Todd Energy Limited
Deep Well Injection
Monitoring Programme
Annual Report
2018-2019

Technical Report 2019-59

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Executive summary

Todd Energy Limited (the Company) operate a number of wellsites across the Taranaki region, including the Tuhua, Pouri, Mangahewa and McKee wellsites, located east of New Plymouth and the Kapuni wellsites located west of Stratford. Each wellsite contains varying numbers of producing wells and associated production infrastructure. This report for the period July 2018 to June 2019 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) in relation to the Company's deep well injection (DWI) activities. The report details the results of the monitoring undertaken, assesses the Company's environmental and consent compliance performance during the period under review and the environmental effects of their DWI activities.

The Company held six resource consents for DWI activities, which included a total of 111 conditions setting out the requirements that the Company must satisfy. Five of the six consents were exercised during the period being reported.

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 annual site inspections, four injectate samples and 20 groundwater samples collected for physicochemical analysis. The monitoring programme also included a significant data review component, with all injection data submitted by the Company assessed for compliance on receipt.

The monitoring showed that the Company's DWI activities were generally carried out in compliance with the conditions of the applicable resource consents. There is no evidence of any issues with any injection well currently in use, or the ability of the receiving formation to accept injected fluids. The results of groundwater quality monitoring undertaken show no adverse effects of the activity on local groundwater resources. Inspections undertaken during the monitoring year found sites being operated in a professional manner.

The Council served one abatement notice to the Company on 24 September 2018 in relation to the Tuhua-B wellsite. The abatement notice required the Company to cease the discharge of fluid waste at the wellsite, to ensure compliance with Special Condition 3 of resource consent 1315-1.2 which stated that there shall be no injection of any fluids after 1 June 2018. There were no environmental impacts associated with the non-compliance and the abatement notice was immediately complied with.

During the year, the Company demonstrated a high level of environmental performance and a level of administrative performance that required improvement.

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

In terms of overall environmental and compliance performance by the Company over the last several years, this report shows that the Company's performance generally remains at a high level.

This report includes recommendations to be implemented during the 2019–2020 monitoring period.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2018 to June 2019 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Todd Energy Limited (the Company) for deep well injection (DWI) activities. During the period under review, the Company held six resource consents for the subsurface injection of fluids by DWI. The consents authorise discharges from seven separate wellsites. Five located within the Company's McKee and Mangahewa oil and gas fields, east of New Plymouth, in North Taranaki and two located within the Kapuni oil and gas field located south of Stratford, in South Taranaki.

The resource consents held by the Company permit the discharge of a range of fluids by DWI, including produced water, contaminated stormwater, well drilling fluids, hydraulic fracturing (HF) fluids, production sludges and any other fluids approved by the Council in writing. The consents include a number of special conditions which set out specific requirements the Company must satisfy.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the DWI consents held by the Company. This is the eighth report to be prepared by the Council to cover the Company's DWI discharges and their effects.

1.1.2 Structure of this report

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

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

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

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

Section 4 presents recommendations to be implemented in the 2019-2020 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
b. physical effects on the locality, including landscape, amenity and visual effects;

c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
e. risks to the neighbourhood or environment.

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

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

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

Administrative performance

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

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

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

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

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

1.2 Process description

The process of DWI involves injecting fluids deep underground into geological formations which are confined from overlying groundwater aquifers by low permeability strata. Injection wells are also designed and constructed to provide multi barrier protection against contaminant migration to groundwater systems.

The subsurface injection of fluids by DWI is often used as a method for disposing of waste fluids generated during oil and gas exploration and production activities. The greatest volume of waste fluids generated through these activities is saline water (brine) that is drawn to the surface with hydrocarbons through producing wells ('produced water'). The DWI consents currently held by the Company also authorise the injection of fluid types other than produced water. The range of fluid types authorised for injection varies by consent, but includes contaminated stormwater, production sludges, well workover fluids, well drilling fluids,

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

HF fluids and HF return fluids. In addition to providing a means to dispose of waste fluids, the subsurface injection of fluids by DWI is also an established oilfield technique for regulating reservoir pressure as a means of enhancing the rate of hydrocarbon recovery from a reservoir. This process, commonly referred to as water flooding, is often implemented when natural reservoir pressures become reduced due to ongoing production. Fluids can also be heated prior to injection to reduce the viscosity of the oil being produced, improving its flow toward a producing well and upward through the wellbore itself.

Water flooding is the primary purpose of a number of the injection wells that inject into the Mangahewa and McKee reservoirs.

A schematic representation of injection wells for both waste discharge and enhanced oil recovery is presented in Figure 1.

Further details regarding hydrocarbon exploration and production in Taranaki, the DWI process and its history within region can be found in previous compliance reports published by the Council (see Bibliography).

1.3 Resource consents

The Company holds six resource consents the details of which are summarised in the table below. One consent was varied during the reporting period. Consent 1315-1.2 was amended to extend the injection timeframe by a further 12 months and to change the consent purpose, to allow for injection into the McKee Formation. Summaries of the conditions attached to each permit are set out in Section 3 of this report.

A summary of the various consent types issued by the Council is included Appendix I, as are copies of all permits held by the Company during the period under review.

Figure 2 shows the location of the DWI consents held by the Company during the period under review.

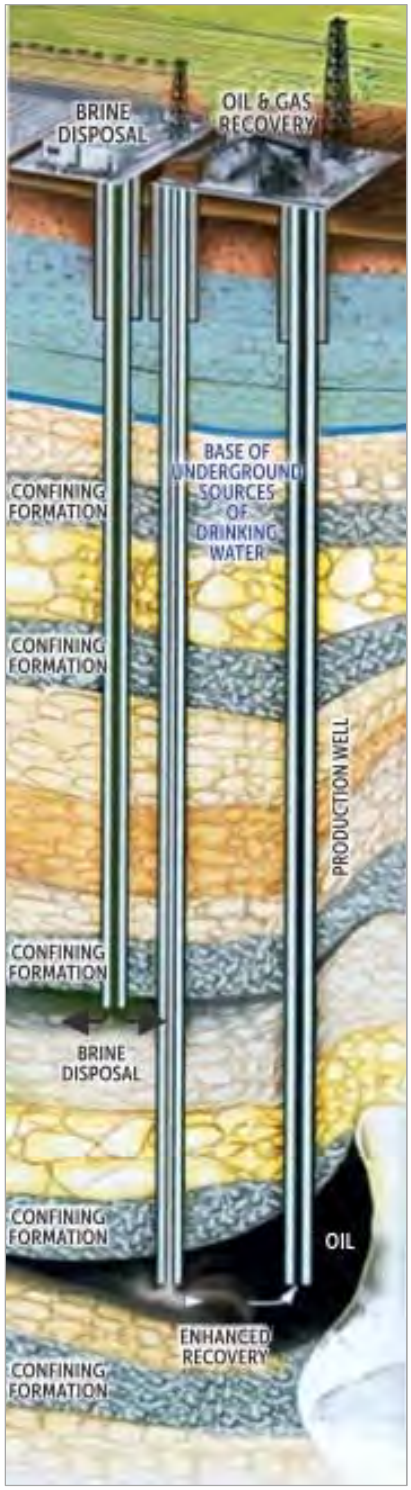

Figure 1 DWI schematic (www.epa.gov/uic)

Table 1 Resource consents held by the Company during the 2018-2019 monitoring year

Consent number	Purpose	Granted	Review	Expires
Discharges of waste to land				
1315-2	To discharge fluid waste generated by oil and gas exploration and production activities into the Mount Messenger and McKee Formations by deep well injection at the Tuhua-B wellsite	31 May 2019	June annually	01 Jun 2033
4182-2	To discharge fluid waste generated by oil and gas exploration and production activities to the McKee Formation by deep well injection at the McKee-A wellsite	24 June 2003	June annually	01 Jun 2033
5037-2.2	To discharge waste drilling fluids, water, produced water and stormwater from hydrocarbon exploration and production operations by deep well injection at the Pouri-A wellsite	20 Nov 2003	June annually	01 Jun 2033
5052-2	To discharge fluid waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection	27 May 2014	June annually	01 Jun 2033
9970-1.2	To discharge waste fluids, associated with hydrocarbon exploration and production by deep well injection, into the Matemateaonga Formation via the KW2 and KW16 wells, or into the Mangahewa Formation via the KA1 and/or KA7 wells or Moki and Matemateaonga Formations via the KA20A well as a contingency	07 Oct 2014	June annually	01 Jun 2029
10661-1	To discharge produced water, well drilling fluids, well work over fluids and hydraulic fracturing fluids from hydrocarbon exploration and production operations into the McKee Formation by deep well injection at the Tuhua-D wellsite	13 June 2018	June annually	01 Jun 2033

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 Company's DWI sites consisted of five 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 Company's wellsites were visited once each in relation to the Company's DWI Monitoring programme during the monitoring period. The main points of interest with regard to DWI consents are general housekeeping and any processes with potential or actual discharges, including any surface water runoff, and their receiving environments.

