Boyd Drilling Waste and Stockpiling Landfarm and Landspreading

Monitoring Programme

Annual Report

2021-2022

Technical Report 2022-21

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Taranaki Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

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Executive summary

Colin Boyd (the consent holder), in conjunction with MI SWACO (the Company), operated a landspreading/landfarming operation and stockpiling facility at Surrey Road, Tariki. The consent holder has three resource consents to discharge contaminants to land and water from the storage and application of waste to land. The site primarily received drilling waste from the petroleum industry and since 2010 also received water sludge from the New Plymouth District Council and Stratford District Council water treatment plants. Drilling waste was deposited at the stockpiling facility and dewatered into water treatment lagoons. The dewatered drilling waste and water sludge was then applied to paddocks and incorporated into the soil, after which the paddocks were contoured and reseeded into pasture.

The site stopped receiving drilling waste approximately three years ago, and water sludge approximately five years ago. The stockpiling facility was decommissioned during this monitoring period, however all consents remain active. The consent for stockpiling waste may be surrendered at any time. A soil sampling and validation programme must be conducted before the landspreading consent may be surrendered.

This report for the period July 2021 to June 2022 details the soil, water and biological monitoring programme implemented by the Taranaki Regional Council to assess the environmental impacts of the on-site activities, and compliance with the conditions of the consents during the period under review. The monitoring programme for this year included nine inspections, one water sampling survey, one soil sampling survey, and two in-stream biomonitoring surveys.

During the monitoring period, the site generally demonstrated a level of administrative performance that requires improvement in terms of annual reporting. The environmental performance is rated 'good' rather than high' due to inadequate management of sediment discharges during earthworks, which had only low-level impacts on the tributary. The ratings are defined in appendix II.

The site was generally compliant with the conditions of the three consents. Minor issues related to controlling overland flows and stormwater ponds, and contaminated liquid in the land soakage area were noted by the monitoring officers. The Company rectified these by the time of the following inspection.

The results of the groundwater sampling survey indicated that the concentration of most analytes had improved since the previous monitoring survey. Groundwater quality does not appear to have been affected by on-site activities. Water quality in the tributary declined during the decommissioning of the stockpile facility, but improved significantly after the completion of these works, likely due to the reduction in/absence of discharges into the tributary.

Analysis of soil samples collected from four waste disposal paddocks show that hydrocarbon contaminants and chloride are present at concentrations which exceed the assessment criteria set out in the consent conditions. These contaminants do not necessarily pose a risk to human health while they remain in the soil, but may adversely impact aquatic organisms if hydrocarbons leach into surface or groundwater.

The spring biological survey of the Mangatengehu tributary concluded that the macroinvertebrate community was in a very poor or poor condition. This was likely a result of inadequate sediment control by the Company during the decommissioning of the stockpile facility. The results of the second biomonitoring survey showed that the macroinvertebrate community had recovered to an extent, and was considered to be in fair condition overall. This was likely a result of a reduction in/absence of discharges into the tributary following the completion of the decommissioning earthworks.

This report recommends surrendering the stockpiling consent, and planning the soil sampling programme for the landfarmed paddocks.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2021 to June 2022 by the Taranaki Regional Council (the Council) concerning the monitoring programme for three resource consents held by Colin Boyd (the consent holder) and his subsidiary Company, Surrey Road Landfarms Limited. The consent holder in conjunction with Mi SWACO (the Company) controls and operates a drilling waste stockpile facility (Surrey Road stockpiling facility), and a landfarming and landspreading operation located on Surrey Road, Tariki in the Waitara catchment.

The report includes the results and findings of the soil, water and biological monitoring programme implemented by the Council that relate to the storage and discharge of drilling mud and water sludge to land within the Waitara catchment.

1.1.2 Structure of this report

Section 1 of this report is an introduction. 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 though annual programmes;
- summary of the location and on-site processes; and
- resource consents held by the Company.

Section 2 outlines the monitoring programme for the site, the environmental monitoring methodologies, and the monitoring requirements by the consent holder.

Section 3 presents the results of the environmental monitoring, and summarises the compliance inspections and reports on any incidents or investigations during the monitoring period.

Section 4 discusses the results of the environmental monitoring and the effects on the environment from on-site activities, compliance with the consent conditions, recommendations from the previous annual report and alterations to the monitoring programme for the upcoming year.

Section 5 presents recommendations to be implemented in the 2022-2023 monitoring year.

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. risk to the neighbourhood or environment.

In drafting and reviewing conditions on discharge consents, 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 consent 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 the consent holder'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 I.

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

1.2 Location and process description

A detailed description of how drilling waste is generated in Taranaki, the contaminants associated with the waste, and the landfarming process can be found in the Review of Petroleum Waste and Land Farming (Pattle Delamore Partners, 2013) prepared for the Council. A summary can be found in sections 1.2.2 and 1.2.3 below.

1.2.1 Location

The site is located on the Taranaki ring plain bordering the Te Papakura o Taranaki/Egmont National Park to the west (Figure 1). The Mangatengehu and Mangamawhete streams, and several tributaries, flow through the site toward the east. Discharges of contaminants from the activities on the site are likely to be into these waterways. The surrounding properties are all in pasture and any activities on adjacent properties are rural in character. The nearest towns are Stratford which is 10 km to the south east and Inglewood which is 12 km to the north.

The predominant soil type has been identified as gravelly sand, and vegetation growth transitions from native forest at the edge of the national park to pasture. The average annual rainfall for the site is 1,942 mm based on the Stratford meteorological station.

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

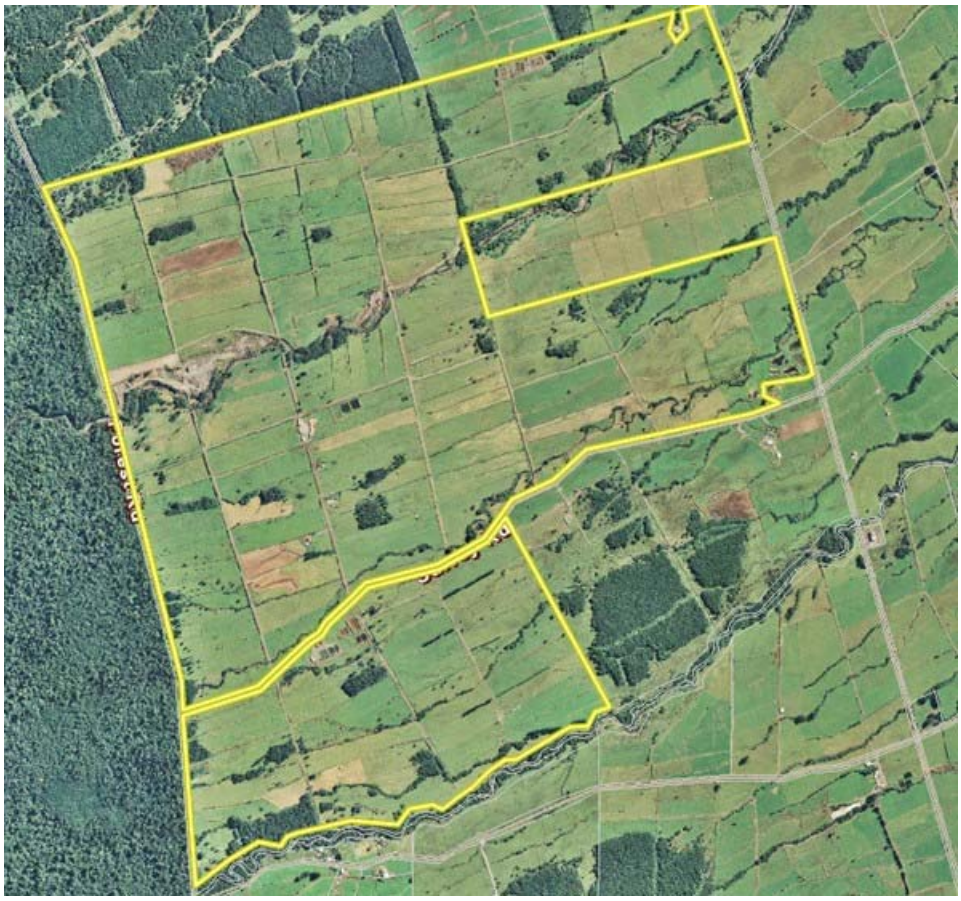

Figure 1 Location of the site and surrounding area. The property boundaries are marked in yellow

1.2.2 Hydrocarbon exploration and production wastes

Exploration activities by Taranaki's petroleum industry result in drilling and production wastes. Drilling fluids are engineered to perform several crucial tasks in the drilling of a hydrocarbon well including transporting cuttings from the drill bit to the surface, 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. Wells may be drilled with either synthetic based mud (SBM) or water based mud (WBM).

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.

Cuttings 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 but the cuttings may contain small amounts of fluid bound to the surfaces.

1.2.3 Landfarming process

Drilling waste is transported from well sites by truck (cuttings) or tanker (liquids) and discharged into a lined storage pit. Cuttings arrive at the consent holder's facilities in metal 'D' bins from the wellsite. Before leaving the well sites samples from the waste are collected and sent to a laboratory to be analysed for the presence of contaminants specified in the resource consent conditions.

The disposal area is prepared by scraping existing pasture/topsoil and stockpiling it for later use. The waste is spread over the prepared area using muck spreader (Photo 1) while the liquids are spread by tanker or

spray irrigation system. After a drying period the surface or the disposal area is tilled with a tractor and discs and then levelled using chains or harrows (Photo 2).

Stockpiled or imported top soil is spread over the disposal area and then reseeded so that it returns to pasture.

