BTW Company Ltd
Wellington Landfarm
Monitoring Programme
Annual Report
2017-2018

Technical Report 2018-46

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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 2017 to June 2018 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, 16 water samples and four composite soil samples collected for physicochemical analysis.

The monitoring showed that the remaining landfarmed area, area F12, is close to its final surrender concentrations. One soil sample, of the three collected from the landfarmed area, was found to be above the specific concentrations for surrender as required by resource consent. One soil sample was also collected from the former storage cell area and found to be elevated in terms of total soluble field salts.

Groundwater monitoring indicated, in similarity to the previous monitoring period, that trace benzene and total dissolved salt 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.

The upcoming monitoring period will determine whether additional work is required to find the potential source for the trace benzene and salts.

There were no unauthorised incidents recording non-compliance in respect of this consent holder during the period under review.

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

For reference, in the 2017-2018 year, consent holders were found to achieve a high level of environmental performance and compliance for 76% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 20% 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 2018-2019 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 2017 to June 2018 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 (Wellington Landfarm) situated on Brown Road, Waitara, in the Waitara catchment.

The Wellington Landfarm was the second site in this area. The first, at Brown Road began stockpiling in 2006 and was surrendered in the 2013-2014 monitoring period. The Wellington Landfarm began operating in the 2010-2011 monitoring year; it was an expansion of the then operational Brown Road Landfarm. During the 2010-2011 monitoring year the Wellington Landfarm site became the primary disposal site for the Company.

During 2011-2012, the Council required the Company to apply for additional resource consent to explicitly provide for the disposal of well work-over and production fluids, including hydraulic fracturing return fluids. This consent (7884-1) was granted on 8 July 2011. The landfarm extension was utilised for the remainder of the monitoring period to dispose of several different types of hydrocarbon exploration and production waste, in accordance with the latest consent. The initial consent (7670-1) for the Wellington area was subsequently surrendered during the 2011-2012 monitoring year as surrender criteria were deemed to have been satisfied, and all further activities were covered under the new consent.

Activity at the site in terms of deliveries of landfarmable material ceased during the 2013-2014 period. The site had since moved into a monitoring stage, whereby material, post application and incorporation will slowly bio remediate. The Company and the Council have both monitored the degree of the bio remediation at this facility.

During the 2014-2015 period, further areas of the site met the surrender criteria and the Company applied for a change of conditions to the consent. Post partial surrender of the site, two areas remained above the required surrender criteria, these areas (F12 and F18), formed the basis for monitoring in the previous monitoring period, 2015-2016.

In the 2015-2016 monitoring period, soil analysis of area F18 indicated compliance with its specific surrender criteria and further analysis of this area was not required in this monitoring year. Subsequently, area F12 was the final area to meet surrender criteria, and formed the basis for soil monitoring in the 2016-2017 monitoring period.

In the 2017-2018 monitoring period the soil analysis focused on the landfarmed area F12. While the groundwater analysis continued to assess the trace impacts which have been observed to be reducing overtime since 2012.

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 related to discharges of drilling mud 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 water, land and air, and is the sixth annual report by the Council for the Company.

1.1.2 Structure of this report

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

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

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

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

Section 4 presents recommendations to be implemented in the 2018-2019 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 2017-2018 year, consent holders were found to achieve a high level of environmental performance and compliance for 76% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 20% of the consents, a good level of environmental performance and compliance was achieved.

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.

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).

Photo 1 An example of a landfarmed area Wellington Landfarm 2013

The landfarming process utilised at this facility is 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-in state 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 consents (7670-1, 7884-1) being exercised, there were areas of pine which have been 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 1).

Figure 1 Wellington Landfarm with associated monitoring locations

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 and outlined in sections 1.3.1.

Table 1 Resource consents held by BTW Company Ltd.

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

1.3.1 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.

The Company holds discharge permit 7884-1.1 to cover the discharge of wastes from hydrocarbon exploration drilling operations, production activities, storage activities, and well work-over activities onto and into land via land farming. This permit was issued by the Council on 8 July 2011 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

There are 30 special conditions attached to the consent.

- Conditions 1 to 3 deal with definitions, best practicable option and wastes to be discharged.
- Conditions 4 to 9 deal with notifications, monitoring and reporting.
- Conditions 10 to 12 relate to storage of wastes.
- Conditions 13 to 21 deal with discharge limits.
- Conditions 22 and 23 set limits on contaminants in receiving waters.
- Conditions 24 to 28 deal with contaminants in soil.
- Condition 29 relates to any archaeological remains found.
- Conditions 30 and 31 deal with lapse and review of the consent.

The permit is attached to this report in Appendix I.

This summary of consent conditions may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consent which are appended to this report.

Consent consultation

The following was extracted from the Officer report 7884-1 at the time of granting the consent.

BTW had consulted with the landowner Marie Wellington, and neighbours Graeme Rogers (Papawai Holdings Ltd), and Mark Weston. None of whom raised any concerns about the proposal.

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 site was inspected on three occasions during the monitoring period, additional observations were also undertaken by field monitoring staff during monitoring rounds. As discussed the site was not operational during this monitoring period and was decommissioned during a previous monitoring period.

As such the main focus of the monitoring in this period was the remediation of the remaining parameters within the soil profile, monitoring the site groundwater impacts, the degree of revegetation post application, and reinstatement. The neighbourhood was also surveyed for environmental effects.

1.4.4 Chemical sampling

The Wellington Landfarm contains defined monitoring locations (Figure 1). The Council monitored soil and groundwater during this monitoring period.

The site contains four groundwater monitoring wells, these wells were sampled by the Council four times this monitoring year to assess for seasonal variation. Groundwater analytes are defined in Table 1.

Four composite soil samples from the Wellington site were collected for analysis during the monitoring period. The methodology utilised was modified from the Guidelines for the Safe Application of Biosolids to land in NZ (2003) and it involves the compositing of 10 soil cores. These cores are collected from 400 mm+/- depth below ground level (bgl) to encompass the zone of application. The cores are collected at 10

m intervals along a transect through a spreading area. The sample transects are GPS marked for reference. The soil analysis is provided in Table 2.