An additional two visits to the Company's McKee Production Station and Kapuni Production Station were undertaken by Council Officers for sampling purposes, as outlined in Section 1.4.4.

1.4.4 Injectate sampling

Injectate samples were obtained for analysis on two occasions from the McKee and Kapuni production stations. The sampling of injectate is carried out in order to characterise the general chemical nature of the discharge and also the variation in its chemical composition across the monitoring period.

Injectate samples were collected from the bulk storage tank at the McKee Production Station identified on-site as tank T-100 (Figure 3) and the bulk storage tank (T604) at the Kapuni Production Station (Figure 4). The injectate samples were analysed for the following parameters:

- pH;
- conductivity;
- chlorides; and
- total petroleum hydrocarbons.

1.4.5 Groundwater sampling

Groundwater samples were obtained on two occasions in the vicinity of the active wellsites during the monitoring period. This sampling is a continuation of the groundwater monitoring component of this programme which was initiated during the 2013-2014 monitoring period.

Five monitoring sites were sampled in relation to the DWI activities at the Company's McKee, Tuhua and Pouri wellsites, and five monitoring sites were sampled in relation to the Company's DWI activities at the Kapuni wellsites. Two new site specific monitoring bores were installed during the review period. The first (GND3018) was installed to improve monitoring at the Tuhua-B wellsite. This bore has now replaced GND2453 and GND2454, which were both shallow spring sites. The second (GND3023) was installed to monitor groundwater at the Tuhua-D wellsite, prior to the commencement of DWI activities at the wellsite.

Details of the groundwater monitoring sites are listed below in Table 2. The location of each site in relation to the injection well being monitored is illustrated in Figure 3 and Figure 4.

Table 2 Groundwater monitoring sites

Site code	Wellsite	Type	Distance from wellsite (m)	Interval (m BMP)	Depth (m BMP)	Aquifer	Sample method
GND2453	Tuhua-B	Spring	169	-	spring	Volcanics	No longer sampled
GND2454	Tuhua-B	Spring	161	-	spring	Volcanics	
GND2455	McKee-A	Bore	38	28.5-35.5	35.5	Volcanics	Peri-pump

Site code	Wellsite	Type	Distance from wellsite (m)	Interval (m BMP)	Depth (m BMP)	Aquifer	Sample method
GND3005	Pouri-A	Bore	<50	30.6-33.6	33.6	Marine Terraces	Peri-pump
GND2748	McKee-B	Bore	<50	18-30	30	Volcanics	Bladder
GND3018	Tuhua-D	Bore	<50	38-50	50	Volcanics	Bladder
GND3023	Tuhua-B	Bore	<50	35-47	47	Volcanics	Bladder
GND1701	KA9	Bore	2,971	92	337	Matemateaonga	Tap
GND2369	KA9	Bore	4,643	280-448	448	Matemateaonga	Tap
GND1659	KA9	Bore	4,020	123-432	432	Matemateaonga	Tap
GND2357	KA9	Bore	<50	35*	unknown	Volcanics	Bladder
GND0093	KA1/7/19/20	Bore	<10	unknown	42.6	Volcanics	Bladder

** The pump was pushed down to 35 m during remediation of the bore however the total depth of bore is unknown*

Groundwater samples taken by the Council were sent on behalf of the Company to Hill Laboratories Limited (Hills) and analysed for a range of parameters including the following which are required under the conditions of each consent:

- pH;
- conductivity;
- chlorides; and
- total petroleum hydrocarbons.

The parameters above are deemed sufficient to enable identification of any significant changes in groundwater quality related to DWI activities.

In addition, baseline samples have been collected from all monitored sites and analysed by Hills for general ion chemistry, BTEX and dissolved gas concentrations. These more detailed analyses will allow a more in depth assessment of variations in groundwater composition should the need arise in the future.

1.4.6 Assessment of data submitted by the Company

A significant component of the monitoring programme is the assessment of consent holder submitted data. The Company is required to submit a wide range of data under the conditions of their DWI consents.

As required by the conditions of their consents, the Company has submitted an Injection Operation Management Plan for each active injection well. The plans are required to include the operational details of the injection activities and to identify the conditions that would trigger concerns about the integrity of the injection well, the receiving formation or overlying geological seals. The plans are also required to detail the action(s) to be taken by the consent holder if trigger conditions are reached. The Company was also required to submit well construction details, an assessment of the local geological environment, results of well integrity testing and details of the proposed monitoring plan for the injection well.

The Company is also required to maintain continuous records of injection volumes, and average and maximum injection pressures, and to characterise the chemical characteristics of all waste types being discharged. This data is submitted to the Council on a monthly basis where it is assessed for compliance against the relevant consent conditions.

