

BTW Company Ltd  
Wellington Landfarm  
Monitoring Programme  
Annual Report  
2018-2019

Technical Report 2019-26

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Taranaki Regional Council  
Private Bag 713  
STRATFORD  
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## Executive summary

BTW Company Ltd (the Company) operates a Landfarm (Wellington Landfarm) located on Brown Road, Waitara in the Waitara catchment. The consent held by the Company allowed for the discharge of wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming.

This report for the period July 2018 to June 2019 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds one resource consent, which includes a total of 31 conditions setting out the requirements that the Company must satisfy.

**During the monitoring period, the Company demonstrated an overall good level of environmental performance.**

The Council's monitoring programme for the year under review included three inspections, 12 water and four composite soil samples collected for physicochemical analysis.

The monitoring indicated that the remaining landfarmed area, area F12, is close to its final surrender concentrations. Two soil samples, of the four collected from the landfarmed area, were found to be above the specific concentrations for surrender as required by resource consent.

Groundwater monitoring indicated, in similarity to the previous monitoring period, that trace benzene and total dissolved solid impacts were still apparent in two of the four groundwater monitoring wells on site. The concentrations observed did detail reducing concentrations when compared to the long term records for both parameters. Specifically one monitoring well reported its lowest concentration in terms of total dissolved solids since its inception in 2012.

Further monitoring of the two impacted wells and the final landfarmed area of F12 will be undertaken in the upcoming monitoring period, 2019-2020.

During the year, the Company demonstrated a good level of environmental and high level of administrative performance with the resource consents.

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.

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

This report includes recommendations for the 2019-2020 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 2018 to June 2019 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by BTW Company Ltd (the Company). The Company operates a landfarm situated on Brown Road, Waitara, in the Waitara 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 relate to the discharges of drilling mud and associated drilling wastes within the Waitara Catchment.

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

### 1.1.2 Structure of this report

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

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

**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 2019-2020 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' inasmuch as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

### 1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

#### Environmental Performance

**High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving significant 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 in response to unauthorised incident reports, 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 in response to unauthorised incident reports. 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 in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

#### Administrative performance

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

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

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

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

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.<sup>1</sup>

## 1.2 Process description

### 1.2.1 Hydrocarbon exploration and production wastes management

For the purposes of disposal to land, waste from the petroleum industry can be divided into two broad categories; exploration (drilling) wastes, and production wastes.

#### 1.2.1.1 Exploration wastes

##### Drilling wastes

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

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<sup>1</sup> The Council has used these compliance grading criteria for 15 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

## Drilling fluids

Oil and gas wells may be drilled with either synthetic based mud (SBM) or water based mud (WBM). As the names suggest, these are fluids with either water (fresh or saline) or synthetic oil as a base material, to which further compounds are added to modify the physical characteristics of the mud (for example mud weight or viscosity). More than one type of fluid may be used to drill an individual well. In the past, oil based muds (diesel/crude oil based) have also been used. Their use has declined since the 1980s due to their ecotoxicity; they have been replaced by SBM. SBM use olefins, 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.

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 are normally recovered from return flows during the drilling of a well, for re-use after separation from rock cuttings. They 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.

### 1.2.1.2 Production wastes

#### Produced water

Produced water is subsurface water brought to the surface with oil and gas during the production of a well. It is primarily highly saline water, but its chemistry is altered through direct contact with geological formations and hydrocarbon reservoirs. The physical and chemical properties of produced water vary considerably depending on the geographic location of the field, geological formations, and the type of hydrocarbon product being produced.

Produced water is typically disposed of using deep well injection or similar disposal methods, but fixed quantities have on occasion been disposed of to land following evaluation of chemical concentrations.

#### Fracturing return fluids

Water and sand (proppant) make up 98% to 99.5% of the fluid used in hydraulic fracturing. In addition, chemical additives are used. The exact formulation varies depending on the well. Chemicals serve many functions in hydraulic fracturing. From limiting the growth of bacteria to preventing corrosion of the well casing, chemicals are needed to ensure that the fracturing job is effective and efficient.

The number of chemical additives used in a typical fracture treatment depends on the conditions of the specific well being fractured. A typical fracture treatment will use very low concentrations of between 3 and 12 additive chemicals, depending on the characteristics of the water and the tight sand/shale formations being fractured. Each component serves a specific, engineered purpose. For example, the predominant fluids currently being used for fracture treatments in the gas shales are water-based fracturing fluids mixed

with friction-reducing additives (called slickwater). The addition of friction reducers allows fracturing fluids and sand, or other solid materials called proppants, to be pumped to the target zone at a higher rate and reduced pressure than if water alone were used.

In addition to friction reducers, other additives include: biocides to prevent microorganism growth which can interfere with the gel management system, and to reduce biofouling of the fractures and the production of sour gas; oxygen scavengers and other stabilisers to prevent corrosion of metal pipes; and sometimes used acids that are used to remove drilling mud damage within the near-wellbore area. These fluids are used to create the fractures in the formation and to carry a propping agent (typically silica sand), which is deposited in the induced fractures to keep them from closing up.

The fracturing fluids disposed of to land through landfarming in Taranaki have been return fluids following the completion of hydraulic fracturing jobs. The make-up of these fluids is altered during the fracturing process as these fluids interact with hydrocarbon reservoirs and varying geological formations. This material is tested for an extensive range of contaminants prior to storage and subsequent disposal.

Fracturing fluids are disposed of in Taranaki via deep well re-injection. The discharge to land through landfarming of return fluids following the completion of hydraulic fracturing jobs in Taranaki had been explicitly consented only at the Wellington Landfarm.

### 1.2.2 Landfarming process description

The landfarming process has typically been used in the Taranaki region to assist the conversion of sandy coastal sites prone to erosion into productive pasture. Landfarming is a technology that uses natural and assisted bioremediation to reduce the concentration of petroleum compounds through degradation, while simultaneously utilising the drilling muds to stabilise poor quality sandy soils for subsequent land use.

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).



Figure 1 An example of a landfarmed area Wellington landfarm 2013

The landfarming process utilised at this facility was on a single application basis. This means dedicated spreading areas receive only single applications of waste. Basic steps in the landfarming process include:

1. Waste is transported from wellsites. 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, to re-instate and stabilise the site for future alternative use.

Consent 7884-1.1 allowed for the disposal of drilling wastes, oily wastes, contaminated soil, and production fluids including hydraulic fracturing return fluids.

When disposal is complete, the area is re-instated and the consents surrendered once proven to be suitable for uses such as grazing, following stabilisation and re-grassing. It is proven by providing analytical evidence which will satisfy the specific consented conditions that dictate the acceptable level of certain contaminants in the soil.

### 1.2.3 Site description

The Wellington Landfarm is located on Brown Road, Waitara, on marginal coastal farm land situated on reworked dune fields. The predominant soil type has been identified as black loamy sand. Vegetation growth is primarily a mixture of pasture and dune grasses. Prior to the Wellington property consent (7884-1) being exercised, there were areas of pine (Figure 2) which were subsequently removed and processed.

Average annual rainfall for the site is 1,383 mm (taken from nearby Motunui monitoring station). There are no significant surface water bodies located in the immediate vicinity of the areas that are landfarmed, other than small farm drains. Previous land use at the Wellington section of the landfarm has been a mixture of agriculture and small scale forestry. Further inland there are a number of commercial chicken sheds; one is located on the site (Figure 2 and 3).





Figure 2 Aerial image Wellington Landfarm 2012



Figure 3 Aerial image Wellington Landfarm 2017

## Site data

Location	
Word descriptor:	Brown Road, Waitara, Taranaki
Map reference:	E 1704599
(NZTM)	N 5683484
Mean annual rainfall:	1383 mm
Mean annual soil temperature:	~14.05°C
Mean annual soil moisture:	~33.06%
Elevation:	~10 m asl
Geomorphic position:	Dune backslope
Erosion / deposition:	Erosion
Vegetation:	Pasture, dune grasses
Parent material:	Aeolian deposit
Drainage class:	Free / well draining
Land use:	Active disposal (previously)

## 1.3 Resource consents

The Company holds one resource consent, the details of which are summarised in the table below. Summaries of the conditions attached to the permit are set out in Section 4.3 of this report.