Table 2 Chemical analytes Wellington Landfarm 2017-2018

Groundwater monitoring parameters		Soil monitoring parameters	
Barium (acid soluble) Barium (dissolved) Chloride Conductivity Sodium Total dissolved salts	Benzene Toluene Ethylbenzene Xylenes Total petroleum hydrocarbons C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36}, C_7-C_{36}. Polycyclic aromatic hydrocarbons	Calcium Chloride Conductivity Potassium Moisture factor Magnesium Sodium Sodium absorption ratio (SAR) Total soluble salts Naphthalene	Total petroleum hydrocarbons C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36}, C_7-C_{36}. Benzene Ethylbenzene Toluene Xylenes Ammoniacal nitrogen Nitrite/nitrate nitrogen pH Benzo (a) pyrene (BaP) Pyrene

2 Results

2.1 Inspections

9 August 2017

At the time of inspection the following was observed. Wind direction, northerly, at a strength of approximately 15 meters per second. Heavy rain continued throughout the inspection. No objectionable odours or visible emissions were found during the inspection. No recent storage or spreading activities had occurred at the site and no stored muds were present. Historic spreading areas were found to have good pasture cover which appeared healthy. No muds were found at the surface. The foreshore was also inspected and no harmful effects were observed.

6 March 2018

At the time of inspection the following was observed. Wind direction, south west, and strength approximately 4 meters per second. Cloud cover 5/8. No visible emissions or objectionable odours were noted. No recent disposal activities had occurred and no storage facilities were present on site. Historic spreading areas were inspected and found to have very good pasture cover across all areas. All pasture appeared healthy. No drilling muds were present at the surface and none identified within the soil profile. The foreshore was inspected, and no harmful effects were found.

3 July 2018

At the time of the inspection the following was observed. Wind direction south east, wind strength approximately 7 meters per second. No objectionable odours or visible emissions were found during the inspection. Historic spreading areas were found to have good pasture cover which appeared healthy. No muds were found at the surface and no muds were stored at the site. The foreshore was inspected, and no deleterious effects were observed at the time of inspection. Iron oxide discharge from cliff face were prevalent across the length of the spreading areas.

2.2 Results of discharge monitoring

Details of the landfarming applications dates provided by the consent holder are detailed in the following Table 3. The actual landfarmed locations are depicted in Figure 2. Twenty three areas were landfarmed between March 2011 and December 2013.

Table 3 Wellington Landfarm – dates of application for the full site

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)

ID	Mud Type	Date	Well Name
F7	WWF	Nov, 2011	Mangahewa-D(WWF)
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			

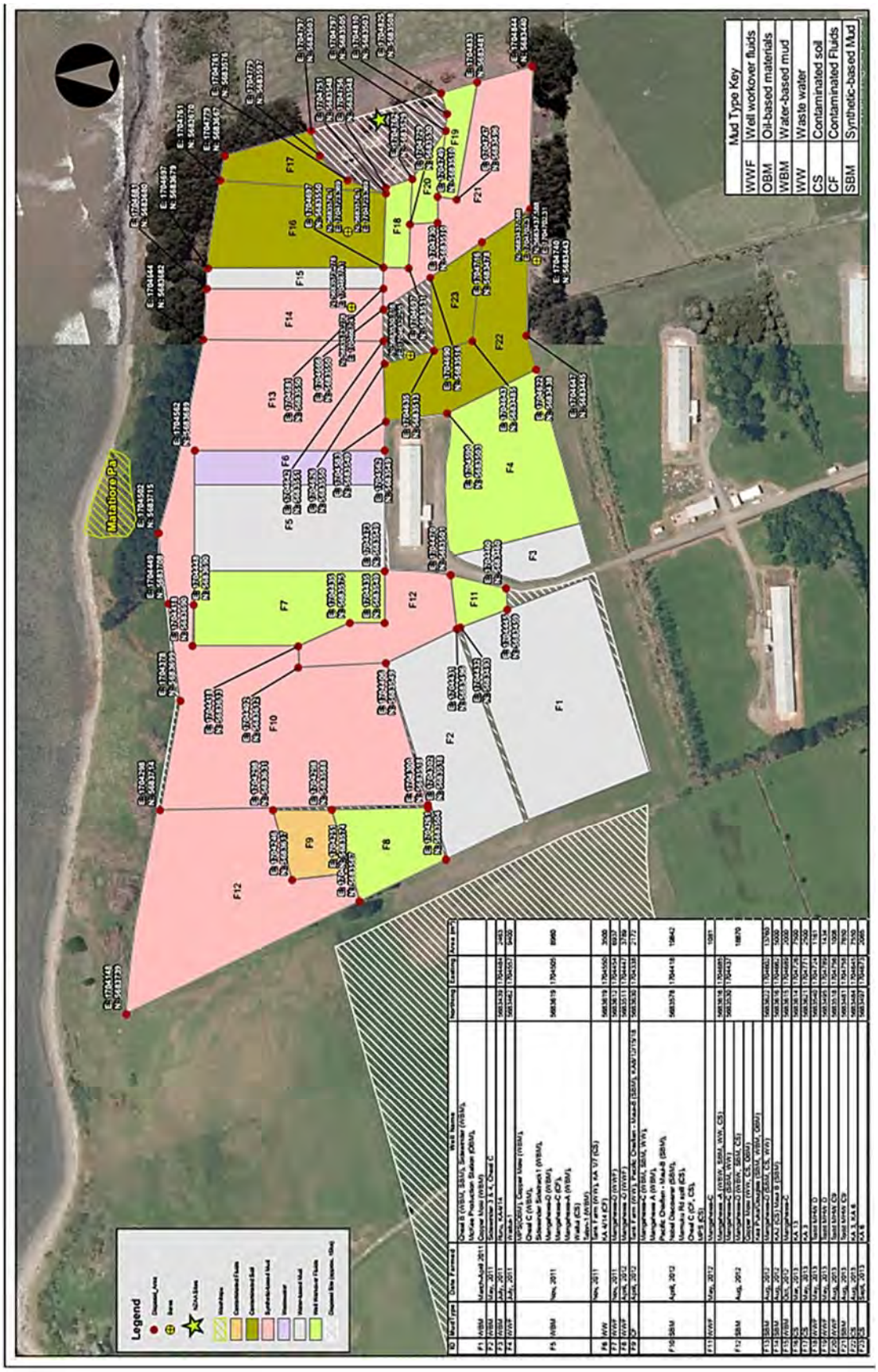

Figure 2 Company provided landfarm application area map Wellington Landfarm

2.3 Results of receiving environment monitoring

2.3.1 Soil sample results

Three of the four soil samples collected in this monitoring period were focussed at assessing the degree of remediation in relation to monitoring area F12 (Figure 2). Area F12, which was landfarmed in 2012, has been observed to be slowly reducing in concentrations of target contaminates over time. A sample was also collected across the former storage pit area, defined as transect A. Soil sample locations are provided in Figure 3. F12 is the final location to meet its surrender criteria. Note the surrender criteria concentrations, as defined by consent 7884-1.1 are defined in the following Table 4.