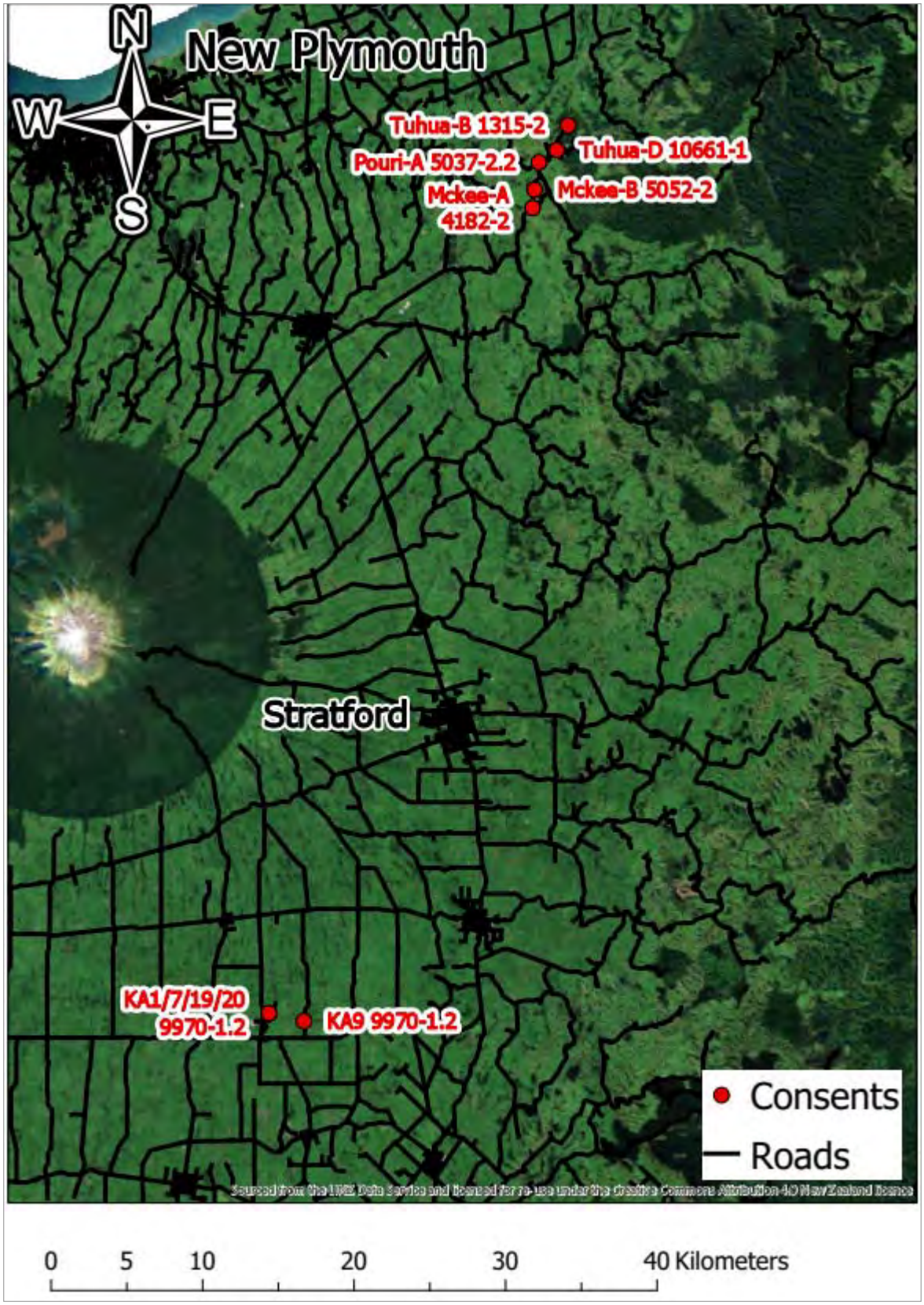

Figure 2 Location of DWI consents held by the Company during the period under review

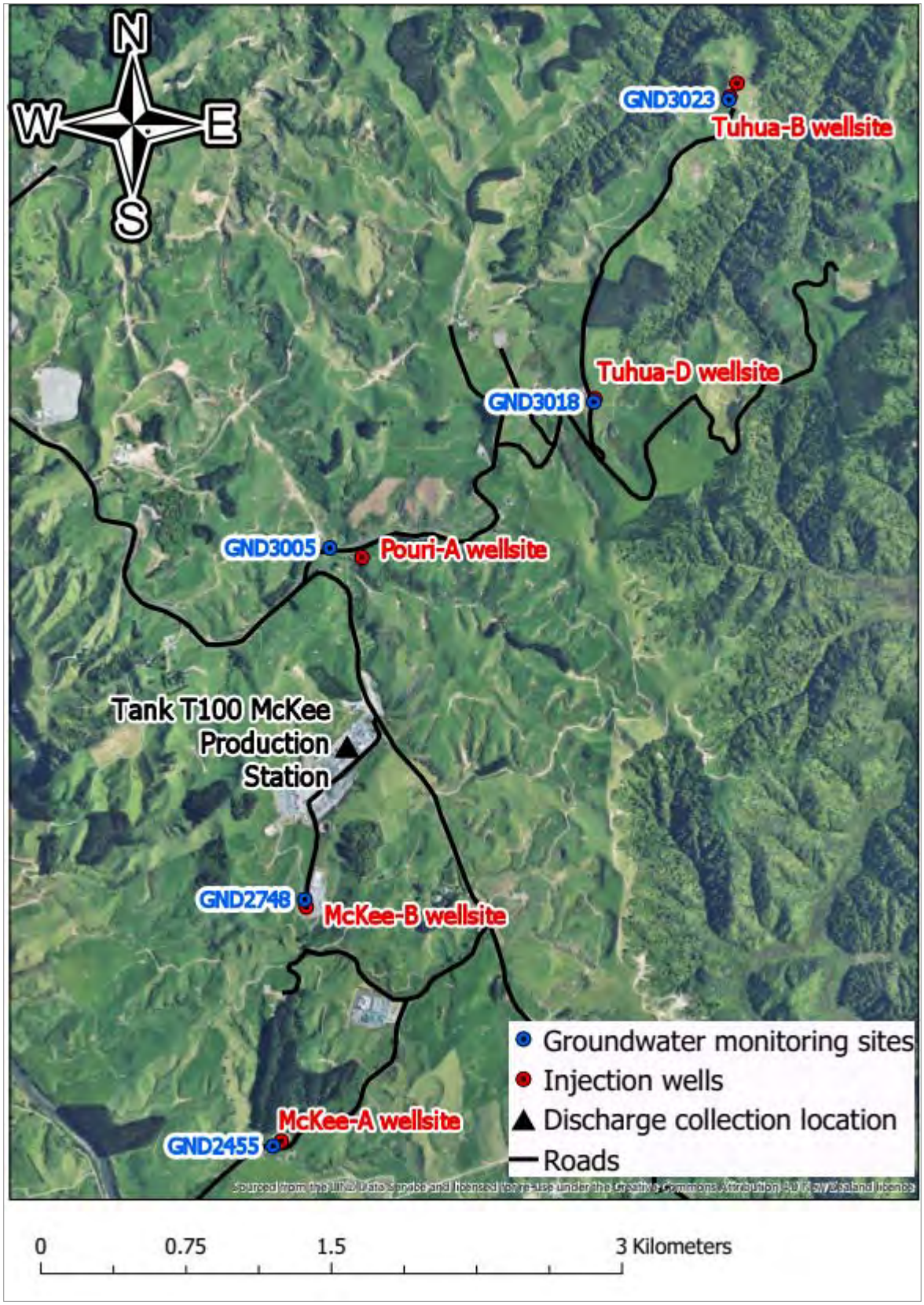

Figure 3 Location of monitoring sites in relation to the Company's McKee DWI wellsites

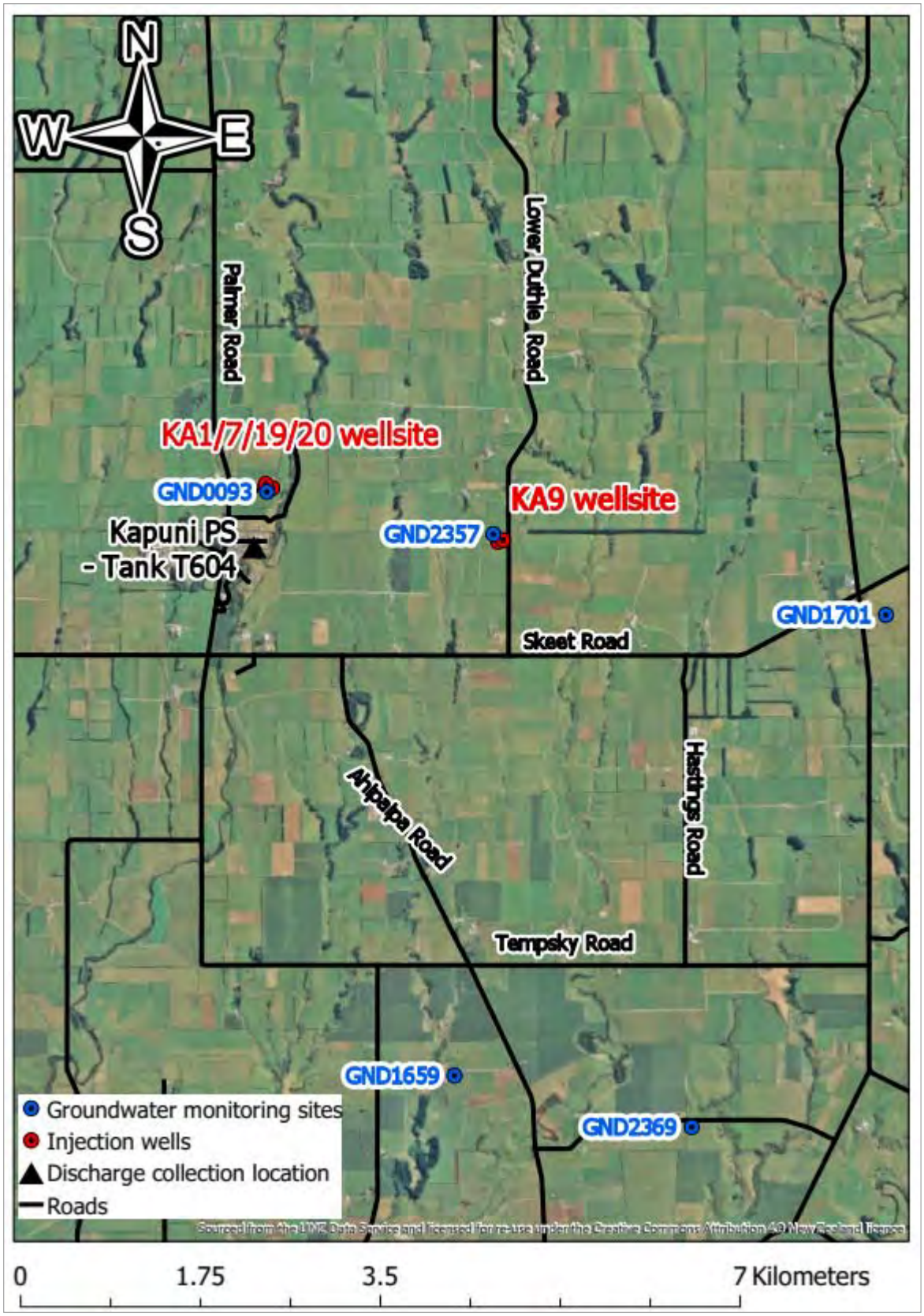

Figure 4 Location of monitoring sites in relation to the Company's Kapuni DWI wellsites