A summary of the consents issued by the Council is provided in appendix I, as is a copy of the consent held by the Company during the period under review.

**Table 1** Resource consent held by Company

Consent number	Purpose	Granted	Review	Expires
<i>Discharges of waste to land</i>				
<b>7884-1.1</b>	To discharge wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming.	July 2011	June 2021	June 2027

## 1.4 Monitoring programme

### 1.4.1 Introduction

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

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

The monitoring programme for the Wellington Landfarm site consisted of three primary components.

## 1.4.2 Programme liaison and management

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

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

## 1.4.3 Site inspections

The Wellington Landfarm site was inspected on three occasions during the monitoring period. Further visits were also undertaken during routine groundwater and soil compliance sampling.

## 1.4.4 Chemical sampling

The Council undertook the sampling of groundwater and soil at the Wellington Landfarm this monitoring period.

### Groundwater

The sampling of the groundwater monitoring well network was undertaken on four occasions this period. Of the four wells which are present on site (Figure 4), two were sampled on four occasions (GND2284 and 2285), one on three occasions (GND2282) and the remaining well (GND2283), on one occasion. (Figure 4).

The monitoring of groundwater was undertaken through the use of low flow peristaltic pump and a YSi flow through cell for field parameters. This method is utilised to assess for impacts to groundwater which may or may not have occurred as process of the exercise of this consent.

### Soil

Soil sampling was undertaken on the final landfarm area of F12 (Figure 5). In this period four composite soil samples were collected from the former landfarm area of F12. The monitoring of soil was undertaken to assess for the reduction of concentrations for target contaminants within the soil over time. Landfarms function as bioremediation technology.

The soil samples were collected via a soil corer, which is inserted to a nominal depth of 400 mm below ground level (bgl) (which encompasses the zone of application) across a landfarmed area. A GPS location is collected at the beginning and at the end of transect which is generally 100 meters long, with a soil core extracted every ten meters across the application area. This method is slightly modified from the Guidelines for the Safe Application of Biosolids to Land in New Zealand (2003).

Table 2 Chemical analytes by medium

Groundwater monitoring parameters		Soil monitoring parameters	
Barium (acid soluble)	Benzene	Calcium	Total petroleum
Barium (dissolved)	Toluene	Chloride	hydrocarbons C <sub>7</sub> -C <sub>9</sub> , C <sub>10</sub> -
Chloride	Ethylbenzene	Conductivity	C <sub>14</sub> , C <sub>15</sub> -C <sub>36</sub> , C <sub>7</sub> -C <sub>36</sub> .
Conductivity	Xylenes	Potassium	Benzene
Sodium	Total petroleum	Moisture factor	Ethylbenzene
Total dissolved salts	hydrocarbons C <sub>7</sub> -C <sub>9</sub> , C <sub>10</sub> -	Magnesium	Toluene
	C <sub>14</sub> , C <sub>15</sub> -C <sub>36</sub> , C <sub>7</sub> -C <sub>36</sub> .	Sodium	Xylenes
	Polycyclic aromatic	Sodium absorption	Ammoniacal nitrogen
	hydrocarbons	ratio (SAR)	Nitrite/nitrate nitrogen
		Total soluble salts	pH
		Naphthalene	Benzo (a) pyrene (BaP)
		Cation exchange	Pyrene

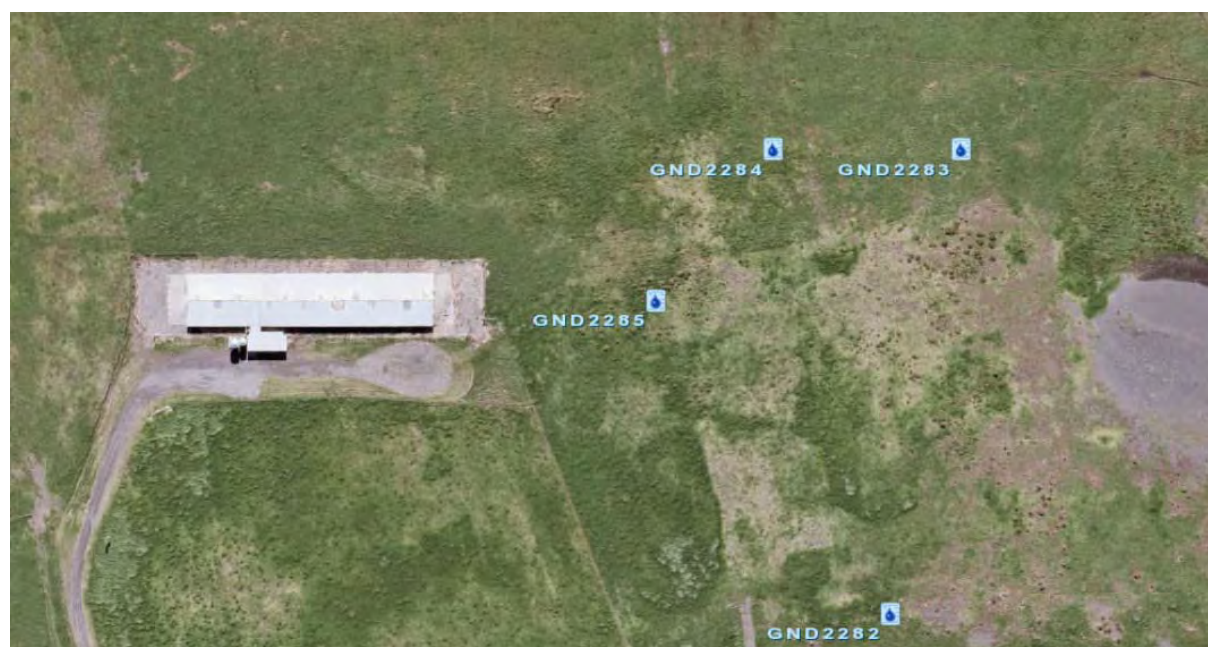


Figure 4 BTW Wellington Landfarm groundwater monitoring locations



## 2 Results

### 2.1 Inspections

04 July 2018

During an inspection of Wellington landfarm, the following was noted. No objectionable odours or visible emissions were found during the inspection. The historic spreading areas were found to have good pasture cover which appeared healthy. No drilling muds were observed at the soil surface and no drilling muds were stored at the site. The foreshore was also inspected and no harmful effects were observed at the time of the inspection. Of note, iron oxide discharge from cliff face was prevalent across the length of the spreading areas.

23 November 2018

During an inspection of Wellington landfarm the following was observed. No objectionable odours or visible emissions were found during the inspection. No recent stockpiling or spreading operations have occurred at the site. The historic spreading areas had complete pasture cover which appeared healthy. On observation, no muds were visible at the surface of the former landfarmed areas. The shoreline was then inspected, no adverse effects were observed at the time of inspection.

02 July 2019

During an inspection of Wellington landfarm the following was noted. No recent mud storage or landfarming activities have occurred at the site. There are no storage pits present. The previous spreading areas had good pasture cover which appeared healthy on observation. There were no muds identified at the soil surface. The shoreline was also inspected, and no adverse effects were observed. Iron oxide was prevalent in the groundwater discharge from the cliff face in two locations.