Table 4 Soil sample analysis Wellington Landfarm 2017-2018 monitoring period

Soil results 2017-2018 BTW Wellington	Sample	Consent	TRC172836	TRC172837	TRC181900	TRC181901
Landfarm	Location	7884-1.1	PIT AREA	F12	F12	F12
	Transect	surrender	A	B	C	D
	Collected	criteria	11 Sep 2017	11 Sep 2017	12 Apr 2018	12 Apr 2018
Parameter	Time	parameters	10:00	11:00	10:00	11:00
Calcium	mg/kg		47.7	143.7	86.8	78.3
Conductivity	mS/m 20°C	290	76.4	19.5	9.9	10
Chloride	mg/kg	700	29.8	56.5	22.2	17.5
Potassium	mg/kg		24.4	74.6	7.2	17.5
Magnesium	mg/kg		8.7	15.4	7.7	5.7
Sodium	mg/kg	460	29.2	12.6	21.7	25.8
Ammoniacal nitrogen	mgN/kg		0.5	0.81	1.09	0.32
Nitrate/ Nitrite Nitrogen	mgN/kg		1.9	0.11	2.12	0.62
Sodium absorption ratio	None	18	1.021	0.267	0.599	0.759
Total Soluble salts	mg/kg	2,500	**3,237.60**	837.4	399.9	403
pH	pH		6.8	8.1	7.5	7.7
1-MethylNaphthalene	mg/kg dry wt		< 0.013	0.74	< 0.012	< 0.012
2-MethylNaphthalene	mg/kg dry wt		0.018	0.91	0.012	< 0.012
Acenaphthylene	mg/kg dry wt		< 0.013	0.177	< 0.012	< 0.012
Anthracene	mg/kg dry wt		0.091	< 0.012	< 0.012	< 0.012
Acenaphthylene	mg/kg dry wt		0.048	< 0.012	< 0.012	< 0.012
Benzo[a]anthracene	mg/kg dry wt		0.42	< 0.012	< 0.012	< 0.012
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.027	**0.71**	0.024	< 0.012	< 0.012
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt		1.01	0.04	< 0.03	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt		1.01	0.04	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt		0.7	0.041	0.012	0.012
Benzo[e]pyrene	mg/kg dry wt		0.46	0.036	< 0.012	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt		0.54	0.023	< 0.012	< 0.012
Benzo[k]fluoranthene	mg/kg dry wt		0.27	< 0.012	< 0.012	< 0.012
Chrysene	mg/kg dry wt		0.41	0.037	< 0.012	< 0.012
Dibenzo[a,h]anthracene	mg/kg dry wt		0.086	< 0.012	< 0.012	< 0.012
Fluoranthene	mg/kg dry wt		0.66	0.044	< 0.012	< 0.012
Fluorene	mg/kg dry wt		< 0.013	0.104	< 0.012	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt		0.65	0.03	< 0.012	< 0.012
Naphthalene	mg/kg dry wt	7.2	< 0.07	0.32	< 0.06	< 0.06

Soil results 2017-2018 BTW Wellington	Sample	Consent	TRC172836	TRC172837	TRC181900	TRC181901
Landfarm	Location	7884-1.1	PIT AREA	F12	F12	F12
	Transect	surrender	A	B	C	D
	Collected	criteria	11 Sep 2017	11 Sep 2017	12 Apr 2018	12 Apr 2018
Parameter	Time	parameters	10:00	11:00	10:00	11:00
Perylene	mg/kg dry wt		0.2	0.063	0.109	0.049
Phenanthrene	mg/kg dry wt		0.181	0.176	< 0.012	< 0.012
Pyrene	mg/kg dry wt	160	0.82	0.053	< 0.012	< 0.012
C_7 - C_9	mg/kg dry wt	120	< 8	< 8	< 8	< 8
C_{10} - C_{14}	mg/kg dry wt	58	< 20	**800**	< 20	24
C_{15} - C_{36}	mg/kg dry wt	4,000	310	3,200	200	420
Total hydrocarbons (C_7 - C_{36})	mg/kg dry wt		310	4,000	200	450
Benzene	mg/kg dry wt	1.1	< 0.06	< 0.05	< 0.05	< 0.05
Toluene	mg/kg dry wt	68	< 0.06	< 0.05	< 0.05	< 0.05
Ethylbenzene	mg/kg dry wt	53	< 0.06	< 0.05	< 0.05	< 0.05
m&p-Xylene	mg/kg dry wt	48	< 0.11	< 0.10	< 0.10	< 0.10
o-Xylene	mg/kg dry wt	48	< 0.06	< 0.05	< 0.05	< 0.05
Total Recoverable Arsenic	mg/kg dry wt	20	< 2	< 2	-	-
Total Recoverable Cadmium	mg/kg dry wt	1	< 0.10	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	600	11	9	-	-
Total Recoverable Copper	mg/kg dry wt	100	25	16	-	-
Total Recoverable Lead	mg/kg dry wt	300	4.4	6.6	-	-
Total Recoverable Mercury	mg/kg dry wt	1	< 0.10	< 0.10	-	-
Total Recoverable Nickel	mg/kg dry wt	60	6	6	-	-
Total Recoverable Zinc	mg/kg dry wt	300	56	55	-	-

The analysis provided by Table 4 indicated the following.

Of the three soil samples collected from landfarmed location F12. One of the three, (transect B) collected in September 2017, was above the limit of surrender for mid-range (C_{10}-C_{14}) hydrocarbons. The subsequent samples, (transects C and D) collected later in the monitoring period indicated concentrations below the surrender criteria. This was found across all surrender parameters in transects C and D.

The sample collected across the former storage pit area (transect A) indicated a value for total soluble field salts which was above the limit of surrender, as defined by the consent of 2,500 mg/kg. This area also contained a measureable concentration of Benzo (a) pyrene (BaP).

Total recoverable heavy metal analysis were undertaken on transects A and B this period. The subsequent results as defined in Table 4 indicated no exceedance with respect to these consented values.

For context, in October 2013 the total hydrocarbons (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. Where as in this period the samples collected ranged from 200-4,000 mg/kg TPH (C_7-C_{36}).

An additional pair of soil samples will be collected along the transect B in the upcoming monitoring period to confirm the area has met its conditional limit for surrender.

