	480	380
Chloride	700	mg/kg dry wt	47	15	42	130	670	159
pH	NS	pH Units	7.9	7.2	7.5	7.1	7.3	7.5
Heavy Metals with Mercury, Screen Level								
Total Recoverable Arsenic	20	mg/kg dry wt	<2	<2	<2	<2	<2	<2
Total Recoverable Cadmium	1	mg/kg dry wt	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Recoverable Chromium	600	mg/kg dry wt	21	17	14	13	16	15
Total Recoverable Copper	100	mg/kg dry wt	16	14	9	10	13	11
Total Recoverable Lead	300	mg/kg dry wt	5.1	2.0	3.3	2.1	3.9	3.1
Total Recoverable Mercury	1	mg/kg dry wt	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Recoverable Nickel	60	mg/kg dry wt	12	9	7	7	8	7
Total Recoverable Zinc	300	mg/kg dry wt	93	83	56	58	61	62
BTEX in Water by Headspace GC-MS								
Benzene	NS	mg/kg dry wt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	NS	mg/kg dry wt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	NS	mg/kg dry wt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
m&p-Xylene	NS	mg/kg dry wt	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	NS	mg/kg dry wt	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Petroleum Hydrocarbons in Water								
C7 – C9	NS	mg/kg dry wt	<20	<20	<20	<20	<20	<20
C10 – C14	NS	mg/kg dry wt	460	<20	250	390	1,250	820
C15 – C36	NS	mg/kg dry wt	2,400	230	1,610	1,310	3,800	3000
Total Hydrocarbons (c7-C36)	NS	mg/kg dry wt	2,800	250	1,860	1,710	5,100	3,900
		Lab Number	3601753.1	3601753.2	3601753.3	3601753.4	3601753.5	3601753.6
Calcium (Sat Paste)	NS	mg/L	206	137	165	286	856	331
Magnesium (Sat Paste)	NS	mg/L	37	14	18	30	52	31
Sodium (Sat Paste)	NS	mg/L	63	42	37	60	162	83
Sodium Absorption Ratio	NS	(mmol/L) <sup>0.5</sup>	1.1	0.9	0.7	0.9	1.5	1.2

## Appendix F – Groundwater Sample Results

### Hill Labs Groundwater results, Waikikai site, all bores 2023-24

Parameter	Consent Limit	BORE	GND2290		GND2291		GND2292	
		Date	8/1/24	22/5/24	8/1/24	22/5/24	8/1/24	22/5/24
		Sample No	3440410.1	3590420.1	3440410.2	3590420.2	3440410.3	3590420.3
Individual Tests								
pH	NS	pH Units	6.9	7.0	6.5	6.8	6.7	6.6
Electrical Conductivity (EC)	NS	mS/m	37.8	37.4	77.6	40.9	44.1	43.9
Electrical Conductivity (EC)	NS	µS/cm	378	374	776	409	441	439
Total Dissolved Solids (TDS)	2,500	g/m³	260	260	530	250	290	280
Dissolved Barium	NS	g/m³	0.035	0.03.5	0.015	<0.005	0.028	0.018
Acid Soluble Barium	NS	g/m³	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11
Total Sodium	NS	g/m³	21	21	74	48	51	56
Chloride	NS	g/m³	27	32	53	47	40	42
BTEX in Water by Headspace GC-MS								
Benzene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	NS	g/m³	<0.0010	<0.0010	0.0013	<0.0010	<0.0010	<0.0010
Ethylbenzene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
m&p-Xylene	NS	g/m³	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
o-Xylene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Petroleum Hydrocarbons in Water								
C7 – C9	NS	g/m³	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
C10 – C14	NS	g/m³	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
C15 – C36	NS	g/m³	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Total Hydrocarbons (c7-C36)	NS	g/m³	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7

Parameter	Consent Limit	BORE	GND2293		GND2294	
		Date	8/1/24	22/5/24	8/1/24	22/5/24
		Sample No	3440410.3	3590420.4	3440410.4	3590420.5
Individual Tests						
pH	NS	pH Units	7.1	7.0	6.9	7.0
Electrical Conductivity (EC)	NS	mS/m	81.8	77.5	88.1	79.0
Electrical Conductivity (EC)	NS	µS/cm	818	775	881	790
Total Dissolved Solids (TDS)	2,500	g/m³	520	470	560	520
Dissolved Barium	NS	g/m³	0.090	0.084	0.022	0.019
Acid Soluble Barium	NS	g/m³	<0.11	<0.11	<0.11	<0.11
Total Sodium	NS	g/m³	58	56	49	44
Chloride	NS	g/m³	163	151	191	158
BTEX in Water by Headspace GC-MS						
Benzene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010
Toluene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010
Ethylbenzene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010
m&p-Xylene	NS	g/m³	<0.002	<0.002	<0.002	<0.002
o-Xylene	NS	g/m³	<0.0010	<0.0010	<0.0010	<0.0010
Total Petroleum Hydrocarbons in Water						
C7 – C9	NS	g/m³	<0.10	<0.10	<0.10	<0.10
C10 – C14	NS	g/m³	<0.2	<0.2	<0.2	<0.2
C15 – C36	NS	g/m³	<0.4	<0.4	<0.4	<0.4
Total Hydrocarbons (c7-C36)	NS	g/m³	<0.7	<0.7	<0.7	<0.7

\* NS - Not Specified

.....END



## Appendix III

Categories used to evaluate environmental and administrative performance

## Categories used to evaluate environmental and administrative performance

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

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

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

### Environmental Performance

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

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

For example:

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

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

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

### Administrative performance

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

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

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

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