

TAG Oil (NZ) Ltd Vanner Landfarm
Monitoring Programme
Annual Report
2017-2018

Technical Report 2018-11

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Executive summary

TAG Oil (NZ) Ltd (the Company) holds consent for the Vanner Landfarm. The landfarm is located on Lower Ball Road, Kakaramea, in the Mangaroa catchment. This site has been operated since 2012 with the consent granted in October 2011. The consent allowed the facility to discharge drilling wastes (consisting of cuttings and fluids from drilling operations with water based muds and synthetic based muds) 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 26 conditions setting out the requirements that the Company must satisfy.

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

The Council's monitoring programme for the year under review included three inspections. These inspections were primarily aimed at assessing the compliance with the final condition which required satisfying for consent 7942-1.1 which related to the re-vegetation of areas F9 and F10. This was achieved at the end of the monitoring period. As a result all consent conditions have been satisfied at the Vanner Landfarm.

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

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

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 remains at a high level.

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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 a resource consents held by TAG Oil (NZ) Ltd (the Company). The Company operated a landfarm (Vanner Landfarm) situated on Lower Ball Road, Kakaramea, in the Mangaroa catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consent held by the Company that related to the discharges of drilling mud within the Mangaroa catchment.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of land and is the 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 through annual programmes;
- the resource consents held by the Company in the Mangaroa catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

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

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

Section 4 presents recommendations to be implemented in the 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

Landfarming

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

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

1. Drilling waste is transported from wellsites by truck (cuttings) or tanker (liquids). It may be discharged directly to land or placed in a dedicated storage pit.
2. The required area is prepared by scraping back and stockpiling existing pasture/topsoil and levelling out uneven ground.
3. Waste is transferred to the prepared area by excavator and truck and spread out with a bulldozer. Liquids may be discharged by tanker or a spray system.

4. Waste is allowed to dry sufficiently before being tilled into the soil to the required depth with a tractor and discs.
5. The disposal area is levelled with chains or harrows.
6. Stockpiled or brought in topsoil/clay is applied to aid stability and assist in grass establishment.
7. Fertiliser may be applied and the area is sown in crop or pasture at a suitable time of year.

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

In a previous monitoring period (2015-2016) the Company provided the Council with sufficient information to allow for the partial surrender of the Vanner site.

Site description

The Vanner Landfarm is located on Lower Ball Road at Kakaramaea, flanked by Origin Energy Ltd's former Spence Road Landfarm to the south. These sites are located on marginal coastal farm land situated on reworked dune fields. An extensive (50-150 m) foredune is located seaward of the consented site, it remained undisturbed by site activities. The foredune provides a considerable natural buffer from prevailing onshore winds. Its location is provided in Figure 1.

The predominant soil type has been identified as black loamy sand and vegetation growth is primarily a mixture of pasture and dune grasses. Test pitting and the logging of boreholes on site indicated a relatively deep water table (especially in the proximity of the storage areas). Test bores were augured to 10 m in the pit area, mostly through coarse sand without intercepting significant soil moisture. Pit construction revealed mostly coarse sand at the pit bases (approximately 3-4 m below surface).

Average annual rainfall for the site is 1,043 mm (taken from the nearby Patea monitoring station). As with the other South Taranaki coastal sites, the Vanner site is subject to strong winds predominantly from the N-NW at average speeds of 10-20 knots (taken from Hawera automated weather station).

The Mangaroa Stream runs through the northern extent of the site separating the stockpiling facilities and some of the available spreading area from the main spreading area at the southern end of the site. Prior to any spreading activities the Company were required to install a culvert across the stream to prevent unauthorised discharges and stream bed damage from earthworks and transporting processes.



Figure 1 Site location and regional inset

Site history

The Vanner site became operational during the 2011-2012 monitoring period, when there was a single disposal of 1,390 m³ of primarily water/synthetic based cuttings and fluids, with smaller quantities of contaminated water and soil. The waste spread in 2012-2013 was sourced from the Mangahewa C and D, Sidewinder, Puka and KA-1 wellsites and Cheal production station.