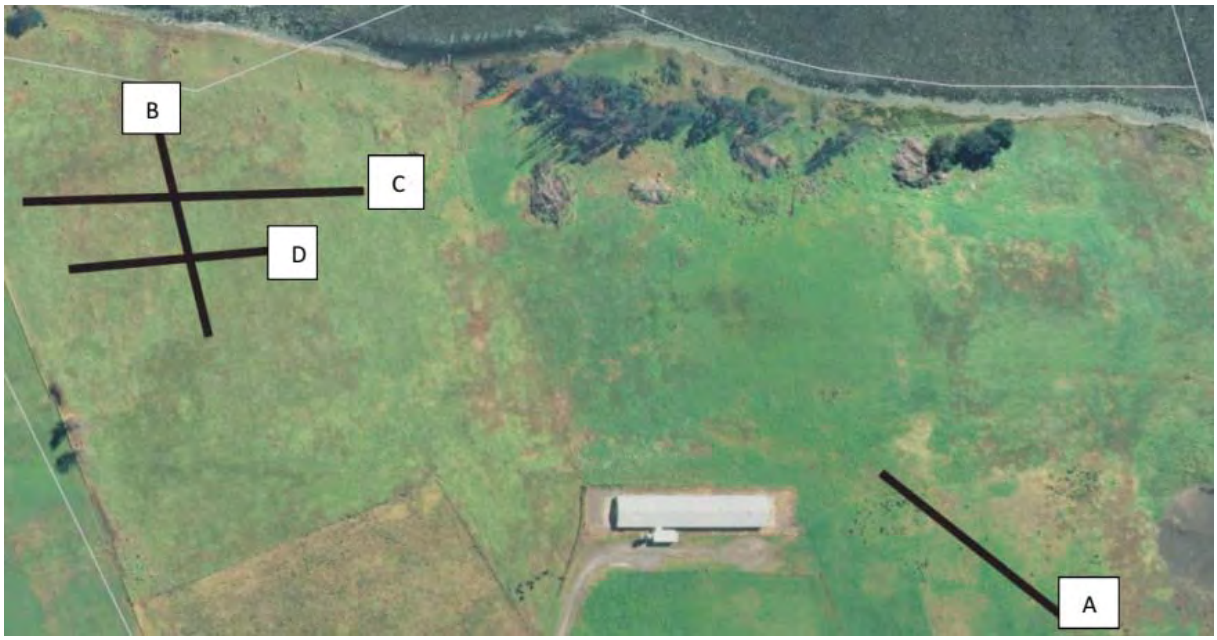

Figure 3 Soil sample transects 2017-2018 monitoring period

2.3.2 Council Groundwater

As defined in Figure 1, the Wellington Landfarm contains a groundwater monitoring network comprised of four monitoring wells. These wells are monitored as close to quarterly as possible to ascertain for seasonal fluctuation. The main purpose of this monitoring well network was to ascertain the groundwater quality in the vicinity of the now former storage cells. These wells, which were a consented obligation, have been monitored by the Council quarterly since September 2012. The resultant analysis in the 2017-2018 monitoring period is presented in the following Tables 5-9 inclusive.

Table 5 GND2282 2017-2018 monitoring results

BTW Wellington	Monitoring well	GND2282	GND2282	GND2282	GND2282
Landfarm	Collected	11 Sep 2017	19 Dec 2017	12 Apr 2018	13 Jun 2018
Parameter	Time	10:15	08:50	12:00	12:00
Arsenic (dissolved)	g/m³	-	-	< 0.0010	-
Barium (acid soluble)	g/m³	0.08	0.11	-	< 0.11
Barium (dissolved)	g/m³	0.08	0.11	0.105	0.092
Chloride	g/m³	171	199	200	148
Conductivity	mS/m@20°C	101	122	115	109.5
Sodium	g/m³	121	136	126	107
pH	pH	6.9	6.6	6.7	6.8
LEVEL	m	2.002	2.451	2.391	2.152
Temperature	°C	14.7	17	16.7	16.5
Benzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C7-C9	g/m³	< 0.06	< 0.06	< 0.06	< 0.06
C10-C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2
C15-C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4
C7-C36	g/m³	< 0.7	< 0.7	< 0.7	< 0.7
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Xylene Meta	g/m³	< 0.002	< 0.002	< 0.002	< 0.002
Xylene Ortha	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010

BTW Wellington	Monitoring well	GND2282	GND2282	GND2282	GND2282
Landfarm	Collected	11 Sep 2017	19 Dec 2017	12 Apr 2018	13 Jun 2018
Parameter	Time	10:15	08:50	12:00	12:00
Total dissolved solids	g/m³	781.4	943.9	889.8	630
Nitrate/ Nitrite Nitrogen	g/m³	-	-	-	0.03

Table 6 GND2283 2017-2018 monitoring results

BTW Wellington	Monitoring well	GND2283	GND2283	GND2283	GND2283
Landfarm	Collected	11 Sep 2017	19 Dec 2017	12 Apr 2018	13 Jun 2018
Parameter	Time	11:00	09:20	12:35	12:45
Arsenic (dissolved)	g/m³	-	-	< 0.0010	-
Barium (acid soluble)	g/m³	0.06	0.06	-	< 0.11
Barium (dissolved)	g/m³	0.06	0.06	0.057	0.065
Chloride	g/m³	31.8	87.6	95	95
Conductivity	mS/m@20°C	48.2	54.6	44.6	69.1
Sodium	g/m³	18.2	45.2	47.9	46
pH	pH	6.6	6.4	6.5	6.5
LEVEL	m	1.959	3.785	4.42	3.146
Temperature	°C	14.1	17	16.5	16.4
Benzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
C7-C9	g/m³	< 0.06	< 0.06	< 0.06	< 0.06
C10-C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2
C15-C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4
C7-C36	g/m³	< 0.7	< 0.7	< 0.7	< 0.7
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Xylene Meta	g/m³	< 0.002	< 0.002	< 0.002	< 0.002
Xylene Ortha	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total dissolved solids	g/m³	372.9	422.4	345.1	310
Nitrate/ Nitrite Nitrogen	g/m³	-	-	-	0.43