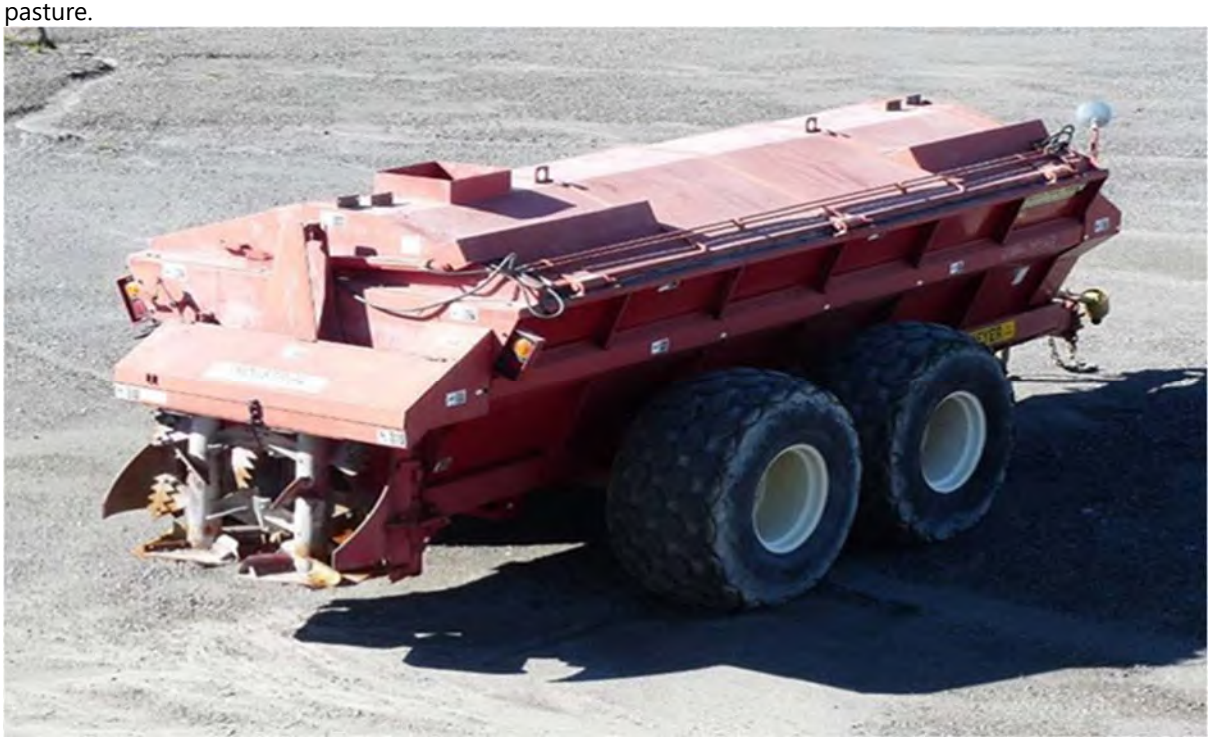

Photo 1 Spreader used for dispersing drilling waste over the landfarming area.

Water sludge is discharged in a similar manner. It is received on site and either stockpiled temporarily, or spread onto paddocks to be incorporated into soil.

Photo 2 Drilling waste being tilled into the soil

1.3 Resource consents

The site holds three resource consents, the details of which are summarised in Table 1 below. A list of all consent conditions and summaries of the site's compliance with these can be found in section 4.2.

Copies of all consents held for operations at this site are included in Appendix I.

Table 1 Resource consents for operations at the site.

Consent number	Purpose	Granted	Review	Expires
Discharges of waste to land				
7559-1.4	To discharge drilling waste (consisting of drilling cuttings and drilling fluid) from hydrocarbon exploration activities with water based muds and synthetic based muds onto and into land for the purpose of storage prior to disposal	20 Nov 2009	June 2019	1 June 2027
7591-1.2	To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids) from hydrocarbon exploration activities with water based muds and from synthetic based muds onto and into the land via landfarming, landspreading, injection spreading and irrigation	21 Jan 2010	June 2019	1 June 2027
5821-2.2	To discharge sludge and other residuals from water treatment plants in the New Plymouth and South Taranaki Districts onto and into land	14 Dec 2005	June 2021	June 2026

2 Monitoring programme

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 consent holder's operations consisted of the following six primary components.

2.1 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 or renewals;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

2.2 Site inspections

The site was inspected on nine occasions over the monitoring period, generally at a monthly frequency, although no inspections were conducted between November 2021 and April 2022. These inspections monitored the decommissioning of the drilling waste storage pits, maintenance of the land soakage area, overland discharges to the stormwater pond and farm drains, and the clarity of water in the drains and stream. The inspections also observed the contouring and reseeding of disused paddocks, and pasture growth. A summary of each inspection can be found in section 3.5.

2.3 Soil sampling

Eight composite soil samples from paddocks 51, 86, 87b and 87c were collected by Council staff on 15 September 2021 to measure the contaminants in soil resulting from the disposal of waste to paddocks. The sampling methodology is adapted from the Guidelines for the Safe Application of Biosolids to Land in New Zealand (2003). Each composite sample consists of 10 soil cores (Photo 3) (400 mm+/- depth) taken at 10 m intervals along a transect. The composite samples are sent for laboratory analysis for the range of contaminants listed in Table 2 below.

Table 2 Soil sample analytes.

Soil analytes	
Calcium	Ammoniacal nitrogen
Chloride	Nitrite-nitrate nitrogen
Magnesium	pH
Sodium	Total soluble salts
Conductivity	Total recoverable heavy metals
Potassium	Total petroleum hydrocarbons
Moisture factor	Polycyclic aromatic hydrocarbons
Sodium absorption ratio (SAR)	Monocyclic aromatic hydrocarbons

Photo 3 Example of a soil core.

2.4 Water sampling

In past monitoring years there were four scheduled water sampling surveys per year, however, with the decommissioning of the stockpile facility only one survey was conducted during this monitoring year before the programme was suspended. Five surface water, stormwater and groundwater samples were collected from monitoring sites (Figure 2) on 24 September 2021. Groundwater samples were collected from three on-site monitoring bores to monitor contaminants discharged from the storage of drilling waste in the storage facility. Two surface water samples were collected from the tributary. Samples were not collected from the nova drain as the sample site had been removed as part of the decommissioning. The stormwater monitoring site was not sampled because there was no discharge into the tributary.

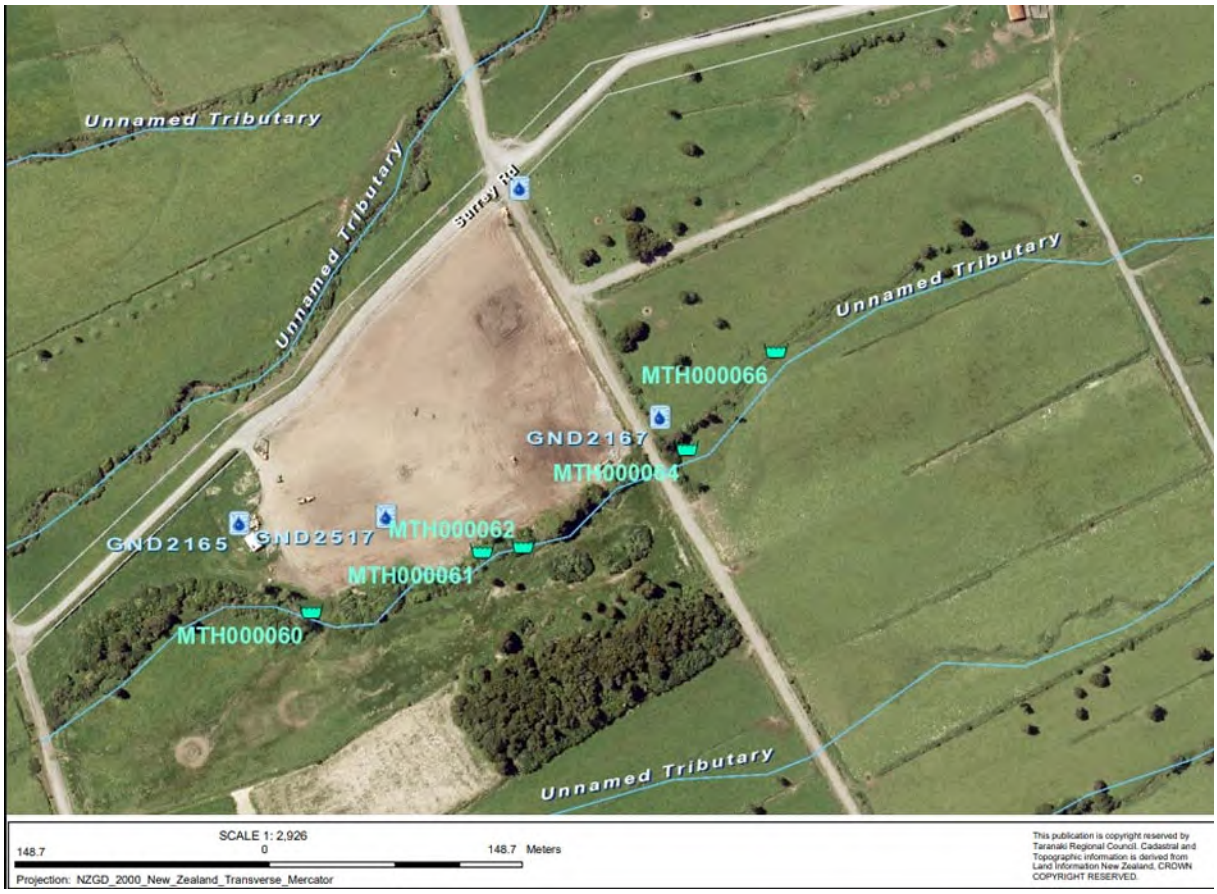

Figure 2 Groundwater (GND) and biomonitoring/surface water (MTH) locations.

Table 3 Water sample analytes.

Surface water and stormwater discharge analytes	
Barium (acid soluble)	Calcium
Benzene	Chloride
Toluene	Conductivity
Ethylene	Total petroleum hydrocarbons
Xylene M/O	Suspended solids
Biological oxygen demand (BOD)	Total dissolved salts (TDS)
Biochemical oxygen demand (BCOD)	Temperature
	pH
Groundwater analytes	
Barium (acid soluble)	Sodium
Barium (dissolved)	Level
Benzene	Nitrite-nitrate nitrogen
Toluene	Total dissolved salts (TDS)
Ethylene	Temperature
Xylene M/O	Level
Chloride	Total petroleum hydrocarbon
Conductivity	Biochemical oxygen demand (BCOD)

2.5 Biomonitoring surveys

Two seasonal biological surveys were performed at four sites along the unnamed tributary which is in close proximity to the stockpiling facility (Figure 3). Surveys were undertaken during spring (November) and summer (February) conditions. These surveys used standardised sampling methods to collect stream macroinvertebrates in order to assess and monitor the condition of the waterway.