On 30 July 2013 consent 7942-1 was transferred from BTW to the Company and the site began exclusively disposing of the Company's mud. The site remained under BTW management and had continued to stockpile and landfarm muds and cuttings for the remainder of the 2013-2014 monitoring period.

During the 2014-2015 monitoring period, one area was landfarmed on site. This was described as area F10, and it represented the final parcel of land of the Northern portion of the landfarm. This material consisted of water based drilling cuttings and fluids, exclusively from the Company's operations at their Waitangi 1 wellsite.

Post the final application of material to area F10, the land was reinstated. The site has since been inactive in terms of landfarming. The Company provided the Council with sufficient information to allow for a partial surrender of the portions of land which had historically been utilised for the practice of landfarming.

Of note, the southern portion of the landfarm is still consented should the Company require additional areas to re-commence the landfarming process.

The monitoring of the 2016-2017 year as defined by the recommendations from 2015-16 annual report focused on monitoring the degree of revegetation in the final application areas, F9 and F10.

The monitoring of the 2017-2018 period is presented in this report.

Earlier reports in relation to this site are referenced in the bibliography and reference section.

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 consent held by the Company

Consent number	Purpose	Granted	Review	Expires
7942-1.1	To discharge drilling waste (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming.	21/10/2011	01/06/2022	01/06/2028

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 **7942-1.1** to discharge drilling wastes (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming. This permit was issued by the Taranaki Regional Council on 21 October 2011 under Section 87(d) of the RMA.

A brief summary of the consent 7942-1.1 conditions are provided below.

- Condition 1 sets out definitions.
- Condition 2 requires the consent holder to adopt the best practicable option to minimise any environmental effects.
- Conditions 3 to 7 require the notification and the provision of information and analytical data prior to receipt of wastes on site for stockpiling, and prior to discharge.
- Condition 8 stipulates the discharge area.
- Condition 9 requires a buffer zone between areas of disposal and surface water bodies and property boundaries.
- Conditions 10 to 13 stipulate the manner and dispersal of wastes and discharge limits.
- Conditions 14 and 15 specify further site management requirements.
- Conditions 16 to 23 specify receiving environment limits for both soil and water.
- Condition 24 concerns archaeological remains.
- Conditions 25 and 26 concern lapse provisions and consent reviews.

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(s) which is/are appended to this report.

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 Vanner landfarm site in the 2017-18 monitoring period consisted of two primary components. Programme liaison and site inspections.

In earlier years when the site was undertaking landfarming, the programme would have also included additional components related to chemical analysis of the landfarmed soils and groundwater analysis to assess for any potential effects. This also included assessing screening analysis of material pre farming and also assessing any monitoring undertaken by the Company.

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 Vanner Landfarm site was inspected on three occasions during the monitoring period. These inspections focused on the following aspects:

- observable and/or ongoing effects upon soil and groundwater quality associated with the land disposal process
- effective incorporation of material, application rates and associated earthworks
- integrity and management of storage facilities (while stock piling and farming)
- dust and odour effects in proximity of the site boundaries
- housekeeping and site management
- the neighbourhood was surveyed for environmental effects; and
- re-vegetation of the final landfarmed areas.

On the 27th March 2015 a variation of the consent 7942-1 was granted (consent 7942-1.1). The Company had applied for a partial surrender of the consent. The partial surrender was achieved by providing the Council with analytical evidence of the soil condition to support the idea that areas of land which had been utilised for the practice of landfarming had met the conditional limit for surrender as detailed in their original consent 7942-1.

Post the successful partial surrender, the Council did not require additional samples to be collected. Results of the soil and groundwater analysis were provided in the previous monitoring years' report.

Post the successful partial surrender (27 March 2015) the main performance indicator with respect to consent 7942-1.1 was consent condition 15.

Consent 7942-1.1 Condition 15

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.

2 Results

2.1 Inspections

24 August 2017 at 10:00

No recent spreading activities had occurred, and no muds were stored at the site. The original spreading areas, defined as F1-F8, at the south of the site were observed to have good pasture cover. The areas which were spread after the areas F1-F8 are located on the northern portion of the site, defined as area F9 and F10. Bare patches of ground yet to establish pasture were present in the area of the former storage pits. The vehicle tyres (noted in the previous monitoring period) were still placed as barriers to the wind onsite, to assist with stabilising the area.