Table 7 GND2284 2017-2018 monitoring results

BTW Wellington	Monitoring well	GND2284	GND2284	GND2284	GND2284
Landfarm	Collected	11 Sep 2017	19 Dec 2017	12 Apr 2018	13 Jun 2018
Parameter	Time	11:40	09:50	13:05	13:15
Arsenic (dissolved)	g/m³	-	-	< 0.005	-
Barium (acid soluble)	g/m³	1.09	1.12	-	1.49
Barium (dissolved)	g/m³	1.09	1.12	1.49	1.48
Chloride	g/m³	2,360	2,320	2,410	2,200
Conductivity	mS/m@20°C	618	639	655	687
Sodium	g/m³	599	596	607	590
pH	pH	6.2	6.1	6.2	6.2
LEVEL	m	1.246	7.69	2.043	1.702
Temperature	°C	14.4	17.7	16.9	16.7
Benzene	g/m³	**0.082**	**0.077**	**0.1**	**0.099**
C7-C9	g/m³	< 0.06	< 0.06	< 0.06	< 0.06
C10-C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2

BTW Wellington	Monitoring well	GND2284	GND2284	GND2284	GND2284
Landfarm	Collected	11 Sep 2017	19 Dec 2017	12 Apr 2018	13 Jun 2018
Parameter	Time	11:40	09:50	13:05	13:15
C15-C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4
C7-C36	g/m³	< 0.7	< 0.7	< 0.7	< 0.7
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Xylene Meta	g/m³	< 0.002	< 0.002	< 0.002	< 0.002
Xylene Ortha	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total dissolved solids	g/m³	**4,781.5**	**4,944**	**5,067.8**	**4,100**
Nitrate/ Nitrite Nitrogen	g/m³	-	-	-	0.028

Table 8 GND2285 2017-2018 monitoring results

BTW Wellington	Monitoring well	GND2285	GND2285	GND2285	GND2285
Landfarm	Collected	11 Sep 2017	19 Dec 2017	12 Apr 2018	13 Jun 2018
Parameter	Time	12:15	10:20	14:00	14:00
Arsenic (dissolved)	g/m³	-	-	< 0.005	-
Barium (acid soluble)	g/m³	1.8	1.45	-	1.42
Barium (dissolved)	g/m³	1.8	1.4	1.2	1.38
Chloride	g/m³	1,670	1,080	1,320	1,330
Conductivity	mS/m@20°C	463	432	378	432
Sodium	g/m³	642	572	510	510
pH	pH	6.5	6.2	6.3	6.3
LEVEL	m	0.764	1.748	1.78	1.384
Temperature	°C	14	17.8	18.1	16.9
Benzene	g/m³	**0.139**	**0.104**	**0.067**	**0.087**
C7-C9	g/m³	< 0.06	< 0.06	< 0.06	< 0.06
C10-C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2
C15-C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4
C7-C36	g/m³	< 0.7	< 0.7	< 0.7	< 0.7
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Xylene Meta	g/m³	**0.006**	**0.004**	**0.004**	**0.006**
Xylene Ortha	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total dissolved solids	g/m³	**3,582.3**	**3,342.4**	**2,924.6**	2,400
Nitrate/ Nitrite Nitrogen	g/m³	-	-	-	0.058

- GND2282 (Table 5) in the previous monitoring period observed a trace concentration of benzene at (0.0015 g/m³) during the August 2017 monitoring round. In this monitoring period there were no observable hydrocarbons or BTEX analysis reported above the limit of detection (LOD) for these analytes. Salt concentrations in terms of chloride, sodium and total dissolved salts have also observed a decreasing concentration.
- GND2283 (Table 6) detailed no observable petroleum hydrocarbon or BTEX analysis this period. This was similar to the previous monitoring period where no results above the LOD were observed. Salt concentrations in terms of chloride and sodium did observe a slight increase from the beginning to the end of the period, however the increase was minimal.
- GND2284, in similarity to the previous monitoring period, observed trace benzene concentrations across all four monitoring rounds. The concentration observed in this monitoring period (0.07-0.1 g/m³ benzene) was less than the previous monitoring period 2016-2017 (0.07-0.23 g/m³ benzene).

- Total petroleum hydrocarbon analysis (all chains) indicated no results above LOD across all four monitoring rounds undertaken.
- Total dissolved salt (TDS) concentrations continue to be elevated above the conditional limit for surrender (>2,500 g/m^3). Ranging this period from 4,100-5,067 g/m^3 TDS. Noteworthy to mention, the final monitoring round in June 2018 indicated the lowest concentration for TDS at 4,100 g/m^3 TDS across the four rounds undertaken at this monitoring location, also the lowest since September 2012 (Figure 4).

- GND2285 remains impacted. For context, in the previous monitoring period benzene was detected in all four monitoring rounds (0.24-0.3 g/m^3). Xylene-M in two rounds at trace concentrations (0.002-0.005 g/m^3) and xylene-O on one round (0.0012 g/m^3).

  In this monitoring period:

  - Benzene was detected in all four monitoring rounds, though the range was lower in comparison, (0.06-0.13 g/m^3). Trace xylene –M was also detected in all four monitoring rounds (0.004-0.006 g/m^3).
  - TDS results ranged from 2,400-3,582 g/m^3 this period. The final monitoring round indicated a concentration below the conditional limit of 2,500 g/m^3 with a value of 2,400 g/m^3, recorded in the June 2018 monitoring round. Note this is the lowest concentration observed at this monitoring location since September 2012 in terms of TDS monitoring (Figure 4).

By way of background, the impacts associated with the exercise of this consent are centred on a legacy issue. The site originally undertook the storage of drilling muds in unlined storage pits. As such the impacts are directly related to the lack of storage liners. The Council will continue to monitor these locations until background concentrations or consent defined standards are achieved.

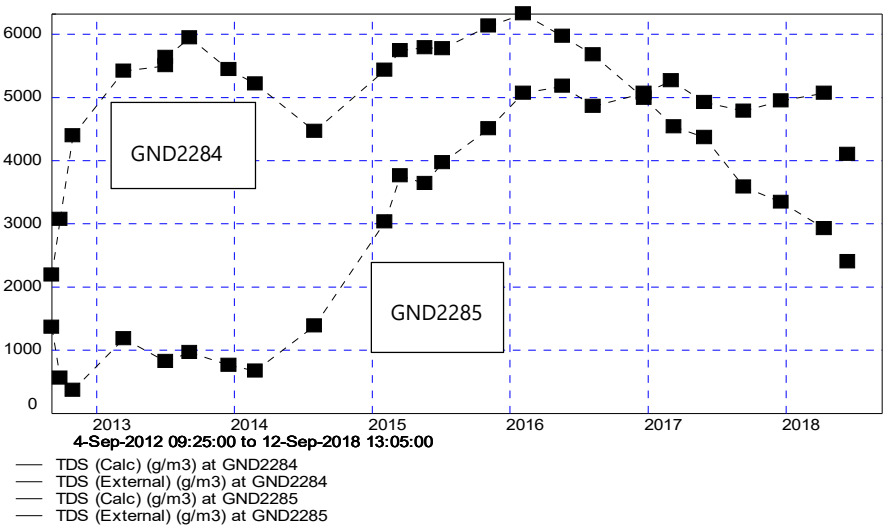

Figure 4 TDS concentrations long term record GND2284 and GND2285

2.4 Investigations, interventions, and incidents

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.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The incident register includes events where the Company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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 company is indeed the source of the incident (or that the allegation cannot be proven).