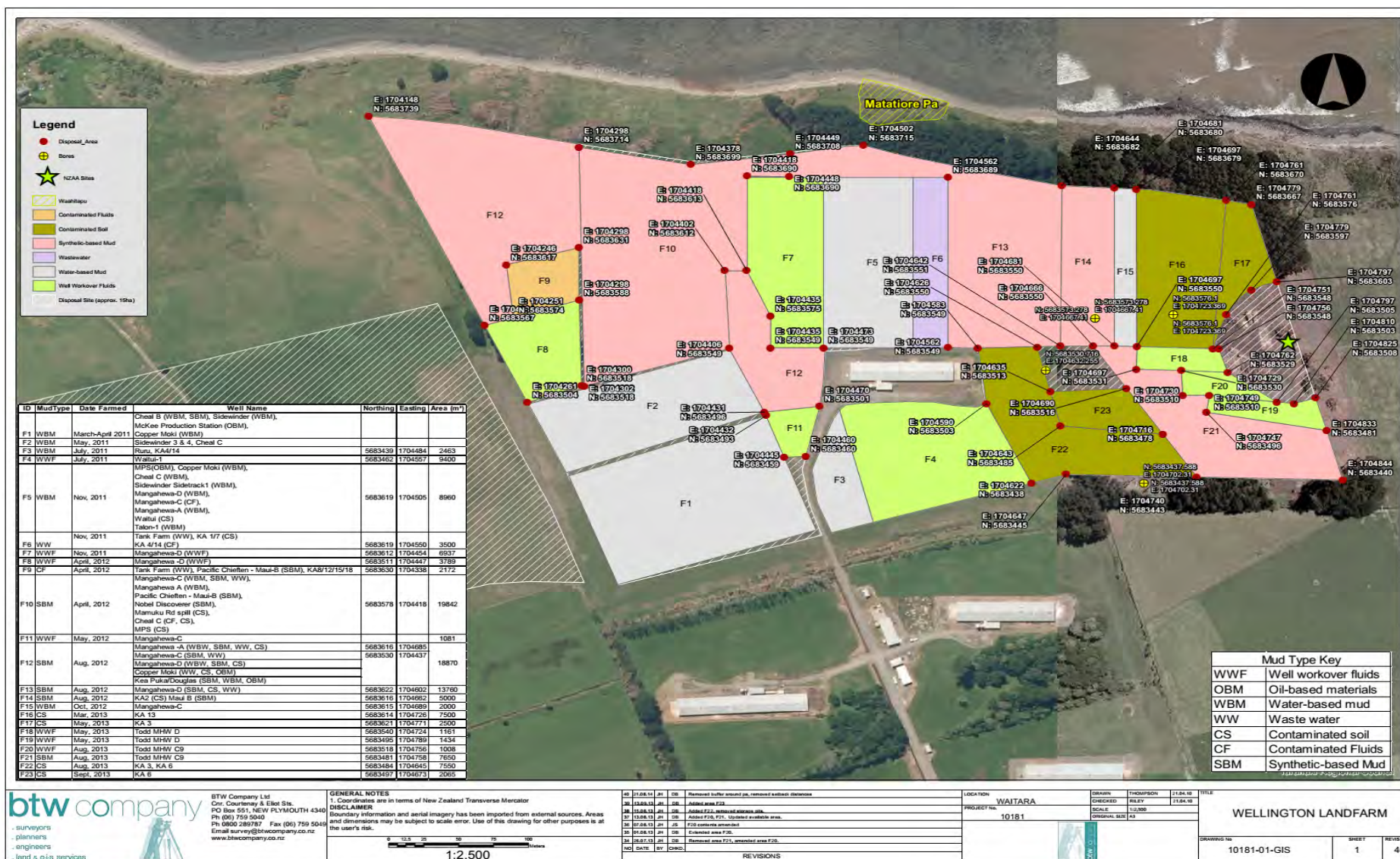
### 2.2 Results of discharge monitoring

To date twenty three locations were utilised across the Wellington Landfarm for applications of drilling wastes under the practice known as landfarming. The applications occurred from March 2011 through to December 2013. The origins of the landfarmed material is provided in the following Table 3. The actual application areas are detailed in Figure 5.

Table 3 Wellington landfarm application dates and waste origins

ID	Mud Type	Date	Well Name
F1	WBM	March-April 2011	Cheal B (WBM, OBM), Sidewinder (WBM), Mckee Production Station (OBM), Copper Moki (WBM)
F2	WBM	May, 2011	Sidewinder 3&4, Cheal C
F3	WBM	July, 2011	Ruru, KA 4/14
F4	WWF	July, 2011	Waitui-1
F5	WBM	Nov, 2011	MPO (OBM), Copper Moki (WBM), Cheal C (WBM), Sidewinder Sidetrack 1 (WBM), Mangahewa-D (WBM), Mangahewa-C (CF), Mangahewa-A (WBM), Waitui (CO), Talon-1 (WBM)
F6	WW	Nov, 2011	Tank Farm (WW), KA 1/7 (CO), KA 4/14 (CF)
F7	WWF	Nov, 2011	Mangahewa-D (WWF)

ID	Mud Type	Date	Well Name
F8	WWF	April, 2012	Mangahewa-D (WWF)
F9	CF	April, 2012	Tank Farm (WW), Pacific Chieften - Maui-B (OBM), KA8/12/15/18
F10	OBM	April, 2012	Mangahewa-C (WBM,OBM,WW), Mangahewa A (WBM), Pacific Chieften - Maui-B (OBM), Nobel Discoverer (OBM), Mamutu Rd Spill (CO), Cheal C (CF,CO), MPO(CO)
F11	WWF	May, 2012	Mangahewa-C
F12	OBM	Aug, 2012	Mangahewa-A (WBM, OBM, WW, CO), Mangahewa-C(OBM, WW),Mangahewa-D (WBW, OBM, CO), Copper Moki (WW, CO, OBM), Kea Puka/Douglas (OBM,WBM,OBM)
F13	OBM	Aug, 2012	Mangahewa-D(OBM,CO,WW)
F14	OBM	Aug, 2012	KA 2 (CO) Maui B(OBM)
F15	WBM	Oct, 2012	Mangahewa-C
F16	CS	Mar,2013	KA 13
F17	CS	May, 2013	KA 3
F18	WWF	May, 2013	Todd MHW D
F19	WWF	May, 2013	Todd MHW D
F20	WWF	Aug, 2013	Todd MHW C9
F21	OBM	Aug, 2013	Todd MHW C9
F22	CS	Aug, 2013	KA 3, KA 6
F23	CS	Dec, 2013	KA 6
WWF: Well work over fluid; OBM: Oil based materials; WBM: Water based muds			
WW: Waste water; CS: Contaminated soil; CF: Contaminated Fluid; SBM: Synthetic based muds; CO contaminated oil.			



## 2.3 Results of receiving environment monitoring

### 2.3.1 Soil sample results

Four composite soil samples were collected from landfarmed area F12 this monitoring period. For context, area F12 is the final landfarmed area to reach surrender concentrations, as defined by consent 7884-1.1. Area F12 was landfarmed in August 2012 and this parcel of land has been monitored by the Council since that date. The analysis as well as the consent defined surrender concentrations is provided in the following Table 4.

Table 4 Soil sample analysis Wellington landfarm 2018-2019

Wellington Landfarm	Area	Consent limit	F12 A	F12 B	F12 C	F12 D
	Collected	surrender	14 Aug 2018	14 Aug 2018	26 Feb 2019	26 Feb 2019
Parameters	Time	7884-1.1	14:30	15:00	13:10	13:30
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	< 0.013	0.012	< 0.011
Acenaphthene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Acenaphthylene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Anthracene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Benzo[a]anthracene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.027	< 0.013	0.015	< 0.011	0.011
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	< 0.04	< 0.04	< 0.03	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	< 0.04	< 0.04	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	0.036	0.042	< 0.011	0.012
Benzo[e]pyrene	mg/kg dry wt	-	0.017	0.022	0.012	0.015
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.018	0.021	0.02	0.019
Benzo[k]fluoranthene	mg/kg dry wt	-	0.015	0.016	< 0.011	< 0.011
Chrysene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Fluoranthene	mg/kg dry wt	-	0.021	0.016	< 0.011	< 0.011
Fluorene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.021	0.019	0.012	0.016
Naphthalene	mg/kg dry wt	7.2	< 0.07	< 0.07	< 0.06	< 0.06
Perylene	mg/kg dry wt	-	0.029	0.026	0.024	0.017
Phenanthrene	mg/kg dry wt	-	< 0.013	< 0.013	< 0.011	< 0.011
Pyrene	mg/kg dry wt	160	0.019	0.029	< 0.011	< 0.011
Total of Reported PAHs in Soil	mg/kg	-	< 0.4	< 0.4	< 0.3	< 0.3
C7 - C9	mg/kg dry wt	120	< 8	< 8	< 8	< 8
C10 - C14	mg/kg dry wt	58	180	146	< 20	< 20
C15 - C36	mg/kg dry wt	4,000	1,720	1,370	240	144
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	1,900	1,520	240	144
Benzene	mg/kg dry wt	1.1	< 0.06	< 0.06	< 0.05	< 0.05