13 February 2018 at 10:00

No recent disposals had occurred on site. There were no storage pits and no stored drilling muds are on-site. The vehicle tyres remained on site. The original spreading areas, defined as F1-F8, had good growth across all areas. No harmful effects were observed in the adjacent Mangaroa Stream. Areas F9 and F10 contained some barren patches.

14 June 2018 at 09:30.

No objectionable odours or visible emissions were observed during the inspection. The historic spreading area at the southern extent of the site had good pasture cover across the entire area. The more recent spreading area was then observed. It appeared that earth had been brought onto site and spread, stockpiles of earth also remained and were yet to be spread, drilling muds were present at the surface in several areas where the bulldozer had been working. Tyres previously used to stabilise the soil have been removed from the spreading areas and stockpiled. Staff outlined the earth came from Company earthworks generated during wellsite preparation works.

No recent spreading activities had occurred, no muds were stored at the site. Original spreading area at the south of the site had good pasture cover, later spreading areas around where the pits were located still showing bare patches yet to establish pasture. Tyres were in place to assist with stabilising the area, by acting as a wind break on the western edge of the northern area, F10.

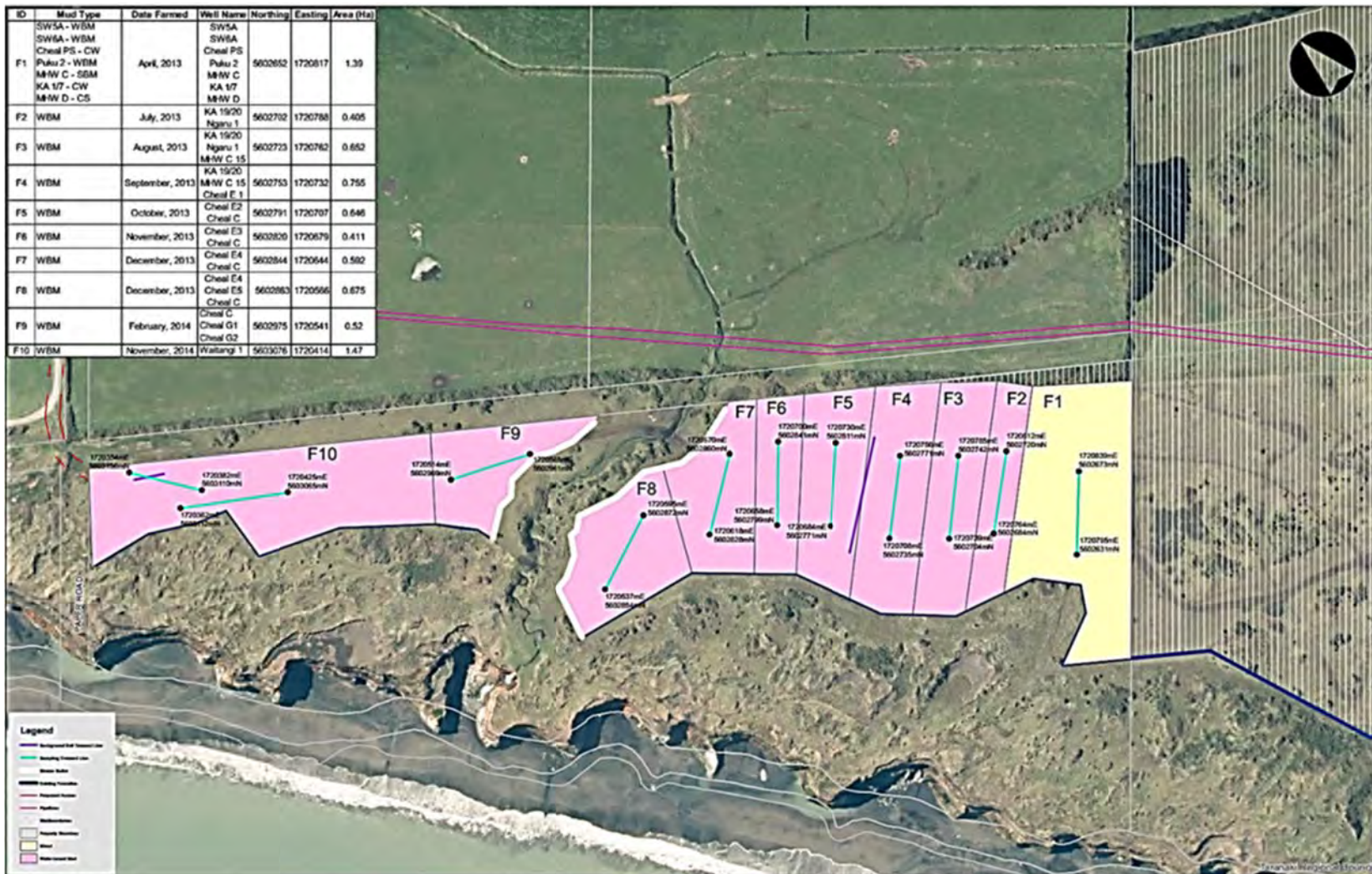


Figure 2 Company provided site map with application areas

2.1.1 Results of receiving environment monitoring

Areas F1 to F8 had been successfully sown to pasture and removed from further monitoring post a successful partial surrender undertaken in the March 2015.

The revegetation of the two remaining areas, F9 and F10, which were farmed in February 2014 and November 2014, had proved problematic. These issues had continued for the majority of this monitoring period, though at the time of writing this report, revegetation of these final area had been achieved.

In the previous monitoring period, old car tyres were brought onto the site to aid with land stabilisation as the facility was suffering from windblown and stormwater erosion. The areas F9 and F10 do not have the same protection by natural features that the other landfarmed areas on this site hold. Thus erosion was adversely effecting top soil stability. This process of land stabilisation, on observation, appeared to be aiding the consent holder with slowly re-establishing pasture coverage.