In the 2017-2018 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

3 Discussion

3.1 Discussion of site performance

Site performance in the 2017-2018 monitoring period for the Wellington landfarm. The facility functions as a process of natural attenuation of petroleum hydrocarbons through the practice of landfarming.

As the landfarm is in its final stages of remediation, not much was required from the Company perspective. The annual report provided by the Company, was received and accepted by the Council and can be found in the appendix II of this report.

Area F12 is the final landfarmed area to meet its consented surrender concentrations. In October 2013 the total petroleum hydrocarbons (TPH) (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 final sample collected in the previous monitoring period (June 2017) indicated a total TPH value of 8,600 mg/kg. In this period the concentration observed for total TPH was 4,000 mg/kg. It is also noteworthy to mention that of the three soil samples collected across landfarmed area F12, only one of the three indicated a concentration above the surrender limit. Thus in order to assess for this variation, two soil samples will be proposed across this area in the upcoming monitoring period.

The Company attempted to find the source for the trace benzene and xylenes observed in monitoring wells GND2284 and GND2285. In attempting to ascertain the location for these trace results, additional site works were undertaken, however these were inconclusive. The upcoming monitoring period will determine if further investigation is required. This will be determined by the initial groundwater monitoring rounds in the 2018-2019 monitoring period.

3.2 Environmental effects of exercise of consents

The environmental effects associated with the exercise of this consent are centred on a legacy issue which was first identified during the 2012-2013 monitoring period. The issue was described as minor but significant at the time, whereby the groundwater in the vicinity of the storage cells had been impacted by poor storage of fluid waste. This had resulted in high salinity in two of the four groundwater monitoring wells, as well as trace benzene in three of the four wells. The legacy remained apparent in the groundwater monitoring undertaken by the Council during this reporting period, (Tables 7, 8 and Figure 4).

The groundwater in monitoring wells GND2284 and GND2285 continued to exhibit trace concentrations of petroleum impacts in terms of benzene and xylenes, however these were observed to be less than the reported values when compared to the previous year's monitoring report (TRC 17-2017). Total dissolved salts concentrations continue to be elevated above the conditional limit of surrender in one of four of the monitoring wells GND2284. GND2285, which had been impacted by saline influences since 2012 was observed to be at its lowest concentrations since September 2012, and more specifically, below the consented limit of 2,500 g/m^3 (Table 8). This would suggest that this area is slowly returning to background concentrations (Figure 4).

The Council will continue to monitor these well locations until required concentrations are reached.

A soil sample was also collected across the former storage pit area (transect A). This sample indicated a value for total soluble field salts which was above the limit of surrender, as defined by the consent of 2,500 mg/kg. This area also contained a measureable concentration of Benzo (a) pyrene (BaP).

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 9.

Table 9 Summary of performance for consent 7884-1.1 in the 2017-2018 monitoring period

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?**
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, initial landfarming storage in unlined cells.	For the most part
4. Only specified wastes to be discharged	Information provided by consent holder	Yes
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 30 August 2017	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
16. Parameters for rate of liquid waste application	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?**
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^3	Exceeded in two of four monitoring wells, though reducing in both	**No**
23. Contaminants in surface or groundwater not to exceed background concentrations	Trace benzene in two of four monitoring wells	**No, but reducing**
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	Sample analysis provided by consent holder and also undertaken by Council this period	Yes
27. Levels of contaminants prior to expiry, cancellation, or surrender of consent	One area remains above surrender criteria, Area F12, though only one of three samples was found to be above the surrender concentration for midrange petroleum hydrocarbons	N/A
28. Consent may not be surrendered until condition 27 is satisfied	See above	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		**Good**
Overall assessment of administrative performance in respect of this consent		**High**

Table 10 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
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		
Totals		0	5	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 2016-2017 Annual Report

In the 2016-2017 Annual Report, it was recommended:

1. THAT monitoring of consented activities at the Wellington Landfarm in the 2017-2018 year continues at the same level as in 2016-2017.

3.5 Alterations to monitoring programmes for 2018-2019

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 2018-2019 the monitoring programme remains unchanged, unless the initial two soil samples collected in the 2018-2019 period indicate that area F12 has fully met its conditional limit for surrender. Monitoring parameters from area F12 (specifically related to consent surrender) will focus on total petroleum hydrocarbons as other contaminates of concern have met their criteria for surrender, these include poly-aromatic, mono-aromatic hydrocarbons and heavy metals.

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 2883 continue to exhibit concentrations below consented obligations, they will be removed from further monitoring, monitoring wells GND2284 and GND2285 will continue to be monitored until conditional limits for surrender are met.

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 2018-2019.

4 Recommendations

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 surrender able.
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.

Glossary of common terms and abbreviations

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

As*	Arsenic.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
Bund	A wall around a tank to contain its contents in the case of a leak.
BTEX	Benzene, toluene, ethylbenzene and xylenes (M and O).
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cu*	Copper.
DO	Dissolved oxygen.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
$g/m^2/day$	Grams/metre^2/day.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m^2	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.

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

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

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

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Appendix I

Resource consents held by BTW Wellington Landfarm

(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

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 P O Box 551 Taranaki Mail Centre NEW PLYMOUTH 4340
Decision Date:	8 July 2011
Commencement 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 at or about (NZTM) 1704599E-5683484N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	70 Brown Road, Waitara [Property owner: M Wellington]
Legal Description:	Lot 1 DP 5462 Blk III Paritutu SD [Discharge site]
Catchment:	Waitara

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 to section 36 of the Resource Management Act.

Special conditions

1. 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.

2. The consent holder shall adopt the best practicable option [as defined section 2 of the Resource Management Act 1991] to prevent or minimise any actual or potential effects on the environment arising from the discharge.