2 Results

2.1 Inspections

During the period under review, the Company's wellsites were all inspected once under the requirements of the DWI monitoring programme. Routine inspections included undertaking a general visual assessment of the operational equipment, storage facilities and associated equipment. The inspecting officer concluded that the wellsites were in good condition and being well managed. There were no issues noted specific to any of the Company's DWI consents.

The McKee and Kapuni production stations were also inspected on five occasions as part of the Council's production station monitoring programme and on two occasions for the purpose of injectate sampling. Injectate sampling involved accessing the Company's bulk liquid storage tanks, under the supervision of onsite technicians, at the McKee and Kapuni production stations. No issues were noted by staff during these visits.

2.2 Injectate monitoring

Samples of injectate were obtained from the Company's McKee Production Station on 28 November 2018 and 21 May 2019 and at the Kapuni Production Station on 12 November 2018 and 16 May 2019. All fluids for disposal are handled and controlled through the production stations. The samples were submitted to Hills laboratory on the same day for physicochemical analysis.

The results of the sample analyses undertaken by the Council are included in Table 3 and Table 4. The range of results for each analyte since 2004 are also presented for comparison.

The Company also undertakes regular analysis of injectate at both production stations. The results provided to the Council for the 2018-2019 monitoring year are presented in Table 5.

The concentrations of each analyte measured over the 2018-2019 period are within the typical range for injectate samples at these sites.

Table 3 Results of injectate sampling undertaken by the Council at the McKee Production Station

Sample details	Units	McKee Production Station (Sample Point T100)			
TRC sample number	-	Minimum	Maximum	TRC184327	TRC191972
Sample date	-	July 2014-Jun 2019		28 Nov 18	21 May 19
Sample time	NZST	-	-	12:00	12:40
pH	pH	6.6	9.0	6.7	6.6
Electrical conductivity	mS/m	188	3,590	3,190	3,120
Chloride	g/m^3	5,000	14,600	10,800	10,500
Total petroleum hydrocarbons	g/m^3	0.8	480	100	138

Table 4 Results of injectate sampling undertaken by the Council at the Kapuni Production Station

Sample details	Unit	Kapuni Production Station (Sample Point T604)			
TRC sample number	-	Minimum	Maximum	TRC184326	TRC191971
Sample date	-	July 2004-Jun 2019		12 Nov 2018	16 May 2019
Sample time	NZST	-	-	10:50	11:05
pH	pH	6.7	9.0	7.4	7.2

Sample details	Unit	Kapuni Production Station (Sample Point T604)			
TRC sample number	-	Minimum	Maximum	TRC184326	TRC191971
Sample date	-	July 2004-Jun 2019		12 Nov 2018	16 May 2019
Electrical conductivity	mS/m	1,400	3,540	3,420	3,340
Chloride	g/m^3	6,070	12,000	7,300	8,200
Total petroleum hydrocarbons	g/m^3	29	1,300	52	220

Table 5 Range of results of the Company's injectate sampling (2018-2019)

Sample details	-	Kapuni Production Station (Sample Point T604)		McKee Production Station (Sample Point T100)	
Range	Unit	Minimum	Maximum	-	-
Sample date	-	July 2018- June 2019		19 Nov 2019	20 May 2019
pH	pH units	7.0	7.4	7.3	6.6
Electrical conductivity	mS/m	34	3,500	3,220	31
Suspended solids	g/m^3	4	109	27	104
Temperature	℃	17.1	19.7	Not provided	17.6
Salinity (as TDS)	g/m^3	35	35,000	20	19
Chlorides	g/m^3	301	9,050	10,600	9,936
Total petroleum hydrocarbons	g/m^3	78	9,800	84	298

2.3 Groundwater sampling

The results of analyses carried out during the period are set out below in Table 6, Table 7, Table 8 and Table 9. Historical data has also been provided for comparison if available. . Baseline sampling undertaken at the Tuhua-B and Tuhua-D wellsites during the reporting period is included in Appendix II.

The results show there have been no significant changes in groundwater composition at any of the sites since monitoring commenced, demonstrated by the relatively narrow ranges between minimum and maximum analyte concentrations. The subtle variations in analyte concentrations at each site are a result of natural seasonal fluctuation and sampling variability.

Table 6 Results of groundwater sampling in relation to Tuhua-B under consent 1315-2

Sample details	Units	GND2453/GND2454		GND3018	
TRC sample number	-	Minimum	Maximum	TRC184963	TRC191969
Sample date	-	July 2013 to June 2018		30 Nov 18	23 May 19
Sample time	NZST	-	-	11:24	11:55
pH	pH	6.2	7.5	6.9	6.4
Temperature	°C	14.2	15.7	16.9	15.4
Electrical conductivity	mS/m	6.4	18.9	20.8	12.3
Chloride	g/m^3	8.4	44.6	19.5	14.1
Total petroleum hydrocarbons	g/m^3	<0.5	<0.7	<0.7	<0.7

Table 7 Results of groundwater sampling in relation to McKee-A under consent 4182-2

Sample details	Units	GND2455			
TRC sample number	**-**	**Minimum**	**Maximum**	**TRC184304**	**TRC191960**
Sample date	-	July 2013 to June 2019		30 Nov 18	21 May 19
Sample time	NZST	-	-	8:25	13:35
pH	pH	7.3	9.7	7.8	7.6
Electrical conductivity	mS/m	32.3	43	43	41.4
Chloride	g/m^3	11.7	15.2	12.2	11.7
Total petroleum hydrocarbons	g/m^3	<0.5	<0.7	<0.7	<0.7

Table 8 Results of groundwater sampling in relation to Pouri-A under consent 5037-2.2

Sample details	Units	GND3005			
TRC sample number	**-**	**Minimum**	**Maximum**	**TRC184307**	**TRC191963**
Sample date	-	July 2015 to June 2019		30 Nov 18	21 May 19
Sample time	NZST	-	-	9:57	14:45
pH	pH	8	8.1	8.1	8.0
Electrical conductivity	mS/m	22.7	25.7	25.6	25.4
Chloride	g/m^3	8.7	11.1	9.3	8.7
Total petroleum hydrocarbons	g/m^3	<0.5	<0.7	<0.7	<0.7

Table 9 Results of groundwater sampling in relation to the McKee-B wellsite consent 5052-2

Sample details	Units	GND2748			
TRC sample number	**-**	**Minimum**	**Maximum**	**TRC184309**	**TRC191965**
Sample date	-	July 2016 to June 2019		28 Nov 18	20 May 19
Sample time	NZST	-	-	11:36	15:15
pH	pH	6.9	7.1	7.1	6.9
Electrical conductivity	mS/m	20.3	20.5	20.5	20.3
Chloride	g/m^3	9.5	9.8	9.5	9.8
Total petroleum hydrocarbons	g/m^3	<0.7	<0.7	<0.5	<0.7
Total petroleum hydrocarbons	g/m^3	<0.7	<0.7	<0.7	<0.7

Table 10 Results of groundwater sampling in relation to the Kapuni wellsites under consent 9970-1.2