Wellington Landfarm	Area	Consent limit	F12 A	F12 B	F12 C	F12 D
	Collected	surrender	14 Aug 2018	14 Aug 2018	26 Feb 2019	26 Feb 2019
Toluene	mg/kg dry wt	68	< 0.06	< 0.06	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	53	< 0.06	< 0.06	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	48	< 0.12	< 0.11	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	48	< 0.06	< 0.06	< 0.05	< 0.05
Calcium	me/100g	-	16.3	14.5	7.3	7
Magnesium	me/100g	-	0.54	0.51	0.47	0.66
Potassium	me/100g	-	0.3	0.29	0.12	0.14
Sodium	me/100g	-	0.27	0.21	0.12	0.15
Chloride	mg/kg	700	46	25	21	52
Dry Matter (Env)	g/100g as rcvd	-	75	78	91	92
Electrical Conductivity (EC)	mS/cm	290	0.16	0.13	0.06	0.09
MAF Cation Units (QT)		-	K 8 Ca 27 Mg 16 Na 17	K 8 Ca 25 Mg 16 Na 13	K 4 Ca 13 Mg 15 Na 8	K 4 Ca 13 Mg 22 Na 10
Cation exchange capacity	me/100g	-	17	15	8	8
Ammonium-N	mg/kg dry wt	-	7	7	6	5
Nitrate-N	mg/kg dry wt	-	< 1.5	< 1.5	3.8	5.4
Nitrate-N + Nitrite-N	mg/kg dry wt	-	< 1.0	< 1.0	3.9	5.5
Nitrite-N	mg/kg dry wt	-	< 1.0	< 1.0	< 1.0	< 1.0
Olsen Phosphorus	mg/L	-	10	11	8	6
pH	pH Units	-	7.8	7.8	7.5	7.6
Sodium Absorption Ratio (SAR)		18	2.4	2	NR	NR
Soluble Salts (Field)	%	0.25	0.06	< 0.05	< 0.05	< 0.05
Total Base Saturation	%	-	100	100	100	100
NR= no results: The SAR has been low at this monitoring location with previous sample indicating a low value						

The analysis indicated, that of the four soil samples collected, two reported values above the limit for surrender for mid-range C<sub>10</sub>-C<sub>14</sub> total petroleum hydrocarbons (TPH) (August 2018, F12 A (180 mg/kg) and F12 B (146 mg/kg)). The surrender limit, as set by the consent is a limit of 58 mg/kg for C<sub>10</sub>-C<sub>14</sub>.

The remaining analysis indicated that the other consent defined parameters for surrender have been met, with all four samples indicating compliance with consent defined parameters, apart from the mid-range TPH. The location of soil sample transects in relation to Area F12 is provided in Figure 6.





Figure 6 Soil sample transect map Wellington Landfarm 2018-2019

For context, in October 2013 total petroleum hydrocarbons all chains ( $C_7$ - $C_{36}$ ) within area F12 held a concentration of 23,000 mg/kg, by May 2016 this value had reduced to 9,200 mg/kg. The June 2017 sample collected at the end of the 2016-2017 monitoring period indicated a total value of 8,600 mg/kg. In the previous monitoring period, 2017-2018, the samples collected ranged from 200-4,000 mg/kg TPH ( $C_7$ - $C_{36}$ ). While in this period  $C_7$ - $C_{36}$  ranged 144-1,900 mg/kg. Thus the reduction in TPH is on-going and the remaining area of F12 is close to surrender concentrations.

### 2.3.2 Groundwater monitoring

The sampling of the groundwater monitoring well network was undertaken on four occasions this period. The rationale for the diminishing number of sampling rounds was due to the wells GND2282 and 2283 indicating a return to background groundwater conditions. Thus these wells have been removed from further monitoring in the upcoming monitoring period. The Council has sampled these monitoring wells quarterly since September 2012. The analysis is provided in the following Tables 5-8.

Table 5 GND2282 2018-2019 monitoring results

BTW Wellington	Site	GND2282	GND2282	GND2282
Landfarm	Collected	14/08/2018	08/10/2018	26/02/2019
Parameter	Time	10:45	09:40	10:15
Electrical Conductivity (EC)	mS/m	88.9	99	91.9
pH	pH Units	6.8	6.8	6.9
LEVEL	m	2.03	2.29	2.685
Temperature	°C	15.3	15.5	16.7
Dissolved Barium	g/m <sup>3</sup>	0.065	0.08	0.071
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11	< 0.11	< 0.11
$C_7 - C_9$	g/m <sup>3</sup>	<b>0.13</b>	< 0.06	< 0.06
$C_{10} - C_{14}$	g/m <sup>3</sup>	< 0.2	< 0.2	< 0.2
$C_{15} - C_{36}$	g/m <sup>3</sup>	< 0.4	< 0.4	< 0.4
Total hydrocarbons ( $C_7 - C_{36}$ )	g/m <sup>3</sup>	< 0.7	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002	< 0.002

BTW Wellington	Site	GND2282	GND2282	GND2282
Landfarm	Collected	14/08/2018	08/10/2018	26/02/2019
Parameter	Time	10:45	09:40	10:15
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010
Sample Temperature	°C	15.3	15.5	16.7
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	530	700	500
Chloride	g/m <sup>3</sup>	109	135	132
Total Sodium	g/m <sup>3</sup>	80	88	88

Table 6 GND2283 2018-2019 monitoring results

BTW Wellington	Site	GND2283
Landfarm	Collected	14/08/2018
Parameter	Time	11:30
Electrical Conductivity (EC)	mS/m	57.9
pH	pH Units	6.4
LEVEL	m	2.185
TEMP	°C	14.9
Dissolved Barium	g/m <sup>3</sup>	0.066
Acid Soluble Barium	g/m <sup>3</sup>	< 0.11
C <sub>7</sub> - C <sub>9</sub>	g/m <sup>3</sup>	< 0.06
C <sub>10</sub> - C <sub>14</sub>	g/m <sup>3</sup>	< 0.2
C <sub>15</sub> - C <sub>36</sub>	g/m <sup>3</sup>	< 0.4
Total hydrocarbons (C <sub>7</sub> - C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7
Benzene	g/m <sup>3</sup>	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010
Sample Temperature	°C	14.9
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	310
Chloride	g/m <sup>3</sup>	97
Total Sodium	g/m <sup>3</sup>	47

Table 7 GND2284 2018-2019 monitoring results

BTW Wellington	Site	GND2284	GND2284	GND2284	GND2284
Landfarm	Collected	14/08/2018	08/10/2018	26/02/2019	08/05/2019
Parameter	Time	12:15	11:45	10:45	10:30
Electrical Conductivity (EC)	mS/m	680	633	516	471
pH	pH Units	5.8	4.4	6.1	6.1
LEVEL	m	1.183	1.898	2.361	1.808
TEMP	°C	15.4	16.2	18.2	17.3
Dissolved Barium	g/m <sup>3</sup>	1.94	1.77	2.2	2.1
Acid Soluble Barium	g/m <sup>3</sup>	1.89	1.65	2.1	2.1
C <sub>7</sub> - C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06	< 0.06	< 0.06
C <sub>10</sub> - C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2	< 0.2	< 0.2

BTW Wellington	Site	GND2284	GND2284	GND2284	GND2284
Landfarm	Collected	14/08/2018	08/10/2018	26/02/2019	08/05/2019
Parameter	Time	12:15	11:45	10:45	10:30
C <sub>15</sub> - C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> - C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	<b>0.128</b>	<b>0.061</b>	<b>0.11</b>	<b>0.049</b>
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010	<b>0.0011</b>	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Sample Temperature	°C	15.4	16.2	18.2	17.3
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	<b>3,900</b>	<b>3,600</b>	<b>3,000</b>	<b>2,900</b>
Chloride	g/m <sup>3</sup>	2,300	2,100	1,580	1,130
Total Sodium	g/m <sup>3</sup>	550	510	450	350