3. Only those wastes specified in application 6815 shall be discharged.

Notifications, monitoring and reporting

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, [by emailing 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.

5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, [by emailing 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.

6. 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_6-C_9, C_{10}-C_{14}, C_{15}-C_{36}];
   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.

7. 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.

8. 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 7, for the period of the previous 12 months, 1 July to 30 June.

Storage

9. Well work-over fluids requiring storage prior to landfarming, shall be stored in a tank, or in a pit with an impermeable synthetic liner.

10. 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.

11. All wastes must be landfarmed as soon as practicable, but no later than twelve months after being brought onto the site.

Discharge limits

12. Well work-over fluids shall be kept separate and distinct from other waste types.

13. No wastes shall be discharged in the F1 and F2 areas landfarmed under consent 7670-1.

14. 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.

15. 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.

16. 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.

17. 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.

18. Any areas of land used for the landfarming of wastes in accordance with conditons 14-16 of this consent, shall not be used for any subsequent discharges of waste.

19. 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.

20. 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

21. The exercise of this consent shall not result in the concentration of total dissolved salts in any fresh water body exceeding 2500 g/m^3.

22. Other than as provided for in condition 21, 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

23. 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.

24. 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.

25. 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 Assoication's Guidelines for the safe application of biosolids to land in New Zealand [2003].

26. 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:

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

MAHs - benzene, toluene, ethylbenzene, xylenes
PAHs - napthalene, non-carc. [pyrene], benzo(a)pyrene eq.
TPH - total petroleum hydrocarbons [C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36}]

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

27. This consent may not be surrendered at any time until the standards in condition 26 have been met.

Archaeological remains

28. 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

29. 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.

30. 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 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 8 July 2011

For and on behalf of
Taranaki Regional Council

_____

Chief Executive

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) 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) 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.

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_6-C_9, C_{10}-C_{14}, C_{15}-C_{36});
    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^3.

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 Assoication'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:

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

MAHs - benzene, toluene, ethylbenzene, xylenes
PAHs - napthalene, non-carc. (pyrene), benzo(a)pyrene eq.
TPH - total petroleum hydrocarbons (C_7-C_9, C_{10}-C_{14}, C_{15}-C_{36})

The requirement to meet these standards shall not apply if, before 1 March 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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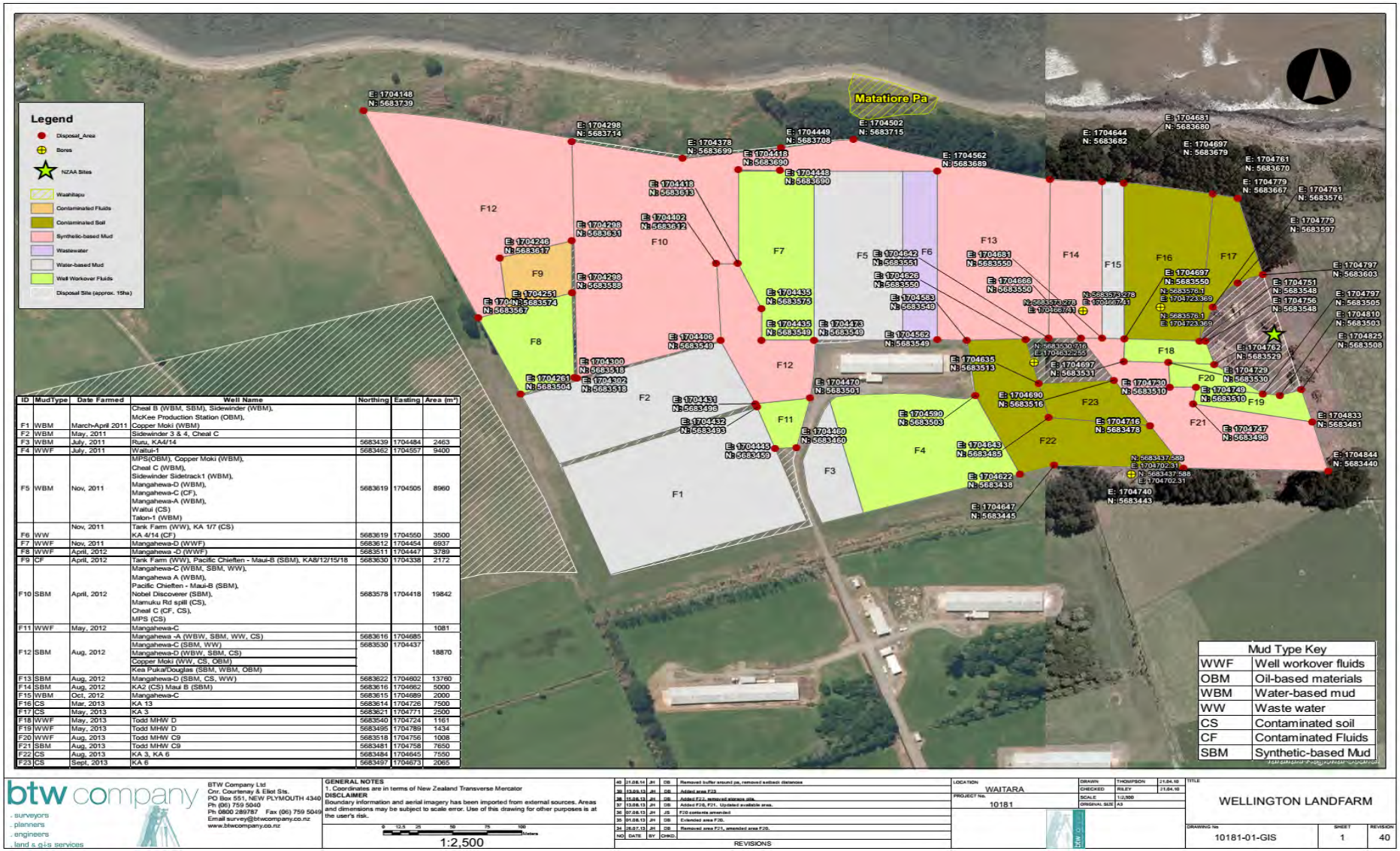
A D McLay
Director - Resource Management