Sample details	Units	GND1701				GND2357			
TRC sample number	-	Minimum	Maximum	TRC184300	TRC191964	Minimum	Maximum	TRC184303	TRC191959
Sample date	-	July 2012 to June 2019		12 Nov 18	16 May 19	July 2014 to June 2019		14 Nov 18	17 May 19
Sample time	NZST	-	-	13:30	13:45	-	-	10:20	12:00
pH	pH	8.3	8.8	8.4	8.3	6.8	7.6	7	6.9
Electrical conductivity	mS/m	30.1	34.1	33.4	33	54.8	93.3	90.9	93.3
Chloride	g/m^3	10.4	12	10.4	11.2	23	36	33	31
Total petroleum hydrocarbons	g/m^3	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Sample details	**Units**	**GND2369**				**GND0093**			
TRC sample number	-	Minimum	Maximum	TRC184298	TRC191133	Minimum	Maximum	TRC184299	TRC191968
Sample date	-	July 2012 to June 2019		13 Nov 18	16 May- 9	July 2013 to June 2019		13 Nov 18	17 May 19
Sample time	NZST	-	-	13:10	12:45	-	-	10:00	11:25
pH	pH	7.8	8.9	8.9	8.7	6.4	7.9	7.4	6.9
Electrical conductivity	mS/m	13.19	37.8	32.2	31.4	13.5	25.4	13.5	20.2
Chloride	g/m^3	10.8	14.3	11.7	11.3	16.9	34	17.4	26
Total petroleum hydrocarbons	g/m^3	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Sample details	**Units**	**GND1659**							
TRC sample number	-	Minimum	Maximum	TRC184297	TRC191961				
Sample date	-	July 2012 to June 2019		14 Nov 18	16 May 19				
Sample time	NZST	-	-	12:20	11:50				
pH	pH	8	8.4	8.1	8				
Electrical conductivity	mS/m	30.6	37.9	37.7	37.2				
Chloride	g/m^3	10.4	12.9	12	11.9				
Total petroleum hydrocarbons	g/m^3	<0.5	<0.7	<0.7	<0.7				

Table 11 Results of groundwater sampling in relation Tuhua-D under consent 10661-1

Sample details	Units	GND3023	
TRC sample number	-	**TRC184962**	**TRC191970**
Sample date	-	22 Jan 19	20 May 19
Sample time	NZST	10:05	13:40
pH	pH	7.3	6.9
Electrical conductivity	mS/m	24.6	22.7
Chloride	g/m^3	14.7	14.8
Total petroleum hydrocarbons	g/m^3	<0.7	<0.7

2.4 Provision of consent holder data

The Company provided records of their injection activities during the 2018-2019 monitoring period, including daily injection volumes, pumping duration and maximum and average injection pressures. All data was provided within the consented timeframes. Table 12 provides an overview of the Company's injection activities across all consents during the monitoring period and shows that DWI occurred at all sites except Pouri-A.

A total of 253,063 m^3 was injected during the monitoring period. The majority of discharge was undertaken at the McKee-A and Tuhua-D wellsites, via the McKee-1 and Tuhua-4 wells respectively. The total annual injection volumes across all sites since 2009 are presented in Table 13.

Table 12 Summary of injection activity during the 2018-2019 monitoring year

Consent	Wellsite	Injection wells	Total volume discharged (m^3) 01/07/18 – 30/06/19	Discharge period		TRC well ID
				From	To	
1315-2	Tuhua-B	McKee Disposal-1	16,696.54	01/07/2018	30/06/2019	GND1749
	Tuhua-B	Tuhua-6*	133.08	22/11/2018	23/11/2018	GND3024
4182-2	McKee-A	McKee-1	89,675.78	01/07/2018	30/06/2019	GND0443
5037-2.2	Pouri-A	Pouri-1A	-	-	-	GND1508
5052-2	McKee-B	McKee-4	15,917.27	18/10/2018	30/06/2019	GND1455
9970-1.2	KA9	KW2	10,108.74	1/10/2019	30/06/2019	GND1412
		KA16	12,342.26	22/02/2019	30/06/2019	GND2669
	KA1/7/19/20	KA1	14,483.15	01/07/2018	30/06/2019	GND1683
		KA20A*	1.86	30/10/2018	30/10/2018	GND2594
10661-1	Tuhua-D	Tuhua-4	93,704.57	01/10/2018	30/06/2019	GND2828
Total	-	-	253,063.25	-	-	-

*Note * flow testing only*

Table 13 Summary of the Company's historical injection activity since 2009

Period	Total volume discharged (m^3)	Period	Total volume discharged (m^3)
2018-2019	253,063	2013-2014	41,105
2017-2018	313,075	2012-2013	91,919

Period	Total volume discharged (m^3)	Period	Total volume discharged (m^3)
2016-2017	279,670	2011-2012	91,325*
2015-2016	240,298	2010-2011	91,325*
2014-2015	239,428	2009-2010	91,324*

Note volumes are reported from the 2009-2012 (273,974 m^3) so total has been averaged over three years*

2.4.1 Summary of injection activities at the Tuhua-B wellsite (consent 1315-2)

A summary of historical data is provided below in Table 14 and graphically in Figure 5 and Figure 6.

A total of 16,697 m^3 of fluid was injected via the McKee Disposal-1 well during the reporting period.

A review of the data indicates that:

- Injection at the wellsite has decreased over time;
- Increases in pressure generally correspond with increased volumes; and
- Average daily pressures have steadily reduced since 2015.

Table 14 Summary of injection occurring under consent 1315 (2009-2019)

Deep well injection undertaken at Tuhua-B wellsite via the McKee Disposal-1 injection well					
Year	Annual volume (m^3)	Max. injection volume (m^3/day)	Maximum injection rate (m^3/hr)	Max. injection pressure (bar)	Avg. injection pressure (bar)
2018-2019	16,697	322	22.0	86.4	7.3
2017-2018	68,014	1,100	45.8	65.0	10.4
2016-2017	82,784	1,015	42.3	63.0	19.6
2015-2016	95,406	642	28.5	58.0	33.4
2014-2015	60,720	1,142	48.0	82.0	15.0
2013-2014	30,239	759	41.0	70.0	29.0
2009-2012*	90,390	450	-	44.0	28.0

*Note *volume was reported from 2009-2012 (271,172 m^3) so total has been averaged over the three year period.*