The observations this period were that areas F9 and F10 continued to revegetate (photo 3 and 5). There was a specific area which required additional work (Photo 4). This was identified as the area where the former lined storage cells were located. This area had been scoured out by wind erosion. To counter this, the consent holder brought in some additional topsoil. As the site had experienced elevated summer temperatures replanting was not possible until the July/August 2018. In September 2018, the areas appeared to have successfully established pasture, with a mix of annual grass and oats sown (Photos 6-9 inclusive).



Photo 1 North-west projection F9 towards F10 November 2015



Photo 2 South-east projection across F10 towards F9 23 May 2016



Photo 3 South-east projection F10 towards F9 February 2018



Photo 4 North-west projection over former storage cell area February 2018



Photo 5 South-east projection towards areas F8-F1 February 2018



Photo 6 South east-projection F10 to F9 September 2018



Photo 7 North-west projection area F9 to F10 September 2018



Photo 8 Slight barren patch area F9/F10 North-west projection September 2018



Photo 9 South-east projection F10-F9 September 2018

2.2 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 consent holder. 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 for the Vanner Landfarm in the 2017-2018 monitoring period was primarily aimed at satisfying consent condition 15 for consent 7942-1.1.

In this monitoring period the company undertook additional works which included bringing in clean top soil from a nearby well site construction, to aid in establishing the vegetation on the final landfarmed areas of F9 and F10. This was undertaken at the end of the monitoring period, June 2018, after soil conditions had been stabilised through the use of used vehicle tyres which prevented wind blow erosion and allowed vegetation to take hold. The addition of top soil and crops to the areas appears to have successfully satisfied condition 15. Careful management will be required moving forward to prevent inundation from sand on the Tasman side of the paddocks. Wind erosion was the key issue which affected the re-vegetation of the final areas.

3.2 Environmental effects of exercise of consents

Environmental effects associated with the Vanner Landfarm have been discussed in previous monitoring reports. This period marks the end of the Vanner Landfarm monitoring. All the consent conditions have been satisfied and the consent holder may submit the consent for surrender.