Figure 3 Locations of the biomonitoring sites.

A detailed description of the biomonitoring methodology and results can be found in the biomonitoring reports. In summary:

- The kick-sampling technique was generally the preferred method at each site. A net is placed on the stream bed then an area upstream is disturbed with the foot to dislodge sediment. The disturbed material is collected in the net, emptied into a container and any macroinvertebrates are collected for analysis.
- The spring survey used a combination of the kick sampling technique and vegetation sweep sampling technique at site 4. The vegetation sweep technique is similar to the kick sampling technique but involves jabbing the sampling net into vegetation and collecting the material for analysis.
- Samples are preserved in ethanol so that they can be sorted and identified at a later date.
- The results are used to determine taxa (groups of related organisms), richness (number of taxa in an area), and abundance (number of individuals per taxa) which is used as an inventory of macroinvertebrates at a site and as an indicator of exposure to toxic substances. The location receives a category based on the abundance of individuals.
- The abundance data are used to calculate scores and categories according to the Macroinvertebrate Community Index (MCI) and semi-quantitative MCI (SQMCI) (Table 4). The MCI and SQMCI are indicators of water quality and stream health, and measures of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution.

A summary of the results and findings of the biomonitoring surveys can be found in section 3.3 below.

Table 4 MCI and SQMCI scores and categories.

TRC Grading	MCI	SQMCI
Excellent	≥140	≥7.00
Very Good	120-139	6.00-6.99
Good	100-119	5.00-5.99
Fair	80-99	4.00-4.99
Poor	60-79	3.00-3.99
Very Poor	<60	<3.00

2.6 Review of consent holder data

In accordance with consent condition 25 of consent 7591-1.2 the consent holder must prepare and submit to the Council an annual report. The annual report must contain the following information

- the location from which the drilling waste was received from;
- the composition of the waste, including the results of sample analysis;
- the location of the waste application areas on a map;
- the volume of waste applied to land;
- the commencement and completion dates of all applications;
- the areas landfarmed, including a map;
- details of the monitoring programme.

The annual report for this monitoring period was not submitted by the consent holder.

3 Results

3.1 Groundwater monitoring

The Surrey Road stockpiling facility contains a groundwater monitoring network (GND) comprised of three monitoring wells (Figure 3). A sample was collected from each and sent for laboratory analysis for a suite of contaminants associated with the activities. The results are found in Table 5 below, the results of the previous survey in May 2021 are in brackets ( ). There are no limits in the consent so the results are compared against the Drinking Water Standards for New Zealand (DWSNZ) (Ministry of Health, revised 2018) where available.

Table 5 Groundwater sampling results 24 September 2021 (<= less than level of detection, previous survey results in brackets ( )).

Parameter	Units	GND2165	GND2166	GND2167
Sample Temperature	°C	11.3 (12.4)	11.2 (14.4)	12.0 (14.7)
Electrical Conductivity	(µS/cm)	60 (98)	43 (45)	104 (84)
	(mS/m)	6.0 (9.8)	4.3 (4.5)	10.4 (8.4)
pH	pH unit	6.1 (6.4)	5.6 (5.9)	5.5 (5.8)
Acid Soluble Barium	(g/m^3)	<0.11 (<0.11)	<0.11 (<0.11)	<0.11 (<0.11)
Dissolved Barium	(g/m^3)	0.008 (0.02)	0.011 (0.01)	0.066 (0.031)
Chloride	(g/m^3)	5.3 (9.8)	3.9 (4.7)	11.2 (6.5)
Nitrate-N + Nitrite-N	(g/m^3)	0.086 (0.89)	0.28 (0.46)	1.72 (0.27)
Total Dissolved Solids	(g/m^3)	43 (70)	33 (36)	82 (59)
Total Sodium	(g/m^3)	3.4 (4.7)	2.7 (3.8)	3.8 (6.1)
Benzene	(g/m^3)	N/A	<0.0010	<0.0010
Toluene	(g/m^3)	N/A	<0.0010	<0.0010
Ethylbenzene	(g/m^3)	N/A	<0.0010	<0.0010
o-Xylene	(g/m^3)	N/A	<0.0010	<0.0010
m&p-Xylene	(g/m^3)	N/A	<0.002	<0.002
C7 - C9	(g/m^3)	N/A	<0.10	<0.10
C10 - C14	(g/m^3)	N/A	<0.2	<0.2
C15 - C36	(g/m^3)	N/A	<0.4	<0.4
Total hydrocarbons (C7 - C36)	(g/m^3)	N/A	<0.7	<0.7

The results of water temperature, pH level and, barium showed little variation compared to the previous survey four months earlier. Of these only barium is listed in the DWSNZ and has a maximum acceptable value (MAV) of 0.7 g/m^3, well above that found in the samples.

Electrical conductivity has a linear relationship with the concentration of dissolved salts, including sodium and chloride, and was significantly lower in GND2165 (60 µS/cm) than the previous survey (98 µS/cm), but higher in GND2167 (104 µS/cm and 84 µS/cm). For reference the ideal electrical conductivity in drinking water is between 200 and 800 µS/cm (DWSNZ). The chloride level in GND2165 was significantly higher than the previous survey and lower than the concentrations typically found in groundwater. Chloride is a naturally occurring substance in water and does not have any known adverse health effects but can taint the taste of drinking water.

The primary contaminant of concern are Nitrate-N + Nitrite-N (NNN) which can cause adverse human health effects and excessive plant and algae growth. In GND2166 the NNN concentration was two times lower than the previous survey, and below the MAV from DWSNZ of 11.3 g/m^3. Nitrate can be found in groundwater naturally at levels of between 0.25 and 3.5 g/m^3.

Samples from two groundwater bores were analysed for the presence of a suite of hydrocarbons. All results were below the limit of detection, and therefore less than any relevant environmental or human-health assessment criterial.

Overall the groundwater bores which were sampled did not show any notable improvement or degradation since the last survey.

3.2 Surface water monitoring

Surface water samples from the two monitoring locations in the tributary were collected and analysed for a suite of contaminants and water quality parameters associated with the activities on site. There are no consent limits so the results are compared against previous sampling results to monitor ongoing trends in water quality.

Table 6 Surface water sampling results 24 September 2021 (<= less than level of detection), previous survey result in brackets ( )).

Parameter	Units	MTH000060	MTH000064
Sample Temperature	°C	10.5 (9.5)	11.1 (10.4)
pH	pH units	6.4 (7)	6.4 (7)
Electrical Conductivity	(mS/m)	6.7 (41.7)	9.1 (30.8)
Chloride	(g/m^3)	6.7 (96)	12.6 (66)
Dissolved C-Biochemical Oxygen Demand	(O_2/m^2)	< 1.0 (11.4)	< 1.0 (6.4)
Total Dissolved Solids	(g/m^3)	59 (210)	79 (270)
Total Sodium	(g/m^3)	5.4 (36)	7.1 (26)
Total Suspended Solids	(g/m^3)	< 4 (<8)	< 4 (10)

There was a substantial reduction in all analytes, except for water temperature and pH level, compared to the previous survey in May 2021. Electrical conductivity decreased substantially between survey periods, with associated reductions in chloride and sodium. However, these results represented a return to typical long-term levels. Concentrations of CBOD at both monitoring sites were below the laboratory limit of detection, a substantial improvement compared to the results of the previous survey when the concentrations were 6 and 11 times greater. Dissolved solids showed a similarly large improvement, decreasing from 210 and 270 g/m^3 to 59 and 79 g/m^3 respectively.

3.3 Biological monitoring

Biological surveys produce a measure of time-integrated effects of discharges on water quality of a waterway, as opposed to the "snapshot" measure of a chemical sampling survey.

3.3.1 Macroinvertebrate surveys

The routine surveys for the period under review were carried out on 8 November 2021 and 25 February 2022. The reports for these surveys are available upon request. The "tributary" referred to below is adjacent

to the southern boundary of the stockpiling area and joins the Mangatengehu Stream several kilometres downstream.

The surveys are conducted at four sites in the tributary and measure the health of the stream in terms of the presence and abundance of benthic macroinvertebrates (bottom dwelling organisms) and microflora. The location details of the monitoring sites are shown in Table 7 and Figure 4. The uppermost site is upstream of the stockpiling area.

Table 7 Biological monitoring sites in the Mangatengehu Stream tributary.

Site number	Site code	Grid reference (NZTM)	Location	Altitude (masl)
1	MTH000060	E1701830 N5651430	Upstream of drilling waste stockpiling site	495
2	MTH000062	E1701954 N5651468	Approximately 85 m upstream of the spring and skimmer pit discharge	495
3	MTH000064	E1702050 N5651525	Approximately 35 m downstream of the skimmer pit discharge	490
4	MTH000066	E1702102 N5651582	Approximately 100 m downstream, of the skimmer pit discharge	485

Figure 4 Biological monitoring sites in the tributary.

Biological monitoring survey on 8 November 2021

The spring biomonitoring survey was conducted on 8 November 2021. Of note was that the survey followed an 8-day period without substantial water flow as discussed in the monitoring report.

Taxa abundance and richness was similar between sites 1 (upstream, 11 taxa) and 4 (downstream, 10 taxa), but low at sites 2 and 3, with only two taxa recorded at both sites (Table 8). In the previous survey (March 2021), sites 2 and 3 recorded nine and 13 taxa respectively, indicating that macroinvertebrate richness had reduced significantly.

Table 8 Results of the spring 2021 survey compared to the previous survey. Grey = very poor, red= poor, orange=fair, green=good, *italics=increase*, **bold=decline**.