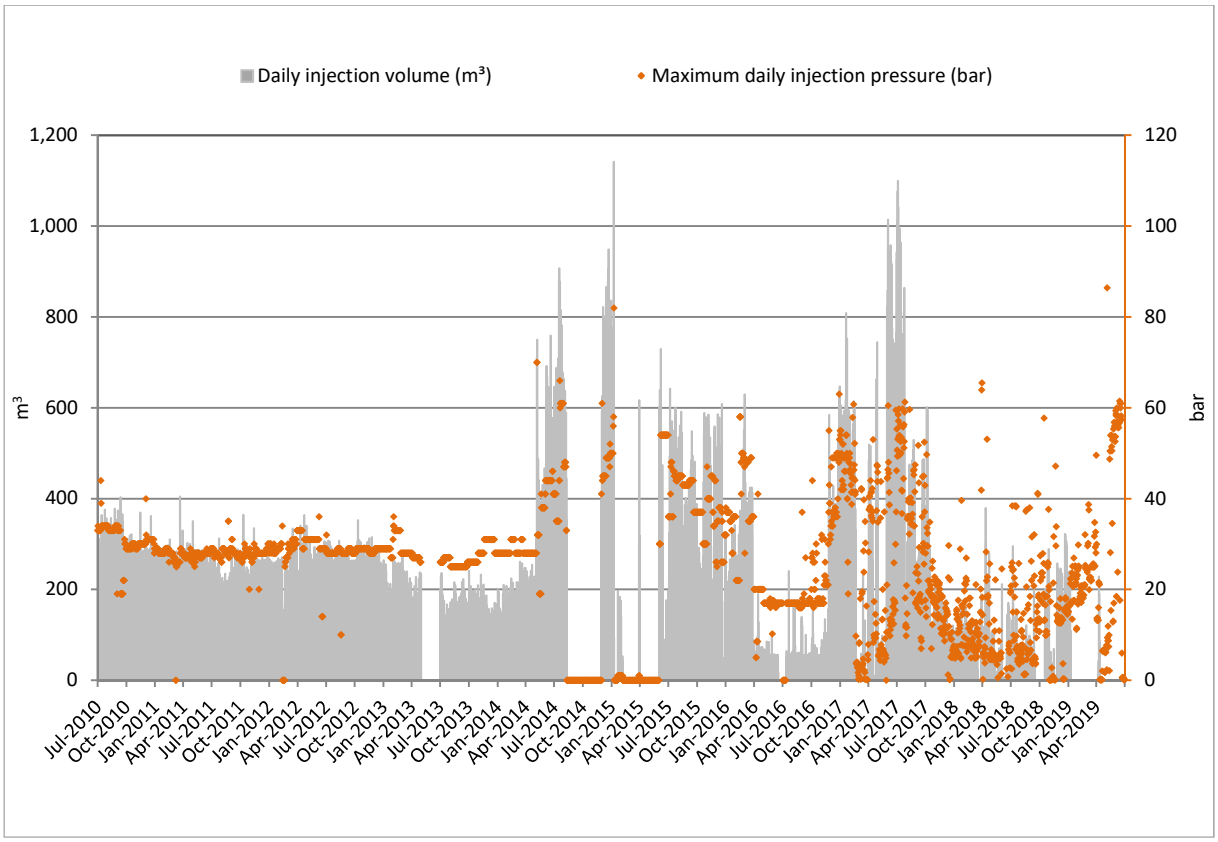

Figure 5 Tuhua-B wellsite: McKee-1 disposal well daily injection volume and pressure (2010-2019)

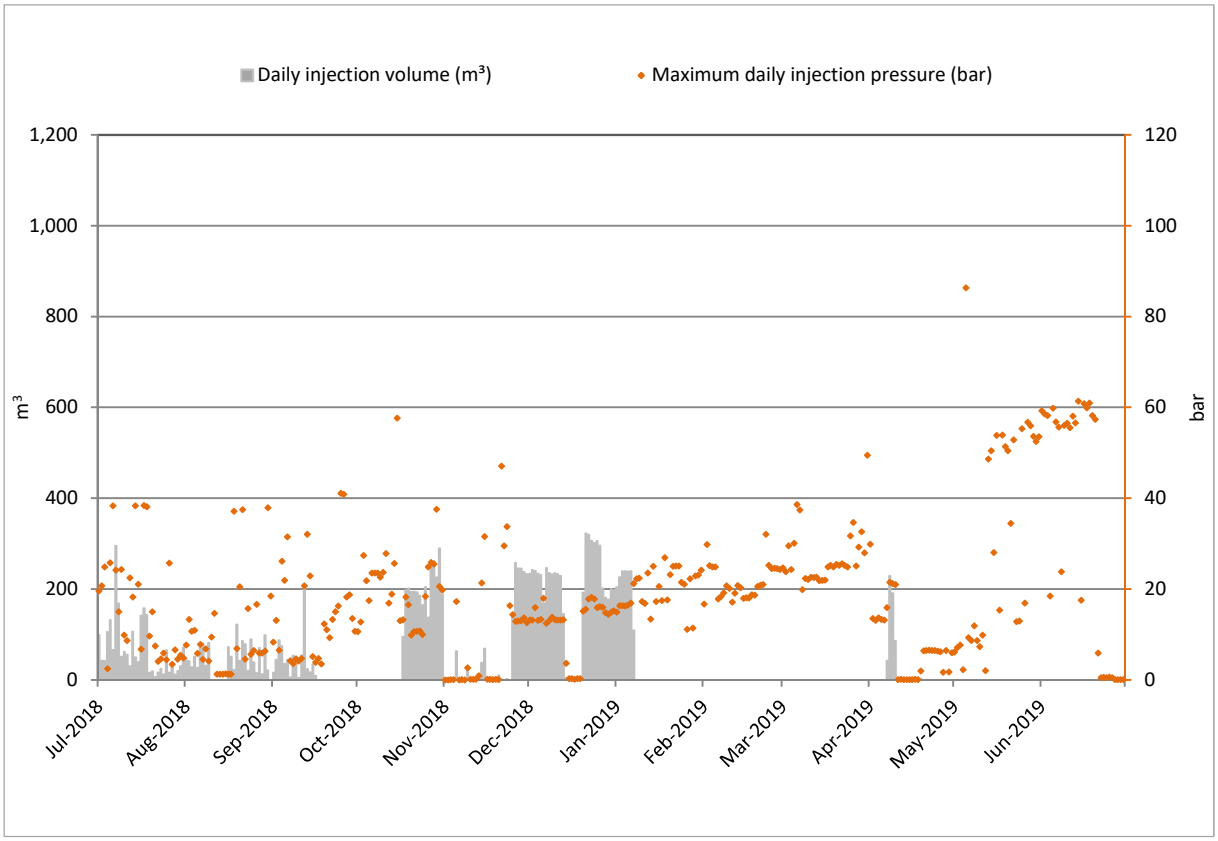

Figure 6 Tuhua-B wellsite: McKee-1 disposal well daily injection volume and pressure (2018-2019)

2.4.2 Summary of injection activities at the McKee-A wellsite (consent 4182-2)

A summary of historical data is provided below in Table 15 and graphically in Figure 7 and Figure 8.

A total of 89,676 m^3 of fluid was injected via the McKee-1 injection well during the reporting period.

A review of the data indicates that:

- Historically the majority of the Company's discharge was undertaken at the McKee-A wellsite via the McKee-1 injection well;
- Injection has been intermittent during the reporting period as several new injection wells have been brought into operation during the year;
- The volume of fluids injected at the McKee-A wellsite was significantly lower than in previous years; and
- The McKee-1 well is utilised for water flooding therefore injection (volumes and pressures) within the well fluctuate in response to the requirements of the water flooding programme.

Table 15 Summary of injection occurring under consent 4182 (2009-2019)

Deep well injection undertaken at McKee-A wellsite via the McKee-1 injection well					
Year	**Annual volume ($m^{3)}$**	**Max. injection volume (m^3/day)**	**Maximum injection rate (m^3/hr)**	**Max. injection pressure (bar)**	**Avg. injection pressure (bar)**
2018-2019	89,676	835	34.8	89.3	12.1
2017-2018	224,955	1,134	47.3	91.8	9.7
2016-2017	191,534	907	52.4	76.0	11.4
2015-2016*	125,876	1,203	166.0	38.0	9.1
2014-2015	178,708	1,064	83.0	17.0	5.0
2013-2014	10,866	336	97.0	No pressure required - vacuum	
2009-2012	2,802	462	-	No pressure required - vacuum	