ID	MudType	Date Farmed	Well Name	Northing	Easting	Area (m²)
F1	WBM	March-April 2011	Cheal B (WBM, SBM), Sidewinder (WBM), McKee Production Station (OBM), Copper Moki (WBM)			
F2	WBM	May, 2011	Sidewinder 3 & 4, Cheal C			
F3	WBM	July, 2011	Ruru, KA4/14	5683439	1704484	2463
F4	WWF	July, 2011	Waitui-1	5683462	1704557	9400
F5	WBM	Nov, 2011	MPS(OBM), Copper Moki (WBM), Cheal C (WBM), Sidewinder Sidetrack1 (WBM), Mangahewa-D (WBM), Mangahewa-C (CF), Mangahewa-A (WBM), Waitui (CS) Talon-1 (WBM)	5683619	1704505	8960
F6	WW	Nov, 2011	Tank Farm (WW), KA 1/7 (CS) KA 4/14 (CF)	5683619	1704550	3500
F7	WWF	Nov, 2011	Mangahewa-D (WWF)	5683612	1704454	6937
F8	WWF	April, 2012	Mangahewa -D (WWF)	5683511	1704447	3789
F9	CF	April, 2012	Tank Farm (WW), Pacific Chieften - Maui-B (SBM), KA8/12/15/18	5683630	1704338	2172
F10	SBM	April, 2012	Mangahewa-C (WBM, SBM, WW), Mangahewa A (WBM), Pacific Chieften - Maui-B (SBM), Nobel Discoverer (SBM), Mamuku Rd spill (CS), Cheal C (CF, CS), MPS (CS)	5683578	1704418	19842
F11	WWF	May, 2012	Mangahewa-C			1081
F12	SBM	Aug, 2012	Mangahewa -A (WBW, SBM, WW, CS) Mangahewa-C (SBM, WW) Mangahewa-D (WBW, SBM, CS) Copper Moki (WW, CS, OBM) Kea Puka/Douglas (SBM, WBM, OBM)	5683616 5683630	1704685 1704437	18870
F13	SBM	Aug, 2012	Mangahewa-D (SBM, CS, WW)	5683622	1704602	13760
F14	SBM	Aug, 2012	KA2 (CS) Maui B (SBM)	5683616	1704662	5000
F15	WBM	Oct, 2012	Mangahewa-C	5683615	1704689	2000
F16	CS	Mar, 2013	KA 13	5683614	1704726	7500
F17	CS	May, 2013	KA 3	5683621	1704771	2500
F18	WWF	May, 2013	Todd MHW D	5683540	1704724	1161
F19	WWF	May, 2013	Todd MHW D	5683495	1704789	1434
F20	WWF	Aug, 2013	Todd MHW C9	5683518	1704756	1008
F21	SBM	Aug, 2013	Todd MHW C9	5683481	1704758	7650
F22	CS	Aug, 2013	KA 3, KA 6	5683484	1704645	7550
F23	CS	Sept, 2013	KA 6	5683497	1704673	2065

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GENERAL NOTES
1. Coordinates are in terms of New Zealand Transverse Mercator

DISCLAIMER
Boundary information and aerial imagery has been imported from external sources. Areas and dimensions may be subject to scale error. Use of this drawing for other purposes is at the user's risk.

1:2,500

NO	DATE	BY	CHKD	REVISIONS
40	21.08.14	JH	DB	Removed buffer around pa, removed setback distances
39	13.09.13	JH	DB	Added area F23
38	11.09.13	JH	DB	Added F22, removed storage site
37	13.08.13	JH	DB	Added F20, F21. Updated available area.
36	07.08.13	JH	JS	F20 contents amended
35	01.08.13	JH	DB	Extended area F20.
34	26.07.13	JH	DB	Removed area F21, amended area F20.

LOCATION: WAITARA
PROJECT No.: 10181

DRAWN	THOMPSON	21.04.10
CHECKED	RILEY	21.04.10
SCALE	1:2,500	
ORIGINAL SIZE	A3	

TITLE: WELLINGTON LANDFARM

DRAWING No	SHEET	REVISION
10181-01-GIS	1	40

Appendix II

BTW Wellington Landfarm
2017-2018 Annual Report

Your Reference : Wellington Landfarm Annual Report letter - Consent 7884

Our Reference *: 10181*

24th August 2018

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

Dear Nathan,

Wellington Landfarm Annaul 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 activity status of the site (decommissioned) and the only environmental monitoring data collected by the Taranaki Regional Council (TRC) during the monitoring period, it was agreed with the TRC for the monitoring period 1st of July 2017 to 30th June 2018 a letter format was sufficient from the consent holder to comply with SC8 of resource consent 7884-1.

JULY 2017 TO JUNE 2018 – SUMMARY

The site was completely decommissioned during the monitoring period (2013-14). Therefore, no new material has been taken to the site during the monitoring period and no new areas were landfarmed during the monitoring period.

Pasture establishment has 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.

All environmental data collected has been undertaken by the TRC. The F12 landfarmed area is the last area to be monitored by the TRC, and the last round of soil sampling during this monitoring period indicated the F12 area had met surrender criteria. TRC are likely to undertake further sampling to confirm soil surrender criteria has been met in this area.

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

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

Figure 1: Wellington Landfarm June 2018

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 landfarmed areas are also 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 landuse values which are the most stringent in this guideline. It's BTW Companies 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 2017-18 collected by the TRC, indicated the soil surrender criteria had been met in the F12 area. However, it is normal procedure to collect additional soil data to confirm this position with confidence, as the F12 area is of considerable size.

ON GOING GROUNDWATER MONITORING

Currently, the TRC monitors four groundwater monitoring wells, these being GND 2282, 2283, 2284 and 2285. The current data from the TRC groundwater monitoring programme for 2017-18 has shown that GND2282 and 2283 are within surrender criteria as stipulated by the consent. We are of the opinion these two monitoring wells can now be removed from the monitoring programme. Due to the current concentration of total dissolved salts and trace detection of benzene in GND2284 and GND2285 we are of the opinion these monitoring wells should be continued to be monitored by the TRC until surrender criteria can be met. However,

it is very pleasing to note a significant reduction in benzene concentrations in GND2285 and 2284 over the monitoring period.

CONCLUSION

The Wellington Landfarm is now very close to complete surrender, and it's the intention of the consent holder to completely surrender the site during the monitoring period 2018-19. Apart from the two-groundwater monitoring well (GND2284 & GND2285) all other measurable environmental parameters through the 2017-18 monitoring period meet the resource consent surrender criteria. The current data trends of the two-impacted groundwater wells show reducing concentrations towards background concentrations. Due to the reducing nature of contaminants in the groundwater no further remediation is deemed necessary at this stage.

Yours sincerely,

Dave Bolger
Team Leader Environment