Site	Number of taxa		MCI value		SQMCI value	
	Previous Survey	Current Survey	Previous Survey	Current Survey	Previous Survey	Current Survey
1	18	**11**	86	*107*	3.3	*3.5*
2	9	**2**	71	**60**	2.5	**1.0**
3	13	**2**	77	**30**	2.8	**1.0**
4	6	*10*	60	*68*	2.3	**2.2**

Overall, the results of this survey showed a significant decline in macroinvertebrate community below the discharge point of the stockpiling site since the March 2021 survey. The number of taxa recorded at the downstream sites 2 and 3 were 80% lower than site 1. Compared to the previous survey the number of taxa declined by 80% at site 2 and 85% at site 3. MCI and SQMCI scores for sites 2 and 3 also declined with distance downstream and were categorised as poor and very poor. MCI scores for sites 1 and 4 were higher than the previous survey, and site 1 improved from the fair category to good. All sites downstream from site 1 fell into the 'very poor' SQMCI category.

The results of the sampling indicate that there was a significant decline in macroinvertebrate abundance and diversity between control site 1 and downstream sites 2 and 3, but a slight improvement at site 4. This indicates that discharges from the stockpile decommissioning works have had a significant detrimental impact on a localised segment of the tributary. It should be noted that the decrease in taxa at sites 1, 2 and 3 are of a similar magnitude, which may be a result of environmental factors such as climate or weather rather than discharges.

The biological monitoring report for this survey concluded;

> *"Overall, the results of this survey show a highly significant decline in macroinvertebrate community health below discharges from the Surrey Road stockpiling site. These results show the works related to the disestablishment of the Surrey Road stockpiling site have significantly adversely affected the macroinvertebrate communities of the unnamed tributary of the Mangatengehu Stream".*

Biological monitoring survey on 25 February 2022

A biological survey of the tributary was repeated in February 2022 to sample the macroinvertebrate community under summer conditions. The survey methodology was the same used for the spring survey except that the kick sampling technique was used at each of the monitoring sites instead of the combination technique. The biomonitoring survey followed a 10-day period without substantial water flow as discussed in the monitoring report.

The survey results in Table 9 below show a general improvement in the condition of the macroinvertebrate community since the previous survey, however most sites were categorised as poor or very poor. Site 1 upstream of the stockpile discharges showed a moderate increase in the number of taxa present from 11 to 17. The MCI result for the summer survey classified the macroinvertebrate community at the site as good, while the SQMCI result upgraded the classification of the site from poor to fair.

Table 9 Results of the summer 2022 survey compared to the previous survey. Grey=very poor, red= poor, orange=fair, green=good.

Site	Number of taxa		MCI value		SQMCI value	
	Previous Survey	Current Survey	Previous Survey	Current Survey	Previous Survey	Current Survey
1	11	*17*	107	*111*	3.5	*4.9*
2	2	*8*	60	*93*	1.0	*2.1*
3	2	*6*	30	*80*	1.0	*2.8*
4	10	**9**	68	*89*	2.2	*3.4*

Sites 2 and 3 which are closest to the stockpile area showed an improvement in the number of macroinvertebrate taxa present, though only a modest change in overall health. The number of taxa present increased three and four times compared to the previous survey. These results shifted the MCI classification from poor and very poor to fair. Of particular note is the change in MCI values at site 3 from 30 to 80, shifting the MCI classification from very poor to fair. Under the SQMCI classification the health of the macroinvertebrate community remained very poor.

Long term trends

Biological surveys of the tributary have been undertaken biannually since the consent was issued in November 2009. Comparing the results of this year's surveys to all previous surveys reveals long term trends in the health of the macroinvertebrate community in the tributary.

All four sites have experienced declines in the number of stream taxa present and in MCI classifications. Site 1 has experienced a small decline over the 12 year period as indicated by the median lines in Figure 6. As the site is upstream of the stockpile discharges it provides a suitable reference point to understand likely impacts on the macroinvertebrate community arising from site's discharges into the tributary.

As seen in Figure 6 and Figure 7, sites 2 and 3 demonstrate similar trends over the monitoring period. From 2010 the MCI value at site 2 fluctuates between 115 (good) and 130 (very good) before declining significantly from summer 2018 to a low of 53 (very poor) in December 2020. The MCI result for the last survey in summer 2022 was 93 (fair). Site 3 shows a similar fluctuating trend, albeit more variable, until 2020. During this time the minimum MCI value was 80 (fair) at the start of monitoring, and a maximum MCI value of 128 (very good) was recorded in 2012 and 2013. In 2020 the MCI value declined from 96 (fair) in the summer 2020 survey to 30 (very poor) in the spring 2021 survey.

Figure 8 shows that the MCI values at site 4 during the monitoring period to date were more stable than the other sites although a substantial decline in the values occurred between summer 2020 when the MCI value was 114 (good) and spring 2020 when the value was 52 (very poor).