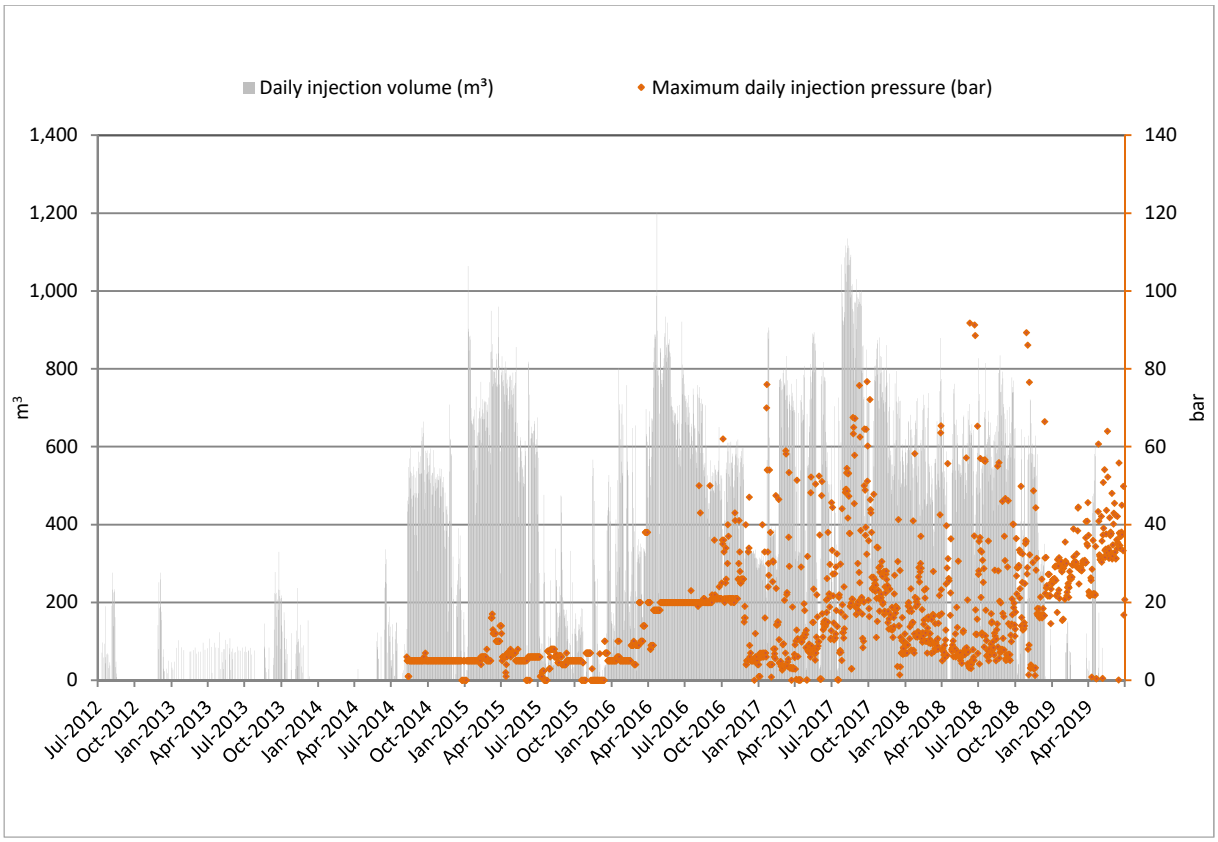

Figure 7 McKee-A wellsite: McKee-1 well daily injection volume and pressure (2012-2019)

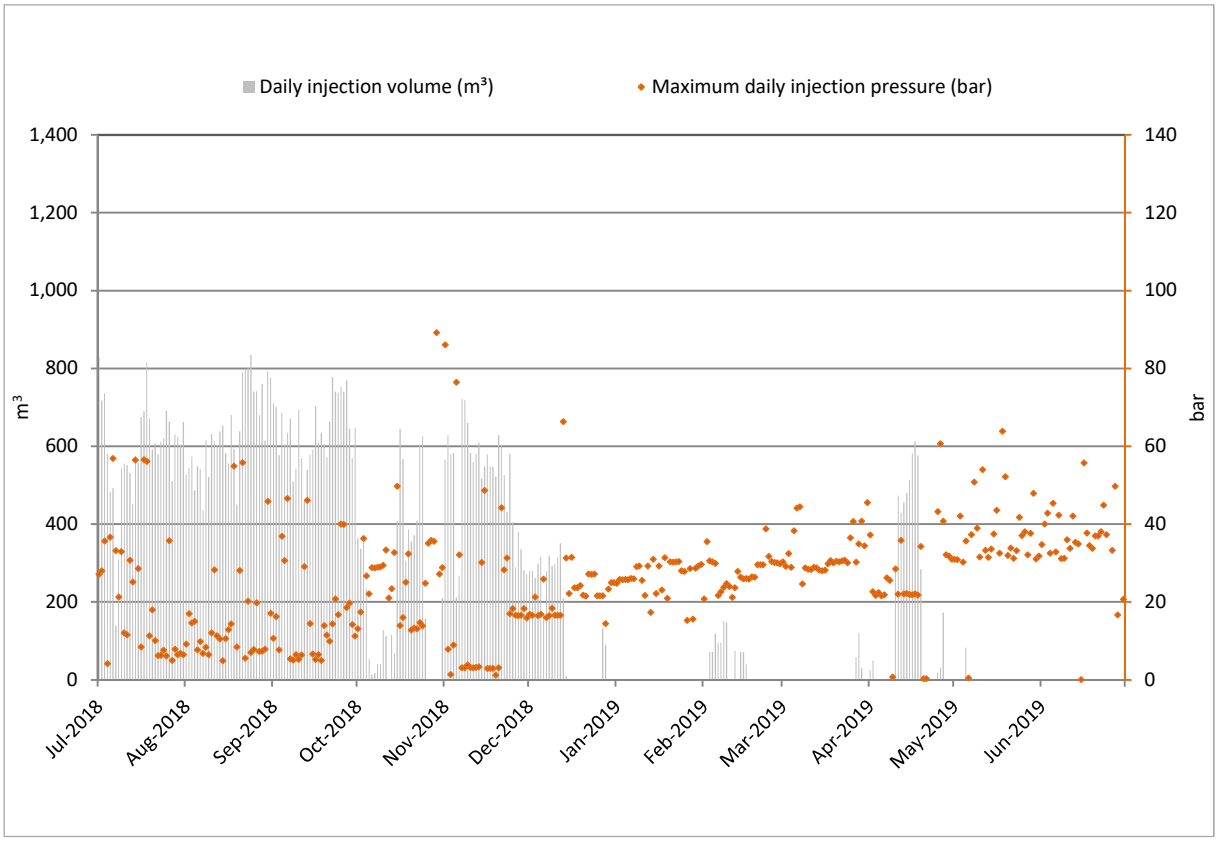

Figure 8 McKee-A wellsite: McKee-1 well daily injection volumes and pressure (2018-2019)

2.4.3 Summary of injection activities at the Pouri-A wellsite (consent 5037-2)

A summary of historical data is provided below in Table 16 and graphically in Figure 9.

There was no injection undertaken at the Pouri-A wellsite via the Pouri-1A injection well during the reporting period.

Table 16 Summary of injection occurring under consent 5037 (2015-2019)

Deep well injection undertaken at Pouri-A wellsite via the Pouri-1A injection well					
Year	Annual volume (m^3)	Max. injection volume (m^3/day)	Maximum injection rate (m^3/hr)	Max. injection pressure (bar)	Avg. injection pressure (bar)
Consent limit	-	-	-	276	-
2018-2019	-	-	-	27.2	7.4
2017-2018	542	197.29	8.2	98.3	13.8
2016-2017	5,381	163.10	6.8	99.6	5.7
2015-2016*	19,016	311.98	45.9	48.0	15.8