Table 8 GND2285 2018-2019 monitoring results

BTW Wellington	Site	GND2285	GND2285	GND2285	GND2285
Landfarm	Collected	14/08/2018	08/10/2018	26/02/2019	08/05/2019
Parameter	Time	13:00	10:40	11:30	11:15
Electrical Conductivity (EC)	mS/m	410	440	376	325
pH	pH Units	6.2	6.3	6.3	6.3
LEVEL	m	0.774	1.476	2.01	1.596
TEMP	°C	15	15.6	18.1	18
Dissolved Barium	g/m <sup>3</sup>	1.27	1.36	1.12	1.17
Acid Soluble Barium	g/m <sup>3</sup>	1.23	1.3	1.12	1.14
C <sub>7</sub> - C <sub>9</sub>	g/m <sup>3</sup>	< 0.06	< 0.06	< 0.06	< 0.06
C <sub>10</sub> - C <sub>14</sub>	g/m <sup>3</sup>	< 0.2	< 0.2	< 0.2	< 0.2
C <sub>15</sub> - C <sub>36</sub>	g/m <sup>3</sup>	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C <sub>7</sub> - C <sub>36</sub> )	g/m <sup>3</sup>	< 0.7	< 0.7	< 0.7	< 0.7
Benzene	g/m <sup>3</sup>	<b>0.02</b>	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m <sup>3</sup>	0.006	< 0.002	< 0.002	< 0.002
o-Xylene	g/m <sup>3</sup>	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Sample Temperature	°C	15	15.6	18.1	18
Total Dissolved Solids (TDS)	g/m <sup>3</sup>	2,400	<b>3,300</b>	2,200	2,100
Chloride	g/m <sup>3</sup>	1,170	1,230	1,030	830
Total Sodium	g/m <sup>3</sup>	470	490	450	400

GND2282 (Table 5). In this monitoring period a trace value for TPH chain C<sub>7</sub>-C<sub>9</sub> was reported (0.13 g/m<sup>3</sup>) during the August 2018 monitoring round. It is noteworthy to mention that this result was viewed as an outlier. The last recorded TPH value at this monitoring location was during the 2013-2014 monitoring period (0.5 g/m<sup>3</sup> C<sub>15</sub>-C<sub>36</sub>, 25 February 2014). This was confirmed through subsequent sample rounds, with no values above the limit of detection recorded in the two following monitoring rounds.

The August 2018 result was the only reported value for any analyte of petroleum origin across the three rounds undertaken on this monitoring well. This included benzene, toluene, ethylbenzene and xylenes (BTEX) (M, P & O) which were all below the limit of detection. The associated salts values for total dissolved solids were reported below the consented value of 2,500 g/m<sup>3</sup> across the three monitoring rounds undertaken.



GND2283 (Table 6). One singular sample was collected from this monitoring well this period. The singular analysis aligned with the previous monitoring period's results (Technical Report 2018-46). That of limited impacts and a return to background concentrations. No petroleum related impacts were observed in the analysis undertaken. The associated TDS concentration was similarly well below the consented value of 2,500 g/m<sup>3</sup>.

GND2284 (Table 7). In similarity to the previous monitoring period, where benzene was observed at low concentrations across all four monitoring rounds undertaken on this well (Technical Report 2018-46). This period benzene was again observed in all four monitoring rounds. The values reported (0.049-0.128 g/m<sup>3</sup>) were marginally higher than the values reported in the 2017-2018 monitoring period (0.077-0.1 g/m<sup>3</sup>). However, the current monitoring period observed a greater range and a lower median value (benzene 2017-18 median 0.0905 g/m<sup>3</sup>, benzene 2018-2019 median value 0.0855 g/m<sup>3</sup>). Trace toluene was observed on one occasion (0.0011 g/m<sup>3</sup>) during the February 2019 sample round. No reported values for TPH, all chains, were observed this monitoring period across the four rounds undertaken.

Reported TDS values across all four monitoring rounds were elevated above the consented value (SC21-Consent 7884-1.1) of 2,500 g/m<sup>3</sup>. The values reported this period (range 2,900-3,900 g/m<sup>3</sup>) were lower than the previous monitoring period (range 2017-2018 4,100-5,067 g/m<sup>3</sup>).

Of note, the pH did indicate a drop in values to a value of 4.4 pH, observed in the October 2018 monitoring round. This was the lowest pH value observed in this data set since September 2012. The following monitoring rounds indicate an increase to 6.1 pH.

Similarly chloride (range 1,130-2,300 g/m<sup>3</sup>) and sodium (range concentrations 350-550 g/m<sup>3</sup>) concentrations decreased when compared to the previous monitoring period's results, (2017-2018, chloride 2,200-2,410 g/m<sup>3</sup> and sodium 590-607 g/m<sup>3</sup>).

GND2285 (Table 8). The analysis reported this period indicated a reduction in benzene values. For context, in the previous monitoring period (2017-2018) benzene was reported across all four monitoring rounds (range 0.067- 0.139 g/m<sup>3</sup>). In this period, only one detection of benzene was reported during the August 2018 monitoring round (0.02 g/m<sup>3</sup>). M & p xylene was also reported during the August 2018 monitoring round with a trace value of 0.006 g/m<sup>3</sup>. The following monitoring rounds did not report benzene or m & p xylene values above the limit of detection which is set by the laboratory at 0.0010 g/m<sup>3</sup> for benzene and 0.002 g/m<sup>3</sup> for m & p xylene.

Associated salt analysis, TDS, chloride and sodium also reported a reduction in values throughout the monitoring period. For context, legacy impacts associated with elevated salts within groundwater had been observed in this well since 2012, with the well holding values in excess of the consented value of 2,500 g/m<sup>3</sup>. In this monitoring period one monitoring round (October 2018, 3,300 g/m<sup>3</sup> TDS) reported a TDS value above the consented value. The remaining monitoring rounds indicated values which were below the value of 2,500 g/m<sup>3</sup>.

## 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 2018-2019 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. A summary of current non-compliances, in relation to the Wellington Landfarm are provided in Table 9.

**Table 9 Non-compliances BTW Wellington Landfarm 2018-2019**

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
01 July 2018-30 June 2019	Monitoring of groundwater in this monitoring period (2018-2019) identified elevated TDS concentrations within two monitoring wells (GND2284 all four rounds and GND2285 one round) above condition 22 conditional limit of 2,500 g/m3 TDS. This is a legacy issue from the storage of material in unlined storage cells.	N	Infringement notice issued at the time	Monitoring wells were installed post the incident and they have been sampled ever since.
Historical Date 14 August 2014	For context in 2014-2015 monitoring period the following was observed: During routine monitoring it was suspected that the drilling waste storage pits were leaching contaminant to groundwater in breach of resource consent conditions at a drilling mud disposal site at Brown Road, Waitara.			Legacy impacts in terms total dissolved salts still above consent defined limit in one monitoring well (GND2284) and on one occasion in another (GND2285).  Both monitoring locations are now demonstrating a reducing value over time.

## 3 Discussion

### 3.1 Discussion of site performance

The Wellington Landfarm is in its final stages of remediation. The final landfarmed area of F12 has been observed to be slowly remediating back to surrender conditions since its initial landfarming date of August 2012. The degree of remediation has been discussed earlier in this report. The soil analysis reported this period indicated that of the four soil samples collected from F12, two of the four were marginally over the surrender concentrations of 58 mg/kg for mid-range TPH C<sub>10</sub>-C<sub>14</sub>.

The inspections of the site indicated that the site contained good pasture cover which appeared healthy. No adverse effects were observed during inspections, this included the shoreline which was also inspected.

The final area of F12 will continue to be monitored for total petroleum hydrocarbons until it has reached its conditional limit to allow surrender to occur.