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 2

Table 2 Summary of performance for consent 7942-1.1

Purpose: To discharge drilling wastes (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming.		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Definitions which apply to the consent	Not applicable	
2. Best practicable option to be adopted	Inspection and liaison with consent holder	Yes
3. Notify the Council 48 hrs prior to stockpiling	Notifications received, landfarming now complete, no requirement for future notifications	Yes
4. Notify the Council 48 hrs prior to landfarming	Notifications received, landfarming now complete, no requirement for future notifications	Yes
5. The consent holder shall sample for the following: <ul style="list-style-type: none"> a. Total Petroleum Hydrocarbons b. Benzene, toluene, ethylbenzene, xylenes c. Polycyclic aromatic hydrocarbons d. Chloride, nitrogen, pH, potassium, sodium 	Sampling undertaken when required, no longer required, please see annual report 2015-2016 for full analysis	Yes

Purpose: To discharge drilling wastes (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming.

Condition requirement	Means of monitoring during period under review	Compliance achieved?
6. Keep records relating to wastes, areas, compositions, volumes, dates, treatments and monitoring	Company records	Yes
7. Report on records in condition 6 to Council by 31 August each year	Report received last monitoring year, no requirement for report this year	Yes
8. The discharge shall only occur on the area East of area F1	Inspections, no further landfarming undertaken, though there is facility	N/A in this monitoring period
9. No discharge within 25 m of a water body or property boundary	Inspection	Yes
10. Discharge depth limited to 100 mm for waste with hydrocarbons <5%, or 50 mm for waste with hydrocarbons >5%	Company records, no further landfarming undertaken, though there is facility	Yes
11. Incorporation into soil as soon as practicable to a depth of at least 250 mm	Inspection and sampling in previous monitoring periods	Yes
12. Hydrocarbon concentrations in soil shall not exceed 50,000 mg/ kg dry weight	Sampling in previous monitoring periods	Yes
13. Landfarming areas to be used in accordance with conditions 10 and 11 and shall not be used for any subsequent discharges of drilling wastes	Inspection, no further landfarming undertaken, though there is facility	Yes
14. All material to be landfarmed as soon as practicable and no later than 12 months	Company records, no further landfarming undertaken, though there is facility	Yes
15. Re-vegetate landfarmed areas as soon as practicable	Inspections found areas F9 and F10 to have been re-vegetated	Yes
16. Total dissolved salts in any fresh water body shall not exceed 2,500 g/m ³	Sampling	Yes
17. Disposal of waste shall not lead to contaminants entering surface water or ground water exceeding background concentrations	Sampling in previous monitoring periods	Yes
18. Disposal of waste shall not result in any significant adverse environmental effects on the Mangaroa Stream	Inspection and sampling in previous monitoring periods	Yes
19. Soil conductivity must be less than 400 mS/m. If background conductivity exceeds 400 mS/m, then increase shall not exceed 100 mS/m	Sampling in previous monitoring periods	Yes

Purpose: To discharge drilling wastes (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming.		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
20. Sodium absorption ratio [SAR] must be less than 18.0, if background SAR exceeds 18.0 then increase shall not exceed 1.0	Sampling in previous monitoring periods	Yes
21. Concentrations of heavy metals in the soil shall at all times comply with MfE guidelines	Sampling in previous monitoring periods	Yes
22. Prior to expiry/cancellation of consent these levels must not be exceeded: <ul style="list-style-type: none"> a. conductivity, 400 mS/m b. chloride, 700 g/m³ c. dissolved salts, 2,500 g/m³ d. sodium, 460 g/m³ e. PAHs, MAHs and TPH, Tables 4.12 and 4.15, Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand (MfE 1999) 	Sampling prior to surrender	Yes, supplied when facility was partially surrendered please see annual report 2015-2016
23. If condition 22 not met, consent cannot be surrendered	Sampling in previous monitoring periods	Yes, consent partially surrendered in previous period
24. Notification of discovery of archaeological remains	None found	N/A
25. Lapse condition	Inspection for evidence of exercise	N/A
26. Optional review provision re environmental effects	No further option for review	N/A
Overall assessment of environmental performance and compliance in respect of this consent		High
Overall assessment of administrative compliance in respect of this consent		High