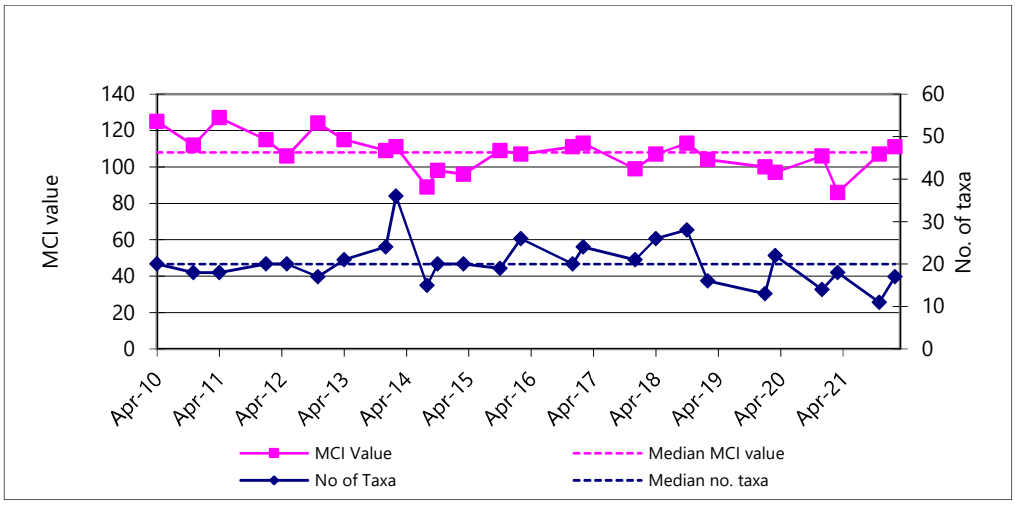

Figure 5 Number of taxa and MCI values at site 1 since 2010

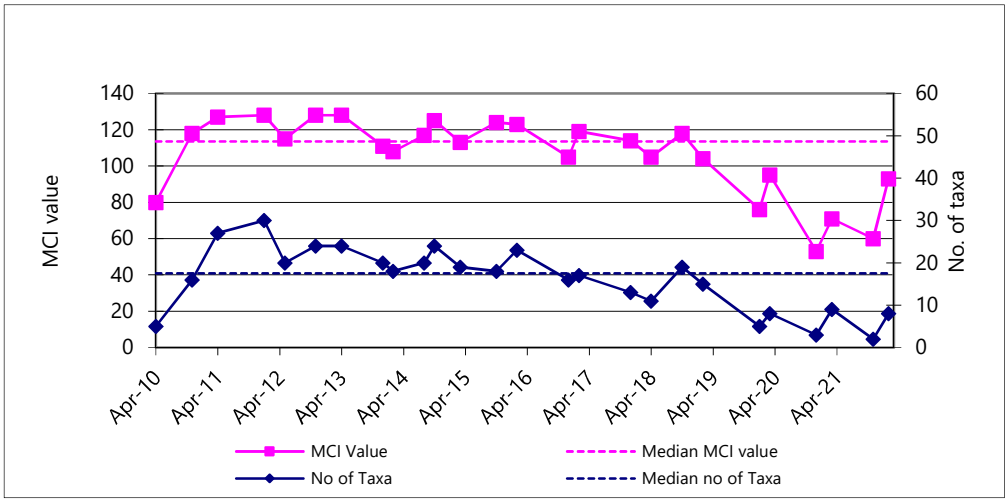

Figure 6 Number of taxa and MCI values at site 2 since 2010

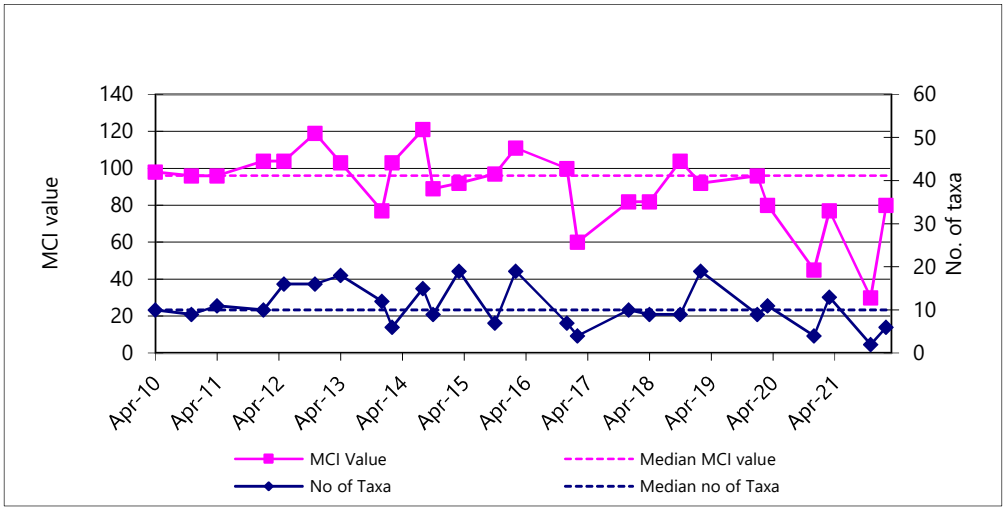

Figure 7 Number of taxa and MCI values at site 3 since 2010

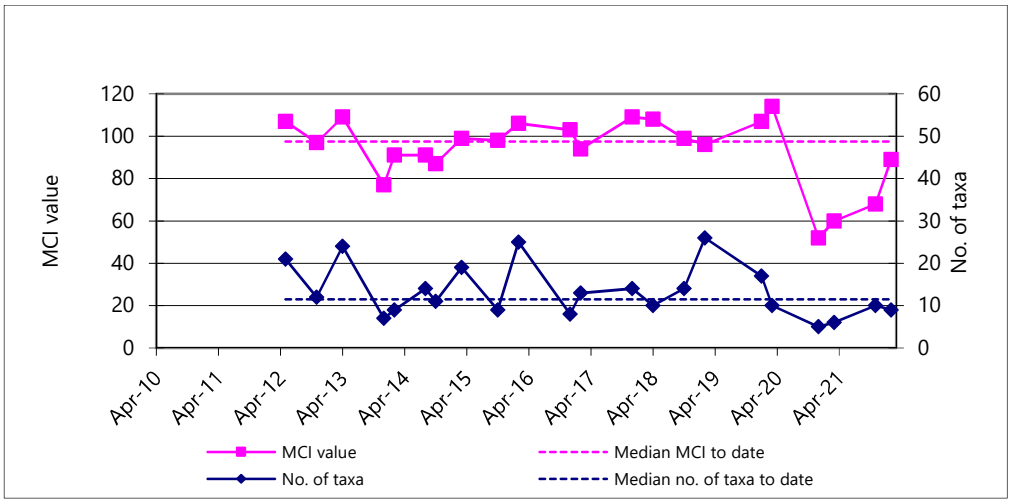

Figure 8 Number of taxa and MCI values at site 4 since 2010

3.4 Soil monitoring

Eight composite soil samples were collected from landfarmed paddocks in the 2020-2021 monitoring period. The paddocks sampled were 51, 86, 87 B, 87 C and the former Derby Road stockpiling facility. The results are presented in Table 10.

Polycyclic aromatic hydrocarbons have not been tabulated because they were either not present at concentrations above the level of detection (LOD) or are not required as a surrender criteria.

Table 10 Landfarming soil sample results 2021-2022 (<=below the limit of detection, underline= above consent limit).

		Paddock	51	51	86	86	87 B	87 C	Derby	Derby
Parameter	**Time**	**Surrender Limit**	**10:00**	**10:30**	**11:20**	**11:45**	**12:30**	**12:46**	**13:20**	**13:45**
Dry Matter (Env)	g/100 g as rcvd		66	68	58	68	69	64	71	66
Electrical Conductivity (EC)	mS/cm	<2900	0.03	0.52	0.07	0.06	0.29	0.15	0.17	0.14
1-Methylnaphthalene	mg/kg dry wt.		< 0.016	0.2	< 0.017	< 0.015	< 0.014	< 0.016	0.026	< 0.016
2-Methylnaphthalene	mg/kg dry wt.		< 0.016	0.37	< 0.017	< 0.015	< 0.014	< 0.016	0.042	< 0.016
Benzo[a]pyrene (BAP)	mg/kg dry wt.	<0.027	< 0.016	< 0.015	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Benzo[e]pyrene	mg/kg dry wt.		< 0.016	0.02	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Benzo[g,h,i]perylene	mg/kg dry wt.		< 0.016	0.021	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Chrysene	mg/kg dry wt.		< 0.016	0.024	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Fluoranthene	mg/kg dry wt.		< 0.016	0.032	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Fluorene	mg/kg dry wt.		< 0.016	0.025	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Naphthalene	mg/kg dry wt.	<7.2	< 0.08	0.21	< 0.09	< 0.08	< 0.07	< 0.08	< 0.07	< 0.08
Perylene	mg/kg dry wt.		< 0.016	< 0.015	0.026	0.018	0.042	< 0.016	< 0.014	< 0.016
Phenanthrene	mg/kg dry wt.		< 0.016	0.132	< 0.017	< 0.015	< 0.014	< 0.016	0.021	< 0.016
Pyrene	mg/kg dry wt.	<160	< 0.016	0.083	< 0.017	< 0.015	< 0.014	< 0.016	< 0.014	< 0.016
Total of Reported PAHs in Soil	mg/kg dry wt.		< 0.4	1.2	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Sodium (Sat Paste)	mg/L		13	97	14	20	51	33	26	15
Calcium (Sat Paste)	mg/L		9	531	28	29	220	100	123	102

		Paddock	51	51	86	86	87 B	87 C	Derby	Derby
Parameter	**Time**	**Surrender Limit**	**10:00**	**10:30**	**11:20**	**11:45**	**12:30**	**12:46**	**13:20**	**13:45**
Magnesium (Sat Paste)	mg/L		< 3	20	< 3	< 3	10	4	5	4
Sodium Absorption Ratio (SAR)	SAR unit	8	1	1.1	0.7	1	0.9	0.9	0.6	0.4
Soluble Salts (Field)	%	<0.25	< 0.05	0.18	< 0.05	< 0.05	0.1	0.05	0.06	< 0.05
Total Recoverable Barium	mg/kg dry wt.	10,000	680	4,800	1,800	3,100	4,700	5,300	2,200	1,990
Chloride	mg/kg	<700	21	616	15	52	279	90	77	50
Total Recoverable Sodium	mg/kg dry wt.	<460	500	590	540	540	580	560	700	670
Benzene	mg/kg dry wt.	<1.1	< 0.07	< 0.07	< 0.09	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07
Toluene	mg/kg dry wt.	<82	0.07	0.32	< 0.09	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07
Ethylbenzene	mg/kg dry wt.	<59	< 0.07	0.08	< 0.09	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07
o-Xylene	mg/kg dry wt.	<59	< 0.07	0.18	< 0.09	< 0.07	< 0.07	< 0.08	< 0.07	< 0.07
m&p-Xylene	mg/kg dry wt.	<59	< 0.14	0.52	< 0.17	< 0.14	< 0.13	< 0.15	< 0.13	< 0.14
C7 - C9	mg/kg dry wt.	<210	< 10	12	< 10	< 9	< 9	< 10	< 9	< 10
C10 - C14	mg/kg dry wt.	<150	53	2,800	27	46	1,460	1,180	410	39
C15 - C36	mg/kg dry wt.	<1,300	370	6,100	340	700	5,300	3,900	6,300	670
Total hydrocarbons (C7 - C36)	mg/kg dry wt.	<20,000	430	8,900	370	750	6,700	5,100	6,700	710
Total Recoverable Arsenic	mg/kg dry wt.	<17	< 2	< 2	< 2	< 2	< 2	2	2	2
Total Recoverable Cadmium	mg/kg dry wt.	<0.8	0.12	0.15	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt.	<600	5	8	7	7	8	7	12	10
Total Recoverable Copper	mg/kg dry wt.	<100	31	35	41	42	38	40	37	39
Total Recoverable Lead	mg/kg dry wt.	<160	4	11.1	5.3	6.1	9.6	14.7	4.6	4.6
Total Recoverable Mercury	mg/kg dry wt.	<1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt.	<60	2	5	3	4	5	4	7	6
Total Recoverable Zinc	mg/kg dry wt.	<300	29	29	30	31	36	31	35	35

The majority of results for concentrations of organic compounds and heavy metals were either below the relevant consent closure limits set out in condition 17 of consent 7591-1.2, or there were no limits. Exceedances of total recoverable sodium and total petroleum hydrocarbons (TPH) limits were found in several samples and are summarised below;

- Total recoverable sodium results in all samples exceeded the consent limit of 460 mg/kg. The results ranged between 500 and 700 mg/kg.
- The TPH fraction C10- C14 was found to exceed the consent limit of 150 mg/kg in four samples. The exceedances ranged between 410 and 2800 mg/kg.
- The TPH fraction C15-C36 was also found to exceed the consent limit of 1,300 mg/kg in the same four samples. The exceedances ranged from 3,900 to 6,300 mg/kg.

3.5 Compliance inspections

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 consent holder and 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.

In the event of complaints about the Site, 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).

14 July 2021

The inspection report noted that the old irrigation ditch has been decommissioned. Runoff from the new land soakage area was discharging into the stormwater ponds which were open to the drain. The officer noted the potential for the discharge to impact surface water after heavy rain. The officer recommended bunding the soakage area and/or the stormwater pits to prevent discharge into the tributary. Pasture strike in the recently landfarmed paddocks was good and no further issues were identified.

21 July 2021

The land soakage area and stormwater pits were observed to be bunded as per the advice during the previous inspection. No further work was reported to have occurred on site and the water in the drain and stream were noted to be clear.

04 August 2021

The land soakage area was no longer completely bunded and liquid was discharging into the first stormwater pond. No further work on site was apparent. Water in the drain and stream was clear, although samples were collected from the last stormwater pond, upstream and downstream locations within the tributary.

01 September 2021

Only a small quantity of drilling waste remained in the storage pits at the time of this inspection. The trackside drain and receiving water were observed to be clear. Good pasture growth was noted in paddock 28 and the report deemed the site to be fully compliant with the conditions of the consent.

08 October 2021

A small quantity of drilling waste, presumably the same observed during the previous inspection, remained on site. The officer advised that contaminated water in one stormwater pond was to be discharged onto land and not to water. Receiving waters were observed to be clear and the site was deemed to be fully compliant with the conditions of the consent.

09 November 2021

The remaining drilling waste had been spread on paddocks and no further waste remained on the site. All ponds had been filled in. Good pasture growth was reported on the most recently landfarmed areas, and receiving waters were clear.

05 April 2022

The paddock adjacent to the old storage area was in the process of being contoured and plants along the streamside had been removed. The consent holder advised that this area would be reseeded over the following two days. The receiving waters were observed to be clear and no non-compliance issues were noted.

22 June 2022

Good pasture strike was observed at all relevant locations. No issues were identified and the site was deemed to be fully compliant with the conditions of the consent.

4 Discussion

4.1 Environmental effects of exercise of consents

On site activities during this monitoring period declined significantly as the company wound up its landfarming and landspreading operations. This had a measurable effect on water quality and the biotic community in the tributary over the duration of the monitoring period. A small amount of residual drilling waste in the stockpile facility had been spread to land by November 2021. The decommissioning of the stockpile facility was completed by the end of the monitoring period and landspreading areas of the site were either in the final stages of surface contouring, being reseeded, or were already in pasture.