### 3.2 Environmental effects of exercise of consents

In similarity to the previous monitoring period, the main environmental effect associated with the exercise of consent at the Wellington Landfarm was centred on elevated salts within the groundwater in the near proximity to the former storage pit area. These elevated saline impacts were also coupled with trace benzene concentrations within two of four groundwater monitoring wells. The Council has continued to monitor these effects for the life of this consent, which came into force in the 2011-2012 monitoring period.

The current monitoring period reported a reduction in saline and benzene values within the long term impacted well of GND2285. The reduction in saline impacts is the lowest reported since the inception of the monitoring location in September 2012.

Conversely, monitoring well GND2284 remains impacted. Saline impacts, in terms of elevated TDS were reported across all four rounds. These elevated values were found to be above the conditional limit, set by consent of 2,500 g/m<sup>3</sup>. Benzene concentration were of greater range than the previous monitoring period, however contained a lower median value.

It should be noted that no effects to groundwater or surface water have been recorded beyond the site boundary.

Soil analysis of the final landfarmed location F12 indicated that this area is very close to reaching its surrender concentrations. Further monitoring is proposed in the upcoming monitoring period. The only parameter which remains above the surrender criteria, as defined by the current monitoring results is mid-range petroleum hydrocarbons C<sub>10</sub>-C<sub>14</sub>.

### 3.3 Evaluation of performance

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

Table 10 Summary of consent performance for consent 7884-1.1 2018-2019 monitoring period

<b>Purpose: To discharge wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Consent application definition	Not applicable	N/A
2. Definitions which apply to the consent	Not applicable	N/A
3. Best practicable option to be adopted	Inspections and liaison with consent holder	Yes
4. Only specified wastes to be discharged	Not applicable as no deliveries in this monitoring period	N/A
5. Notification 48 hours prior to stockpiling	Not applicable as no deliveries in this monitoring period	N/A
6. Notification 48 hours prior to landfarming	Not applicable as no landfarming operations in this monitoring period	N/A
7. Sample of wastes from each individual source to be collected and analysed	Not applicable as no landfarming operations have been undertaken since September 2013	N/A
8. Keep records relating to wastes, areas, compositions, volumes, dates, treatments and monitoring	Information provided by consent holder	Yes
9. Report on records in to Council by 31 August	Report received 27 August 2019	Yes
10. Well work-over fluids to be stored in tank or pit	Inspections and information provided by consent holder indicated WWF was stored in a lined cell. Though no longer stockpiling and landfarming completed in September 2013	N/A
11. Liquid oily wastes to be stored in tank or mixed into pit	None received during monitoring period	N/A
12. All wastes landfarmed ASAP or within 12 months	Inspections and information provided by consent holder	Yes
13. Well work-over fluids to be kept separate from other waste types	Inspections and information provided by consent holder	Yes
14. No waste to be discharged into F1 and F2 areas	Inspections and information provided by consent holder	Yes
15. Solid waste to be applied either 100 mm or 50 mm thick depending on hydrocarbon concentration	Inspections and information provided by consent holder	Yes

Purpose: To discharge wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
16. Parameters for rate of liquid waste application	Inspections and information provided by consent holder	Yes
17. Incorporation of solid wastes to a depth of at least 250 mm ASAP	Inspections and information provided by consent holder	Yes
18. Hydrocarbon concentration shall not exceed 50,000 mg/kg dry weight	Sampling and information provided by consent holder	Yes
19. Single application of wastes to each area of land	Inspections and information provided by consent holder	Yes
20. No discharge within 25m of a water body, property boundary or within 50m of the Tasman Sea	Inspections and information provided by consent holder	Yes
21. Re-vegetate landfarmed areas as soon as practicable	Inspections and information provided by consent holder	Yes
22. Total dissolved salts in surface water or groundwater shall not exceed 2,500 g/m <sup>3</sup>	Groundwater sampling indicated that monitoring well GND2284 held a value above this limit throughout the monitoring period, though it demonstrated a reducing value across the four rounds  GND2285 exceeded this value on one occasion of four (October 2018)	<b>No, but reducing</b>
23. Contaminants in surface or groundwater not to exceed background concentrations	Groundwater sampling indicated that monitoring well GND2284 held trace values of benzene throughout the monitoring period, though it demonstrated a reducing value across the four rounds. Trace toluene was also recorded on one occasion  GND2285 recorded benzene on one occasion at the beginning of the monitoring period  Note these results are in close proximity to the storage cells and have not been recorded beyond the site boundary	<b>No, but reducing</b>
24. Conductivity must be less than 400 mS/m. If background conductivity exceeds 400 mS/m, then increase shall not exceed 100 mS/m	Sampling	Yes
25. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Sampling	Yes
26. Concentration of metals in soil to comply with guidelines	Long term analysis of soil metal concentration indicated compliance with this condition	Yes

<b>Purpose: To discharge wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
27. Levels of contaminants prior to expiry, cancellation, or surrender of consent	One area remains above surrender criteria, Area F12 is marginally above the surrender conditions for mid-range hydrocarbons only	N/A
28. Consent may not be surrendered until condition 27 is satisfied	See above, site not yet surrendered	N/A
29. Notification of discovery of archaeological remains	None found	N/A
30. Consent to lapse in 2016 unless given effect to	Consent exercised	N/A
31. Optional review provision re environmental effects	Next optional review in June 2015	N/A
Overall assessment of environmental performance in respect of this consent		<b>Good</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

Table 11 Evaluation of environmental performance over time

<b>Year</b>	<b>Consent no</b>	<b>High</b>	<b>Good</b>	<b>Improvement req</b>	<b>Poor</b>
2011-2012	7884-1		1		
2012-2013	7884-1				1
2013-2014	7884-1		1		
2014-2015	7884-1.1		1		
2015-2016	7884-1.1		1		
2016-2017	7884-1.1		1		
2017-2018	7884-1.1		1		
Totals		0	6	0	1

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

### 3.4 Recommendations from the 2017-2018 Annual Report

In the 2017-2018 Annual Report, it was recommended:

1. THAT monitoring of consented activities at the Wellington Landfarm in the 2018-2019 year continues at the same level as in 2017-2018 in the first instance.
2. However, if the initial two soil samples in the 2018-2019 indicate that area F12 has fully met its conditional limit for surrender. Area F12 will be accepted as surrenderable.
3. It is proposed that groundwater monitoring continue with all four wells for one more round in the upcoming monitoring period. If monitoring locations GND2282 and 2283 continue to exhibit concentrations below consented obligations, they will be removed from further monitoring.
4. Monitoring wells GND2284 and GND2285 will continue to be monitored until conditional limits for surrender are met.

5. THAT should there be issues with environmental or administrative performance in 2018-2019, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation implementation was as follows:

- Recommendation 1 was undertaken.
- Recommendation 2 was undertaken, however the initial two soil samples identified TPH mid-range hydrocarbons above the surrender limit, thus the area was not surrendered.
- Recommendation 3 was undertaken: however the initial round of groundwater monitoring in the 2018-2019 period identified trace C<sub>7</sub>-C<sub>9</sub> in GND2282, thus an additional two rounds of monitoring were undertaken on GND2282 which allowed for a decision to be made to cease monitoring of this monitoring location. GND2283 was assessed on one occasion found to be close to background conditions, as had been observed in the previous monitoring period, thus this was excluded from further monitoring. The remaining two wells of GND2284 and 2285 will continue to be monitored until contaminants of concern have reduced to background concentrations or below the limit of detection in the case of benzene.
- Recommendation 4 was implemented.
- Recommendation 5 was not required this period.

### 3.5 Alterations to monitoring programmes for 2019-2020

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 is proposed that for 2019-2020 monitoring period the following amendments be undertaken:

- The monitoring of groundwater monitoring wells GND2282 and GND2883 cease.
- The monitoring of groundwater monitoring wells GND2284 and GND2885 continue until conditional limits for surrender are met.
- The monitoring of area F12 (final area) continue for one more round of two composite soils samples for total petroleum hydrocarbons only. The results of these proposed soil samples will determine whether further soil sampling is required. If these result in elevated contaminants of concern then further soil sampling will be required.

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 2019-2020.