Table 3 Summary of performance for consent holder over time

Year	Consent no	High	Good	Improvement req	Poor
2011-2012	7942-1	1			
2012-2013	7942-1	1			
2013-2014	7942-1	1			
2014-2015	7942-1.1	1			
2015-2016	7942-1.1	1			
2016-2017	7942-1.1	1			
2017-2018	7942-1.1	1			
Totals		7	0	0	0

During the year, the Company demonstrated a High level of environmental and a high level of administrative performance with the resource consents as defined in Section 1.1.4. A summary of the consent holder's environmental performance over time is provided in the above Table 3.

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 Vanner 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 consent may be surrendered and the paddocks returned to their intended purpose.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) 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 the consent may be surrendered as consent conditions have been satisfied.
2. 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:

Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m ³ s ⁻¹).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
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.
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	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
Zn*	Zinc.

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

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

Bibliography and references

BTW Limited – TAG OIL (NZ) Limited Landfarm Annual Report – Consent 7942-1—13314—22 July 2014.

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

Ministry for the Environment (2003): Guidelines for the safe application of biosolids to land in New Zealand, Ministry for the Environment.

Taranaki Regional Council (2017): *TAG Oil (NZ) Ltd Vanner Landfarm Monitoring programme Annual report 2016-2017*. Technical Report 2017-06.

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Taranaki Regional Council (2015): *TAG Oil (NZ) Limited Vanner Landfarm Monitoring programme Annual report 2014-2015*. Technical Report 2015-63.

Taranaki Regional Council (2014): *TAG Oil (NZ) Limited Vanner Landfarm Monitoring programme Annual report 2013-2014*. Technical Report 2014 – 47.

Taranaki Regional Council (2013): *BTW Limited Vanner Landfarm Monitoring Programme Annual Report 2012-2013*. Technical Report 2013 – 58.

Appendix I

Resource consents held by Tal Oil (NZ) Ltd

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

Consent number	Purpose	Granted	Review	Expires
7942-1.1	To discharge drilling waste (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming.	21/10/2011	01/06/2022	01/06/2028

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

Name of
Consent Holder: TAG Oil (NZ) Limited
PO Box 402
New Plymouth 4340

Decision Date
(Change): 27 March 2015

Commencement Date
(Change): 27 March 2015 (Granted Date: 21 October 2011)

Conditions of Consent

Consent Granted: To discharge drilling wastes (consisting of drilling cuttings and drilling fluids from drilling operations with water based muds and synthetic based muds) onto and into land via landfarming

Expiry Date: 1 June 2028

Review Date(s): June 2016, June 2022

Site Location: Lower Ball Road, Kakaramea

Legal Description: Lot 1 DP 8481 Sub 2 & 3 Blk II Carlyle SD (Discharge site)

Grid Reference (NZTM) 1721037E-5602605N

Catchment: Mangaroa

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

General condition

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

Special conditions

1. For the purposes of this consent the following definitions shall apply:
 - a) stockpiling means a discharge of drilling wastes from vehicles, tanks, or other containers onto land for the purpose of interim storage prior to landfarming, but without subsequently spreading onto, or incorporating the discharged material into the soil within 48 hours; and
 - b) landfarming means the discharge of drilling wastes onto land, subsequent spreading and incorporation into the soil, for the purpose of attenuation of hydrocarbon and/or other contaminants, and includes any stripping and relaying of topsoil.
2. 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.

Notifications, monitoring and reporting

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, (by emailing worknotification@trc.govt.nz) at least 48 hours prior to permitting drilling wastes onto the site for stockpiling, from each well drilled. Notification shall include the following information:
 - a) the consent number;
 - b) the name of the well(s) from which the waste was generated;
 - c) the type of waste to be stockpiled; and
 - d) the volume of waste to be stockpiled.
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, (by emailing worknotification@trc.govt.nz) at least 48 hours prior to landfarming stockpiled material, or material brought onto the site for landfarming within 48 hours. Notification shall include the following information:
 - a) the consent number;
 - b) the name of the well(s) from which the waste was generated;
 - c) the type of waste to be landfarmed;
 - d) the volume and weight (or density) of the waste to be landfarmed;
 - e) the concentration of chlorides, nitrogen and hydrocarbons in the waste; and
 - f) the specific location and area over which the waste will be landfarmed.