The spring 2021 biomonitoring survey identified a significant decline in the condition of the macroinvertebrate community in the Mangatengehu tributary. The MCI and SQMCI classification of all three downstream sites was either very poor or poor, and were either unchanged or worse compared to the previous survey. The decommissioning of the stockpile facility involved extensive earthworks to fill in ponds and level the site for future use and it's likely that discharges from these earthworks into the tributary resulted in the decline in the health of the in-stream biotic community. The following summer 2022 survey showed a notable improvement. All monitoring sites gained a higher MCI category, and an unchanged or improved SQMCI classification. This survey occurred after the completion of the decommissioning works when discharges into the tributary were likely reduced or had stopped altogether.

Likewise, the results of the surface water sampling survey, which was undertaken near the completion of the decommissioning works, had notably improved since the previous survey. In particular, concentrations of total dissolved solids, chloride and sodium were substantially lower, and likely as a result a reduction in discharges from the stockpile facility and better management of stormwater flows. The effects of these contaminants are largely on aesthetic values of water such as visual clarity or taste. Barium and NNN, which have known adverse human health effects, were both significantly below the MAV for drinking water.

The relatively low reported values of these contaminants is likely to be partly a result of the short distance that the stream travels through developed farmland. The stockpile facility discharge point is approximately 1 km from the national park boundary and therefore the contaminant loading on the tributary up to that point is likely to be low. However, the contaminant concentrations reported at monitoring site MTH00064, downstream of the discharge point, are higher than site MTH00060 which is upstream from the discharge point, indicating that water quality was adversely impacted by the stockpile facility discharges.

The single soil sampling exercise identified levels of certain contaminants which were elevated above the consent closure limits set out in the consent conditions. The contaminants are to be expected given the nature of the drilling waste. Hydrocarbons in the soil likely originated from residual synthetic drilling fluid attached to natural rock particles in the drilling waste. Hydrocarbons in the soil are not thought to pose a risk to human or ruminant health, but leaching into waterways may have adverse effects on sensitive aquatic organisms. Surface water samples from near the stockpile facility were analysed for a suite of hydrocarbons but the concentrations were found to be below the level of detection, indicating that the hydrocarbons were not leaching into surface water at a significant rate. On this basis it is unlikely that hydrocarbons in the landspreading areas are leaching into unmonitored waterways.

If these soil sampling results are extrapolated across the remaining landspreading areas then it is possible that all areas have elevated hydrocarbon and chloride concentrations. Further sampling will confirm if this is the case. This may have implications for the site's ability to comply with the consent closure limits set out in consent 7591-1.2. On this basis it would be prudent for the consent holder to initiate soil sampling sooner rather than later.

Biological and water quality monitoring of the tributary will continue to be suspended unless waste acceptance resumes, or the consent is surrendered or expires.

During the year under review, enforcement proceedings undertaken by the Council against the consent holder were continuing. These were in respect of alleged offences that had occurred during the 2019-2020 year. Mr Boyd had pleaded guilty to four charges, but there was dispute over factual matters. The case was concluded after the end of the period under review, and will be discussed in the next annual report.

4.2 Compliance with consent conditions

The Site was generally compliant with the conditions of the consents, although some conditions were not relevant because waste was no longer being received. Minor issues identified during the inspections related to controlling overland flows and stormwater ponds, and contaminated liquid in the land soakage area. At the time of writing this report the consent holder had not submitted the annual report.

A summary of the consent holder's compliance with the conditions of each resource consent during the period 2021-2022 can be found in Table 11, Table 12, and Table 13 below. Only the conditions which the site was deemed to be non-compliance with are summarised.

Table 11 Summary of performance for consent 7559-1.4

Purpose: ***To discharge drilling wastes [consisting of drilling cuttings and drilling fluids] from hydrocarbon exploration activities with WBM and SBM onto and into land for the purpose of storage prior to disposal***		
Condition requirement	**Comments**	**Compliance achieved?**
1. Shall adopt best practicable option		No
2. Install fit for purpose high grade synthetic liners for storage pits	No longer used.	N/A
3. Notify Council 48 hrs prior to stockpiling wastes	No waste received	N/A
4. Limited to wastes generated in Taranaki including the offshore region	No waste received	N/A
5. No hydraulic fracturing fluids contained within wastes	No waste received	N/A
6. Volume of material stored shall not exceed 4,000 m^3 at any one time	Small amount of residual waste noted during inspection. Origin unknown	Yes
7. All material spread under consent 7591 within a 12 month period	None received	N/A
8. No contamination of groundwater or surface water to exceed background concentrations	No background concentrations available	N/A
9. Consent holder shall keep records of the waste from each well including the following. • Specific analysis • Storage commencement • Monitoring details, locations, methods	No waste received	N/A
10. The consent holder shall provide a report each year which includes information as per condition 9	No report provided	**No**

Purpose: *To discharge drilling wastes [consisting of drilling cuttings and drilling fluids] from hydrocarbon exploration activities with WBM and SBM onto and into land for the purpose of storage prior to disposal*		
Condition requirement	**Comments**	**Compliance achieved?**
11. Review condition	Not required	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Good** **Improvement required**

Table 12 Summary of performance for consent 7591-1.2

Purpose: *To discharge drilling waste from hydrocarbon exploration activities onto and into land via landspreading*		
Condition requirement	**Comments**	**Compliance achieved?**
1. Landfarming/ landspreading definition	N/A	N/A
2. Adoption of the best practicable option	No issues identified	Yes
3. Prior to the exercise of this consent a management plan must be submitted	Plan submitted November 2009	Yes
4. Notify Council 48 hours prior to landspreading/ landfarming	No waste spread to land	N/A
5. Limited to wastes generated in Taranaki including the Taranaki basin	No waste spread to land	N/A
6. No hydraulic fracturing material in waste discharged	No waste spread to land	N/A
7. Consent authorises landfarming/ landspreading as per appendix I of consent	No waste spread to land	N/A
8. Waste application layer shall not exceed: • 100 mm for TPH content of <50,000 mg/kg • 50 mm for TPH >50,000 mg/kg • In a rate and manner where no ponded liquids remain	No waste spread to land	N/A
9. The exercise of this consent shall not results in chloride exceeding 800 kg/ ha	Not calculated in year under review	
10. Nitrogen loading shall not exceed 1,000 kg/ha over any five year period	Not calculated in year under review	

Purpose: *To discharge drilling waste from hydrocarbon exploration activities onto and into land via landspreading*		
Condition requirement	**Comments**	**Compliance achieved?**
11. Landspreading of liquid faction or the stormwater component of the storage pits shall be undertaken through a landspreader, injection spreader or irrigator	No waste liquid spread to land	N/A
12. Areas where any discharge has occurred may receive future applications if the following conditions are met: 17, 19, 20, 21	No future applications are expected	N/A
13. Areas landfarmed must be re-sown into pasture or crop as soon as practicable. If not achieved within two months additional measure must be undertaken	All landfarmed areas have been, or soon will be, in pasture	Yes
14. No waste shall be applied within: • 12 m of boundaries • 12 m of named streams • 6 m of other water courses	No waste spread to land	N/A
15. Liquid wastes which may flow overland shall not be discharged within 25 m of boundaries or water courses	No liquid waste spread to land	N/A
16. Post application the material must be incorporated to a depth of 100 mm and the TPH concentration must be below 2% TPH	No waste spread to land	N/A
17. After March 2027 constituents in the soil at any depth less than 500 mm shall meet the following standards • prior to areas being reused for disposal • at the time of expiry/cancellation/surrender	Soil sampling programme not undertaken yet	N/A
18. The consent may not be surrendered unless the standards specified in condition 17 are met	Surrender is dependent on soil sampling programme	N/A
19. Concentration of metals in soil must comply with set guidelines	Soil sampling programme not undertaken yet	N/A
20. Conductivity must be less than 400 mS/m. If background soil conductivity greater than 400 mS/m, then waste application shall not increase conductivity by more than 100 mS/m	Soil sampling programme not undertaken yet	N/A

Purpose: *To discharge drilling waste from hydrocarbon exploration activities onto and into land via landspreading*		
Condition requirement	**Comments**	**Compliance achieved?**
21. Sodium absorption ratio [SAR] must be less than 8. If background soil SAR is greater than 8, then waste application shall not increase SAR by more than 1	Soil sampling programme not undertaken yet	N/A
22. Total dissolved solids in surface water or groundwater shall not exceed 2,500 g/m^3	Results of tributary sampling are less than 2500 g/m^3	Yes
23. No contamination of groundwater or surface water to exceed background concentrations	No background data available	
24. Records to be kept by consent holder and made available to the Council	Unknown	Yes
25. Consent holder to report to Council by 31 August each year on records specified in condition 24	No report provided	No
26. Optional review provision re environmental effects	Not required	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Good** **Imporovement required**

Table 13 Summary of performance for consent 5821-2

Purpose*: To discharge sludge and other residuals from water treatment plants in the New Plymouth and South Taranaki districts onto and into the land*		
Condition requirement	**Comments**	**Compliance achieved?**
1. Adoption of best practicable option	Inspection	Yes
2. Exercise undertaken in accordance with application	Yes	Yes
3. Notification to be provided prior to exercise of consent	Notification provided	Yes
4. Notification 48 hours prior to undertaking disposal of sludge to site	No waste received	N/A
5. Sludge to be spread as per application	No waste received	N/A
6. Ensure sludge stockpiles areas adequately bunded and no discharge of leachate to any water course	No waste received or stored	N/A

Purpose: *To discharge sludge and other residuals from water treatment plants in the New Plymouth and South Taranaki districts onto and into the land*		
Condition requirement	**Comments**	**Compliance achieved?**
7. No discharge of sludge to land within 25 m of any water course, including farm drains	No waste spread to land	N/A
8. Shall not exceed a total aluminium concentration of 55 µg/L within specific stream, farm drains or water course	No waste spread to land	N/A
9. No area of land stripped for application may exceed 40 acres	No waste spread to land	N/A
10. Post application, the area of land must be contoured and sown into pasture	Inspections noted contouring and pasture strike	Yes
11. Exercise of consent shall not result in contamination of groundwater/ surface water or change in suitability of the water source	No waste received	N/A
12. The exercise of consent shall not result in effects in surface water	No waste received	N/A
13. Is a lapse condition	Not applicable, consent in effect	N/A
14. Is a review condition	Not required at present	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative compliance in respect of this consent		**Good** **Good**

Table 14 Evaluation of environmental performance over time.