## 4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Wellington Landfarm in the 2019-2020 year be amended from that undertaken in 2018-2019, by the following:
2. The monitoring of groundwater monitoring wells GND2282 and GND2883 will cease.
3. The monitoring of groundwater monitoring wells GND2284 and GND2885 will continue until conditional limits for surrender are met.
4. The monitoring of area F12 (final area) will continue for one more round of two composite soil samples for total petroleum hydrocarbons only. The results of these proposed soil samples will determine whether further soil sampling is required. If these result in elevated contaminants of concern then further soil sampling will be required.
5. THAT should there be issues with environmental or administrative performance in 2019-2020, 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:

Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in mS/m.
Cu*	Copper.
DO	Dissolved oxygen.
g/m <sup>2</sup> /day	Grams/metre <sup>2</sup> /day.
g/m <sup>3</sup>	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m <sup>2</sup>	Square Metres.
mS/m	Millisiemens per metre.
NH <sub>4</sub>	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH <sub>3</sub>	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO <sub>3</sub>	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
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.

\*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

For further information on analytical methods, contact a Science Services Manager.

## Bibliography and references

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Taranaki Regional Council, 2013: BTW Company Ltd Brown Road -Wellington Landfarm Monitoring Programme Biennial Report 2011-2013. Technical Report 13-62.



## Appendix I

### Resource consents held by BTW Company Ltd

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

Consent number	Purpose	Granted	Review	Expires
7884-1.1	To discharge wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming.	July 2011	June 2021	June 2027

#### 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: BTW Company Limited  
PO Box 551  
New Plymouth 4340

Decision Date  
(Change): 19 March 2015

Commencement Date  
(Change): 19 March 2015 (Granted Date: 8 July 2011)

**Conditions of Consent**

Consent Granted: To discharge wastes from hydrocarbon exploration, well work-over, production and storage activities, onto and into land via landfarming

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2016, June 2021

Site Location: 70 Brown Road, Waitara  
(Property owner: HV & MC Wellington)

Legal Description: Lot 1 DP 5462 Blk III Paritutu SD (Discharge site)

Grid Reference (NZTM) 1704600E-5683480N

Catchment: Waitara

*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. This consent applies only to areas F12 and F18, as detailed in attached drawing no 10181-01-GIS Revision 40.
2. For the purposes of this consent the following definitions shall apply:
  - a) 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.
  - b) 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.
3. The consent holder shall adopt the best practicable option (as defined section 2 of the Resource Management Act 1991) to prevent or minimise any actual or potential effects on the environment arising from the discharge.
4. Only those wastes specified in application 6815 shall be discharged.

### **Notifications, monitoring and reporting**

5. 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. 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.
6. 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 wastes. 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 landfarmed;
  - d) the volume of the waste to be landfarmed;
  - e) the concentration of hydrocarbons in the waste; and
  - f) the specific location and area over which the waste will be landfarmed.



## Consent 7884-1.1

7. The consent holder shall take a representative sample of the wastes 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) chloride, nitrogen, pH, potassium, and sodium; and
- e) for well work-over fluids only, ethylene glycol, gluteraldehyde, hexavalent chromium and methanol;

and shall provide the results to the Chief Executive, Taranaki Regional Council, prior to landfarming the wastes.

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

- a) composition of wastes;
- b) storage area(s);
- c) volumes of material stored;
- d) landfarming area(s), including a map showing individual disposal areas with GPS co-ordinates;
- e) volumes and weights of wastes landfarmed;
- f) dates of commencement and completion of storage and landfarming events;
- g) dates of sowing landfarmed areas;
- h) photographic evidence of pasture establishment;
- i) treatments applied;
- 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.

9. 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 8, for the period of the previous 12 months, 1 July to 30 June.

### Storage

10. Well work-over fluids requiring storage prior to landfarming, shall be stored in a tank, or in a pit with an impermeable synthetic liner.
11. Liquid oily wastes shall be either:
- a) stored in a tank, or in a pit with an impermeable synthetic liner; or
  - b) mixed directly into a pit containing a suitable volume of water based mud waste, in a manner that prevents the liquid oily wastes entering the ground.
12. All wastes must be landfarmed as soon as practicable, but no later than twelve months after being brought onto the site.

### **Discharge limits**

13. Well work-over fluids shall be kept separate and distinct from other waste types.
14. No wastes shall be discharged in the F1 and F2 areas landfarmed under consent 7670-1.
15. 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.
16. For the purposes of landfarming, liquid wastes shall be applied to land:
  - a) at a rate not exceeding 1 cubic metre of waste per 4 square metres of land; and
  - b) at a rate such that there is no overland flow of liquids; and
  - c) at a rate such that no ponded liquids remain after one hour, after application.
17. As soon as practicable following the application of solid wastes to land, the consent holder shall incorporate the wastes into the soil to a depth of at least 250 mm.
18. The hydrocarbon concentration in the soil over the landfarming area shall not exceed 50,000 mg/kg dry weight at any point where:
  - a) liquid waste has been discharged; or
  - b) solid waste has been discharged and incorporated into the soil.
19. Any areas of land used for the landfarming of wastes in accordance with conditions 15-17 of this consent, shall not be used for any subsequent discharges of waste.
20. No discharge shall take place within 25 metres of surface water courses or of property boundaries, or within 50 metres of Mean High Water Springs.
21. As soon as practicable following landfarming, areas shall be sown into pasture (or into crop). The consent holder shall monitor revegetation and if adequate establishment is not achieved within two months of sowing, shall undertake appropriate land stabilisation measures to minimise wind and stormwater erosion.

### **Receiving environment limits - water**

22. The exercise of this consent shall not result in the concentration of total dissolved salts in any fresh water body exceeding 2500 g/m<sup>3</sup>.
23. Other than as provided for in condition 22, the exercise of this consent shall not result in any contaminant concentration, within surface water or groundwater, which after reasonable mixing, exceeds the background concentration for that particular contaminant.

### Receiving environment limits - soil

24. The conductivity of the soil/waste layer after landfarming shall be less than 400 mS/m, or alternatively, if the background soil conductivity exceeds 400 mS/m, the landfarming of waste shall not increase the soil conductivity by more than 100 mS/m.
25. The sodium absorption ratio (SAR) of the soil/waste layer after landfarming shall be less than 18.0, or alternatively if the background soil SAR exceeds 18.0, the landfarming of waste shall not increase the SAR by more than 1.0.
26. The concentration of metals in the soil shall at all times comply with the guidelines for heavy metals in soil set out in Table 7.1, Section 7 of the Ministry for the Environment and New Zealand Water & Wastes Association's Guidelines for the safe application of biosolids to land in New Zealand (2003).
27. From 1 March 2027 (three months prior to the consent expiry date), constituents in the soil shall not exceed the standards shown in the following table:

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

MAHs - benzene, toluene, ethylbenzene, xylenes

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

TPH - total petroleum hydrocarbons (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 2027, the consent holder applies for a new consent to replace this consent when it expires, and that application is not subsequently withdrawn.

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

### Archaeological remains

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

**Lapse and review**

30. This consent shall lapse on 30 September 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
31. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2016 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.