Consent 7942-1.1

5. The consent holder shall take a representative sample of each type of waste, from each individual source, and have it analysed for the following:
 - a) total petroleum hydrocarbons (C₆-C₉, C₁₀-C₁₄, C₁₅-C₃₆);
 - b) benzene, toluene, ethylbenzene, and xylenes;
 - c) polycyclic aromatic hydrocarbons screening; and
 - d) chloride, nitrogen, pH, potassium, and sodium.
6. The consent holder shall keep records of the following:
 - a) wastes from each individual well;
 - b) composition of wastes (in accordance with condition 5);
 - c) stockpiling area(s);
 - d) volumes of material stockpiled;
 - e) landfarming area(s), including a map showing individual disposal areas with GPS co-ordinates;
 - f) volumes and weights of wastes landfarmed;
 - g) dates of commencement and completion of stockpiling and landfarming events;
 - h) dates of sowing landfarmed areas;
 - i) treatments applied; and
 - j) details of monitoring, including sampling locations, sampling methods and the results of analysis;

and shall make the records available to the Chief Executive, Taranaki Regional Council.

7. 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 6, for the period of the previous 12 months, 1 July to 30 June.

Discharge limits

8. The discharge shall only occur on the area East of area F1 as shown in Drawing No 13314-109-GIS Rev 0 attached.
9. Notwithstanding condition 8, there shall be no discharge within 25 metres of the Mangaroa Stream or property boundaries.
10. For the purposes of landfarming, drilling wastes shall be applied to land in a layer not exceeding:
 - a) 100 mm thick for wastes with a hydrocarbon concentration less than 50,000 mg/kg dry weight; or
 - b) 50 mm thick for wastes with a hydrocarbon concentration equal to or greater than 50,000 mg/kg dry weight; and
 - c) in a rate and manner such that no ponded liquids remain after one hour, for all wastes;prior to incorporation into the soil.
11. As soon as practicable following the application of solid drilling wastes to land, the consent holder shall incorporate the wastes into the soil to a depth of at least 250 mm.

Consent 7942-1.1

12. 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.
13. An area of land used for the landfarming of drilling wastes in accordance with conditions 10 and 11 of this consent, shall not be used for any subsequent discharges of drilling waste.

Operational requirements

14. All material must be landfarmed as soon as practicable, but no later than twelve months after being brought onto the site.
15. 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

16. The exercise of this consent shall not result in the concentration of total dissolved salts in any fresh water body exceeding 2500 g/m³.
17. Other than as provided for in condition 15, 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.
18. The exercise of this consent shall not result in any of the following effects in the Mangaroa Stream:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) the rendering of fresh water unsuitable for consumption by farm animals;
 - e) any significant adverse effects on aquatic life.

Receiving environment limits - soil

19. 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.
20. 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.

Consent 7942-1.1

21. The concentration of heavy metals in the soil shall at all times comply with the Ministry for the Environment and New Zealand Water & Wastes Association's Guidelines for the safe application of biosolids to land in New Zealand (2003), as shown in the following table:

Constituent	Standard (mg/kg dry weight)
Arsenic	20
Cadmium	1
Chromium	600
Copper	100
Lead	300
Mercury	1
Nickel	60
Zinc	300

22. From 1 March 2028 (three months prior to the consent expiry date), constituents in the soil shall not exceed the standards shown in the following table:

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

TPH - total petroleum hydrocarbons (C₇-C₉, C₁₀-C₁₄, C₁₅-C₃₆)

The requirement to meet these standards shall not apply if, before 1 March 2028, the consent holder applies for a new consent to replace this consent when it expires, and that application is not subsequently withdrawn.

23. This consent may not be surrendered at any time until the standards in condition 22 have been met.

Archaeological remains

24. 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

25. This consent shall lapse on 31 December 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.
26. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, 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 27 March 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