Year	Consent no	High	Good	Improvement required	Poor
2013-2014	6900-2	1			
	7911-1		1		
	7559-1			1	
	7591-1	N/A			
2014-2015	6900-2	1			
	7911-1	1			
	7559-1		1		
	7591-1.1	1			
2015-2016	6900-2	1			

Year	Consent no	High	Good	Improvement required	Poor
	7911-1	1			
	7559-1.3		1		
	7591-1.1		1		
2016-2017	6900-2	1			
	7911-1		1		
	7559-1.3			1	
	7591-1.1		1		
2018-2019	6900-2	Consent surrendered			
	7911-1	Consent surrendered			
	7559-1.4			1	
	7591-1.2				1
	5821-2	1			
2019-2020	7559-1.4				1
	7591-1.2				1
	5821-2	1			
2021-2022	7559-1.4			1	
	7591-1.2			1	
	5821-2		1		
Totals		3	5	4	3

During the monitoring period, the site generally demonstrated a level of administrative performance that requires improvement in terms of annual reporting. The environmental performance is rated 'good' rather than high' because inadequate management of sediment discharges during earthworks, which had only low-level impacts on the tributary. The ratings are defined in Appendix II.

Recommendations from the 2020-2021 Annual Report

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

1. In the first instance, monitoring of consented activities at Surrey Road stockpiling facility be scaled back to account for the decommissioned site. One round of groundwater and surface water will be undertaken. Then it will cease. Biological monitoring of the unnamed tributary of the Mangatengehu Stream will continue to be monitored for recovery post the significant impacts to the biology of the receiving environment found during the 2020-2021 monitoring period.
2. When consent 7559-1.4 is surrendered the biological monitoring of the unnamed tributary of the Mangatengehu Stream will be added to the landspreading compliance programme.
3. Monitoring of landspreading will remain unchanged with the inclusion of the biological monitoring of the unnamed tributary of the Mangatengehu Stream.

4. A decision shall be made in relation to the surrender assessment of the previously landfarmed area, which number over 60 paddocks.
5. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation 1 was fully implemented during the 2021-2022 monitoring period. Recommendation 2 was not implemented because the consent has not yet been surrendered. Recommendation 3 was partially implemented and four soil samples were collected. With respect to recommendation 4 an email was sent in November 2021 detailing the consent surrender process. Monitoring was not adjusted due to environmental or administrative performance in accordance with recommendation 5.

4.3 Alterations to monitoring programmes for 2022-2023

I do not recommended any further alterations to the 2022-2023 monitoring programme as it has already been scaled back.

5 Recommendations

1. Consent 7559-1.4 which authorises the stockpiling facility may be surrendered because this activity no longer occurs at the site and there are no specific surrender conditions.
2. The monitoring programme for the stockpile facility will remain suspended until the consent is surrendered.
3. The Consent Holder should review the water sludge consent (5821-2.2) requirements to ensure this activity can resume and comply with the conditions.
4. Consent 7591-1.2 may not be surrendered until the requirements of condition 17 have been met. Routine monitoring will continue.
5. The consent holder should engage with Council to plan the soil validation sampling programme required by consent 7591-1.2.

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Ministry for the Environment 1999: Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand.

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Taranaki Regional Council 2005: Guidelines for the control of drilling waste disposal onto and into land.

Taranaki Regional Council 2020: CD Boyd Drilling Waste Stockpiling Landfarm/ Landspreading Monitoring Programme Annual Report 2019-2020. Technical Report 2020-11.

Taranaki Regional Council, 2021, Biomonitoring of an unnamed tributary of the Mangatengehu Stream in relation to the Surrey Road stockpiling facility, November 2021.

Taranaki Regional Council, 2021, Biomonitoring of an unnamed tributary of the Mangatengehu Stream in relation to the Surrey Road stockpiling facility, February 2022.

Appendix I

Resource consents held by CD Boyd

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

Discharge Permit

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

Name of Consent Holder:	Colin David Boyd P O Box 44 INGLEWOOD 4347
Decision Date (Change):	5 February 2014
Commencement Date (Change):	5 February 2014 (Granted: 14 December 2005)

Conditions of Consent

Consent Granted:	To discharge sludge and other residuals from water treatment plants in the New Plymouth and South Taranaki Districts onto and into land
Expiry Date:	1 June 2026
Review Date(s):	June 2015, June 2021
Site Location:	Surrey Road, Inglewood
Legal Description:	Secs 9, 10 & Pt Sec 13 Blk XII Egmont SD Lot 2 DP 344156 Blk XII Egmont SD Secs 17 & 18 Blk XVI Egmont SD (Discharge sites)
Grid Reference (NZTM)	1701925E-5652253N
Catchment:	Waitara
Tributary:	Mangamawhete Mangatengehu

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

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

1. 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.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of the original application and any subsequent applications to change conditions. In the case of any contradiction between the documentation submitted in support of previous applications and the conditions of this consent, the conditions of this consent shall prevail.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent.

4. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to the transportation of the sludge to the disposal site, and again at least 48 hours prior to beginning the actual disposal operation. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

5. The sludge shall only be spread in the areas specified in application 4067 and 6784.

6. The consent holder shall ensure that sludge stockpiles are adequately bunded to ensure that there is no stormwater or leachate runoff to any surface watercourse, including farm drains.

7. The sludge shall not be deposited within 25 metres of the Mangamawhete Stream, the Mangatengehu Stream or the Waipuku Stream, or within 10 metres of any open drain or other watercourse.

8. The exercise of the consent shall not result in a total aluminium concentration exceeding 55ug/L in the Mangamawhete Stream, the Mangatengehu Stream or the Waipuku Stream or any open drain or watercourse including farm drains.

9. The area of bare land, stripped for receipt of the residuals, exposed at any particular time shall not exceed 40 acres.

10. As soon as practicable following discharge and incorporation, the discharge area shall be contoured and sown into pasture.

11. 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.

12. The exercise of this consent shall not result in any of the following effects on surface water:

    a) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
    b) Any conspicuous change in the colour or visual clarity
    c) Any emission of objectionable odour;
    d) The rendering of freshwater unsuitable for consumption by farm animals;
    e) Any significant adverse effects on aquatic life.

13. This consent shall lapse on the expiry of five years after the date of issue of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

14. 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 2009 and/or June 2015 and/or June 2021, 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 5 February 2014

For and on behalf of
Taranaki Regional Council

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A D McLay
Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Colin David Boyd PO Box 44 Inglewood 4347	
Decision Date (Change):	20 December 2018	
Commencement Date (Change):	20 December 2018	(Granted Date: 20 November 2009)

Conditions of Consent

Consent Granted:	To discharge drilling wastes (consisting of drilling cuttings and drilling fluids) from hydrocarbon exploration activities with water based muds and synthetic based muds, onto and into land for the purpose of storage prior to disposal
Expiry Date:	1 June 2027
Review Date(s):	June 2019, June 2025
Site Location:	Surrey Road, Inglewood
Grid Reference (NZTM)	1701847E-5651476N & 1701850E-5651480N
Catchment:	Waitara
Tributary:	Manganui Mangamawhete Mangatengehu

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. 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.

2. All waste shall be stored in pits that are lined with 'fit for purpose' high-grade synthetic liner or equivalent and the consent holder shall demonstrate, that the lined pits are suitable for storing liquid without leakage through the base or side walls. The consent holder shall monitor the integrity of the pit liners and repair or replace liners as required.

Notification and sampling requirements prior to discharge

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, (by emailing worknotification@trc.govt.nz) at least 48 hours prior to bringing wastes onto the site. Notification shall include the following information:

    a. the consent number;
    b. the name of the well(s) from which the waste was generated;
    c. the type of waste; and
    d. the volume of waste.

Discharge limits

4. Subject to condition 5, the exercise of this consent is limited to waste generated in the Taranaki region, including from outside the 12 nautical mile maritime limit within the Taranaki Basin.

5. Waste brought to the site shall not contain any hydraulic fracturing fluids.

6. The volume of material stored on the site shall not exceed 4000 m^3 at any one time.

7. All material must be spread onto land in accordance with consent 7591 as soon as practicable, but no later than 12 months after being brought onto the site.

Receiving environment limits for water

8. The exercise of this consent shall not result in any contaminant concentration, within surface water or groundwater, which after reasonable mixing, exceeds the background concentration for that particular contaminant.

Monitoring and reporting

9. The consent holder shall keep records of the wastes from each individual well, including:

    a) composition of wastes, including concentrations of Metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn), Salts (Barium, Calcium, Chloride, Magnesium, Sodium, Potassium), Hydrocarbons (Total Petroleum Hydrocarbons, Mono Cyclic Aromatic Hydrocarbons and Poly Cyclic Aromatic Hydrocarbons) and Nitrogen;
    b) dates of commencement of storage;
    c) 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 on request.

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

Review

11. 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 2019 and/or June 2025, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 20 December 2018

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Surrey Road Landfarms Limited PO Box 44 Inglewood 4347	
Decision Date (Change):	20 December 2018	
Commencement Date (Change):	20 December 2018	(Granted Date: 21 January 2010)

Conditions of Consent

Consent Granted:	To discharge drilling waste cuttings (consisting of drilling cuttings and drilling fluids) from hydrocarbon exploration activities with water based muds and synthetic based muds onto and into the land via landfarming, landspreading, injection spreading and irrigation
Expiry Date:	1 June 2027
Review Date(s):	June 2019, June 2025
Site Location:	Surrey Road, Inglewood
Grid Reference (NZTM)	1701750E-5652370N & 1701750E-5652370N
Catchment:	Waitara
Tributary:	Manganui Mangawmawhete Mangatengehu Waipuku

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. landfarming means the discharge of drilling wastes from vehicles, tanks, or other containers onto and into land, with spreading, or incorporation into the soil as soon as practicable; and
    b. landspreading means the discharge to land of the liquid fraction of drilling wastes. This includes the stormwater component of the storage cells through the use of a landspreader and/or irrigator and/or injection spreader. Throughout the application of the liquid fraction the consent holder shall maintain pasture cover at all times.