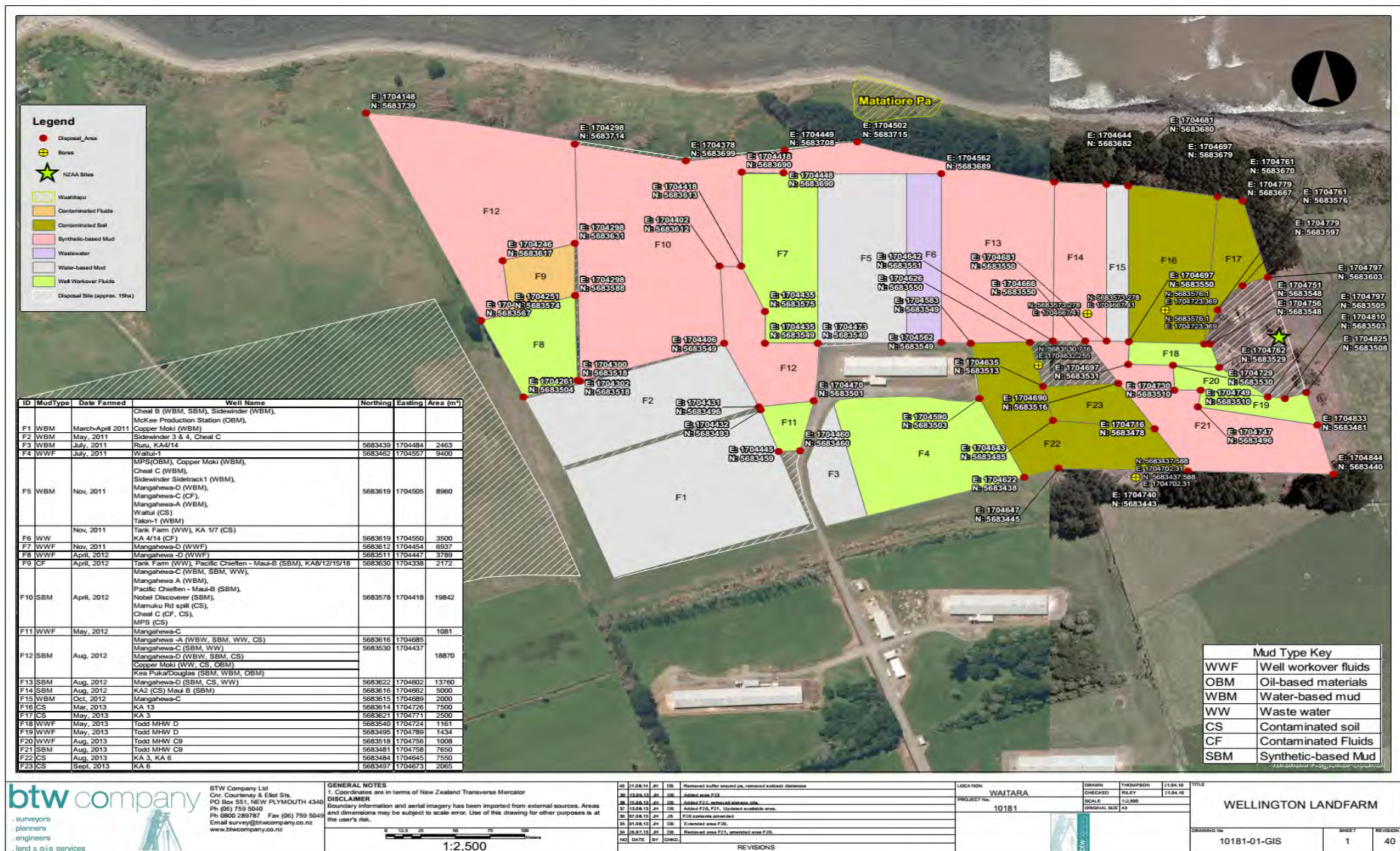
Signed at Stratford on 19 March 2015

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**

# Consent 7884-1.1





## Appendix II

Company provided annual report





Your Reference : Wellington Landfarm Annual Report letter -  
Consent 7884

Our Reference : 10181

27th August 2019

Taranaki Regional Council  
Private Bag 713  
Stratford  
New Zealand  
Attn: Nathan Crook

Dear Nathan,

**Wellington Landfarm Annual Compliance Letter - Consent 7884**

In accordance with Special Condition 8 (SC8) of resource consent 7884 -1 it is a requirement that:

*The consent holder provides 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 Special Condition 7 (SC7), for the period of the previous 1 July to 30 June.*

Due to the site being decommissioned and in agreement with the Taranaki Regional Council (TRC) a letter format was deemed sufficient to comply with SC8 of resource consent 7884-1.

**JULY 2018 TO JUNE 2019 – SUMMARY**

As stated previously, the site was completely decommissioned during the 2013-2014 monitoring period. Therefore, no new material has been taken to the site in the last five monitoring periods.

Pasture establishment has again been excellent across the site, especially considering there has been minimal farm management of the site, which accounts for the abundant array of weed species within the vegetation cover, see figure 1, 2 and 3 below.

All environmental data collected has been undertaken by the TRC. The F12 area is the last landfarmed area to be monitored by the TRC. F12 was sampled on August 14, 2018 and then again on February 26, 2019, with the last round of soil sampling indicated the F12 area had met the resource consent surrender criteria.

Over the monitoring period no infringement notices or abatement notices have been issued by the TRC.

Figure 1, 2 and 3 shows the current state of the site, which is completely vegetated with a mixture of weeds and grass species and is currently used for grazing dry stock.



**Figure 1: Browns Road Decommissioned Land Farm East toward Waitara**



**Figure 2: Browns Road Decommissioned Land Farm Looking West**



**Figure 3: Brown Road Decommissioned Land Farm Looking North West**



## ON GOING SOIL MONITORING

All historical soil sampling results recorded no elevated levels of heavy metals in the soil. All levels fall well below the biosolids guideline values set by the Ministry for the Environment to protect human health and the environment, plus to safeguard the life-supporting capacity of soils.

All the land farmed areas are measured against the Ministry for the Environment guidelines for assessing and managing petroleum hydrocarbons on contaminated sites in New Zealand. The TRC have adopted a conservative approach using the tier 1 approach to protect human health and based on the agricultural land use values which are the most stringent in this guideline. It is BTW Company's assessment that this is the appropriate approach to ensure soil is safe for future use.

The last round of soil data from the monitoring period (February 26, 2019) collected by the TRC, indicated the soil surrender criteria had been met in the F12 area. However, we agree with your assessment (email to Dave Bolger dated August 8, 2019) that it would be prudent to confirm this with one last follow-up sample. If the follow up sample demonstrates compliance with surrender criteria, monitoring the soil in the F12 area will cease.

## ON GOING GROUNDWATER MONITORING

Currently, the TRC monitors two groundwater monitoring bores, these being GND2284 and GND2285. As predicted the recorded concentrations of benzene in GND 2285 were decreasing and are now compliant with the New Zealand Drinking Water Standards (NZDWS 2005). Benzene concentrations in GND2284 are not compliant with the NZDWS but trending down over the monitoring period.

However, we are of the opinion the continued use of a human drinking water standard for benzene in the absence of human drinking water receptors on the decommissioned site is overly onerous on BTW Company as the resource consent holder. It is our assessment there are far more appropriate guideline values which are reflective of the agricultural receptors which exist at the site.

Similarly, we consider Condition 22 of resource consent 7884-1 difficult to achieve as consent holder. As a resource consent holder, we have not been permitted a '*reasonable mixing*' zone through the operation of this resource consent condition. This is because the TRC installed monitoring bores GND 2285 and GND 2284 were sited immediately adjacent the mud storage pits to gauge the 'worst-case scenario' and make no allowance for a reasonable mixing zone. Evidence of this is the detection of hydrocarbon contaminants in GND2285 immediately after bore installation. We consider this is not representative of the wider shallow groundwater table beneath the site and whereby it makes no allowance for a 'reasonable mixing zone, as we are legally entitled to under Condition 22. We are also of the opinion, no background concentration were predetermined prior to the landfarming operation, therefore to determine background concentration is problematic now.

## CONCLUSION

The Wellington Landfarm is again very close to complete surrender, and it is the intention of the consent holder to completely surrender the site at the end of the 2019-2020 monitoring period or seek legal clarification regarding condition requirements. Apart from the groundwater monitoring bore GND2284 all other measurable environmental parameters through the 2018-19 monitoring period now meet the resource consent surrender criteria. However, one more round of soil sampling in F12 is recommended by the TRC and is supported by BTW.

The current data for the groundwater bore GND2284 shows a reducing trend towards background concentrations, similarly to GND2285 in the last monitoring period. However, it is BTW Company's assessment that the combination of applying an inappropriate drinking water standard to a groundwater monitoring site without a zone of reasonable mixing makes meeting Condition 22 difficult. Therefore, we ask the Council to consider the necessity to continue to monitor GND2285 and GND2284 beyond the monitoring programme for 2019/20 or provide justification why the NZDWS is considered the appropriate guideline to meet for this shallow groundwater resource.

Yours sincerely,



Grant Aitken  
**Managing Director**