2. 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. For the purpose of this consent, the best practicable option will include undertaking the landfarming/landspreading/injection spreading of drilling waste during extended periods of dry weather.

3. Prior to the exercise of this consent, the consent holder shall provide, to the written satisfaction of the Chief Executive, Taranaki Regional Council, a landfarming management plan to demonstrate the activity will be conducted to comply with all of the conditions of this consent. The management plan shall be reviewed annually 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) methods used for the mixing and testing of different waste types;
    f) procedures for landfarming drilling wastes (including means of transfer from stockpiling area, means of spreading, and incorporation into the soil);
    g) contingency procedures;
    h) sampling regime and methodology; and
    i) post-landfarming management, monitoring and sites reinstatement.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, (by emailing worknotification@trc.govt.nz) at least 48 hours prior to landfarming/landspreading/injection spreading waste from each separate storage cell. Notification shall include the following information:

   a) the consent number;
   b) the name of the well(s) from which the waste was generated;
   c) the type of waste to be applied;
   d) the volume of waste to be applied;
   e) the specific concentrations of Metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn), Salts (Barium, Calcium, Chloride, Magnesium, Sodium, Potassium). Hydrocarbons (Total Petroleum Hydrocarbons, Mono Cyclic Aromatic Hydrocarbons and Poly Cyclic Aromatic Hydrocarbons) and Nitrogen in the waste prior application to land;
   f) the specific location and area over which the waste will be applied; and
   g) the method of application.

   In order to demonstrate compliance with conditions 8, 9, 10, 11, 16, 19, 20, and 21 of this consent.

5. Subject to condition 6, the exercise of this consent is limited to waste generated in the Taranaki Region, and from outside the 12 nautical mile maritime limit, within the Taranaki Basin.

6. Waste discharged shall not contain any hydraulic fracturing fluids.

7. This consent authorises the application of material to land only within the area indicated on the attached map (Appendix 1).

Discharge limits

8. For the purposes of landfarming, 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; and
   c) in a rate and manner such that no ponded liquids remain after one hour, for all wastes.

9. The exercise of this consent shall not result in a chloride loading exceeding 800 kg/ha.

10. The nitrogen loading (including that from any application of nitrogen fertiliser) over any area where drilling wastes are applied, shall not exceed 1000 kilograms per hectare over any 5 year period.

11. Landspreading of liquid fraction of drilling wastes and or stormwater component of the storage cells shall be undertaken through the use of a landspreader or injection spreader or irrigator. Throughout the application of the liquid fraction the consent holder shall maintain pasture cover at all times.

12. The areas where any discharge has occurred may receive future applications of material only if they meet the standards defined by conditions 17, 19, 20, 21 of this consent.

13. As soon as practicable following the landfarming of wastes the discharge area shall be re-sown into pasture (or into crop). If revegetation cannot be established within two months of the discharge, the consent holder shall undertake appropriate land stabilisation measures to minimise wind and/or stormwater erosion.

14. No waste shall be discharged within:

    a) 12 metre(s) of property boundaries; or
    b) 12 metre(s) of the Mangamawhete, Mangatengehu and Waipuku Streams; or
    c) 6 metre(s) of any other surface water course (including farm drains).

15. Any liquid drilling waste which may flow over land, shall not be discharged within 25 metre(s) of property boundaries or surface water courses (including farm drains).

Receiving environment limits for soil

16. As soon as practicable following the application of drilling wastes to land, the consent holder shall incorporate the material into the soil to a depth of at least 250 mm for landfarming and 100 mm for the injection spreader, so that the hydrocarbon concentration at any point in the soil/waste mix is equal to or less than 20,000 mg/kg (2%) dry weight at any point.

17. After 1 March 2027 (three months before the consent expiry date), constituents in the soil at any depth less than 500 mm shall meet 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)	

The requirement to meet these standards shall not apply if, before 1 March 2027, the consent holder applies for a new consent to replace this consent when it expires, and that the application is not subsequently withdrawn. These conditions also apply:

a) prior to drilling wastes being discharged onto an area that has previously been used for the disposal of drilling wastes; and
b) at the time of expiry, cancellation, or surrender of this consent.

18. This consent may not be surrendered unless the standards specified in condition 17 have been met.

19. The concentration of metals and salts in the soil layer containing discharged material shall comply with the following criteria:

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

20. The conductivity of the soil layer containing discharged material shall be less than 400 mS/m, or alternatively, if the background soil conductivity exceeds 400 mS/m, the application of waste shall not increase the soil conductivity by more than 100 mS/m.

21. After incorporation of the waste within the soil, the sodium absorption ratio (SAR) of the waste soil mix shall not be more than 3 units higher than background soil SAR, or exceed a SAR of 8. Alternatively if the soil SAR exceeds 8, the application of the waste shall not increase the SAR by more than 1.

Receiving environment limits for water

22. The exercise of this consent shall not result in a level of total dissolved salts within any surface water or groundwater of more than 2500 g/m^3.

23. The exercise of this consent shall not result in any contaminant concentration, within surface water or groundwater, which exceeds the background concentration for that particular contaminant, as determined by the Chief Executive, Taranaki Regional Council.

Monitoring and reporting

24. For all waste discharged, the consent holder shall keep records of the following:

    a) the source i.e. the well from which it originated;
    b) composition of wastes, as analysed in condition (4 e);
    c) application areas, including a map showing individual disposal areas with GPS co-ordinates;
    d) volume of wastes applied;
    e) dates of commencement and completion of application events;
    f) 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 on request.

25. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, by 31 August of each year, a report on all records required to be kept in accordance with condition 24, for the period of the previous 1 July to 30 June.

Lapse and review

26. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2017 and/or June 2018 and/or June 2019 and/or June 2025 for the purpose of ensuring that the conditions area 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, or to take into account any Act of Parliament, regulations, national policy statement, and national environmental standard which is relevant to this consent.

Signed at Stratford on 20 December 2018

For and on behalf of
Taranaki Regional Council

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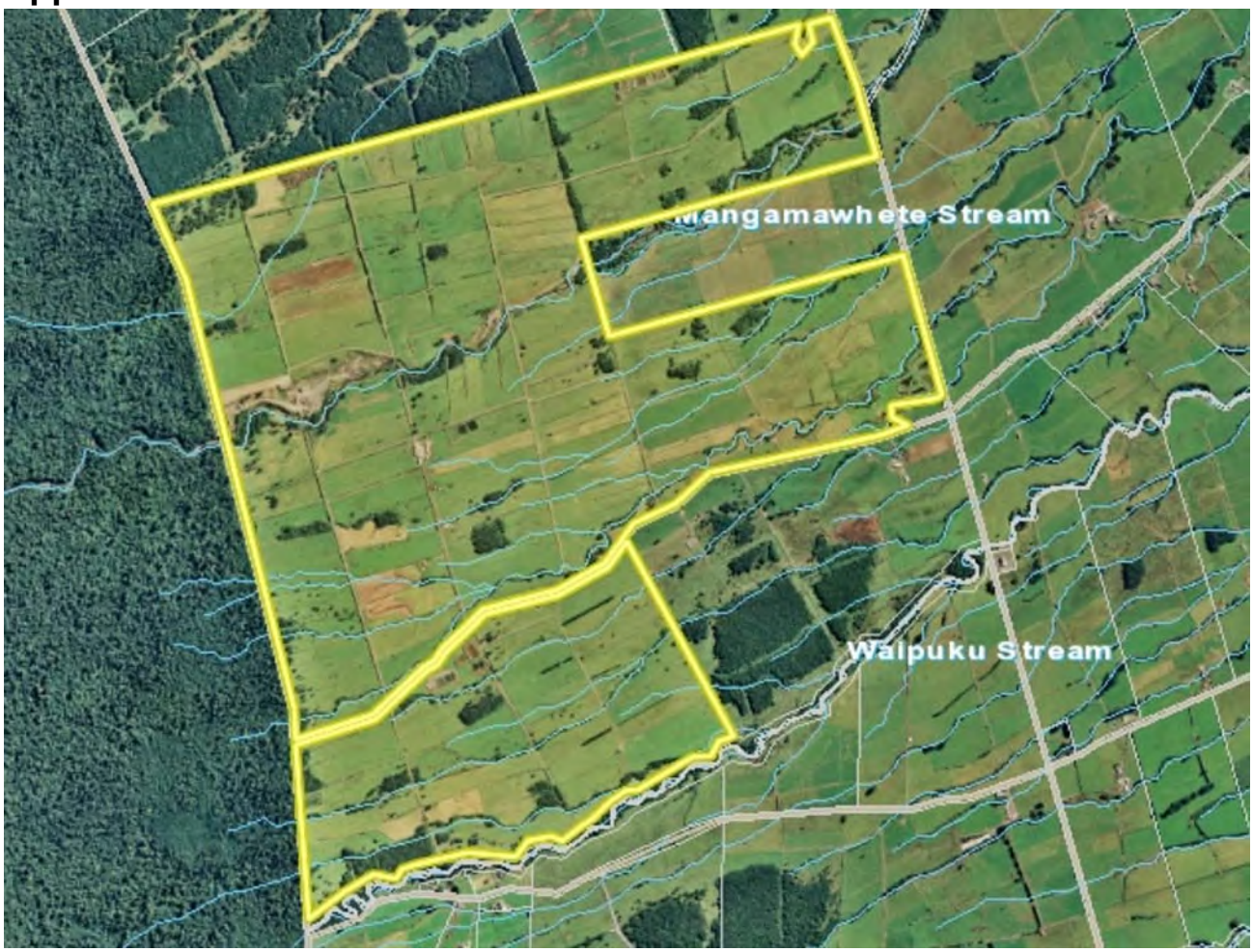
A D McLay
Director - Resource Management

Appendix 1



Appendix II

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 sensitive receptors 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.