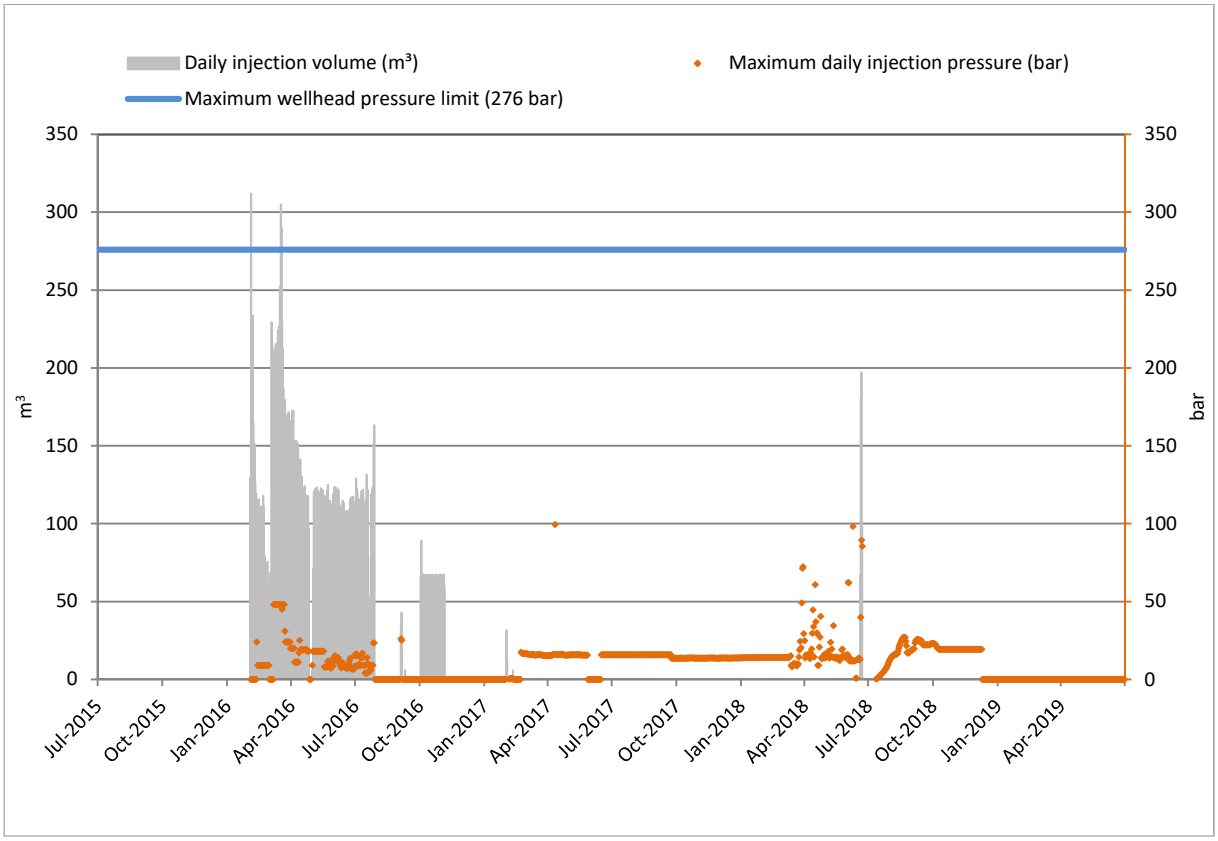

Figure 9 Pouri-A wellsite: Pouri-1A well daily injection volume and pressure (2015-2019)

2.4.4 Summary of injection activities at the McKee-B wellsite (consent 5052-2)

A summary of historical data is provided below in Table 17 and graphically in Figure 10.

A total of 15,917 m^3 of fluid was injected via the McKee-4 injection well during the reporting period.

A review of the data indicates that:

- Injection via the McKee-4 well commenced 18 October 2018;
- Increases in pressure generally correspond with increased volumes; and
- Injection via the well fluctuated over the monitoring period.

Table 17 Summary of injection occurring under consent 5052 (2018-2019)

Deep well injection undertaken at McKee-B wellsite via the McKee-4 injection well					
Year	Annual volume ($m^{3)}$	Max. injection volume (m^3/day)	Maximum injection rate (m^3/hr)	Max. injection pressure (bar)	Avg. injection pressure (bar)
2018-2019	15,917	440	29.4	78.0	2.6

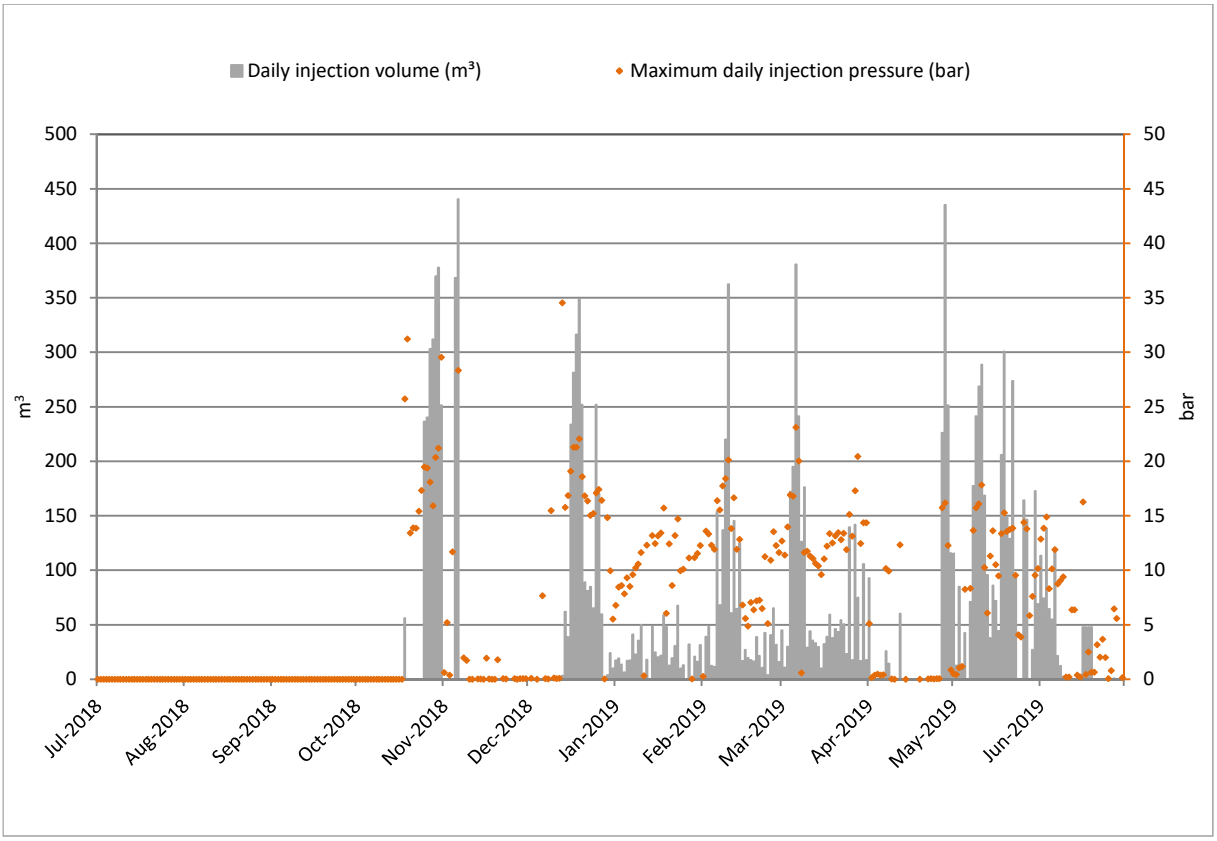

Figure 10 McKee-B wellsite: McKee-4 well daily injection volume and pressure (2018-2019)

2.4.5 Summary of injection activities at the Kapuni wellsites (consent 9970-2)

A summary of historical data is provided below in Table 18 and graphically in Figure 11, Figure 12, Figure 13 and Figure 14.

A total of 24,594 m^3 of fluid was injected via the Kapuni injection wells during the reporting period. The KW2 and KA16 wells at the KA9 wellsite injected 10,109 m^3 and 12,342 m^3 respectively and the KA1 injection well located at the KA1/7/19 /20 wellsite injected 14,483 m^3. Only a small volume of fluid was injected via the KA20A well. Injection was undertaken in the well to test its suitability for addition to the Company's DWI programme. Tests showed poor injectivity in the targeted formation and no further DWI is planned for the well.

A review of the data indicates that:

- The KA1 well was utilised by Todd as the main injector at the Kapuni wellsites until February 2019;
- Pressures in the KA1 well steadily increase when injection ceases;
- Injection recommenced at the KW2 well on 1 October 2018; and
- Injection recommenced at the KA16 well on 22 February 2019.

Table 18 Summary of injection occurring under consent 9970 (2015-2019)

Deep well injection undertaken at the KA9 and KA1/9/19/20 wellsites via the KW2, KA16 and KA1 wells					
Year	**Annual volume ($m^{3)}$**	**Max. injection volume (m^3/day)**	**Maximum injection rate (m^3/hr)***	**Max. injection pressure (bar)**	**Avg. injection pressure (bar)**
Consent limit	-	2,000	-	-	-
2018-2019	24,594	478	29	100	N/A
2017-2018	19,563	565	72	100	32
2016-2017	*32,500*	*584*	*35*	*63*	*42*
2015-2016	*35,830*	*489*	*73*	*61*	*44*
2014-2015	*43,014*	*617*	*-*	*60*	*45*
2013-2014	*62,648*	*890*	*164*	*66*	*38*
2012-2013	*62,228*	*790*	*147*	*65*	*47*

*Note *not measured calculated using daily volume and injection hours.*

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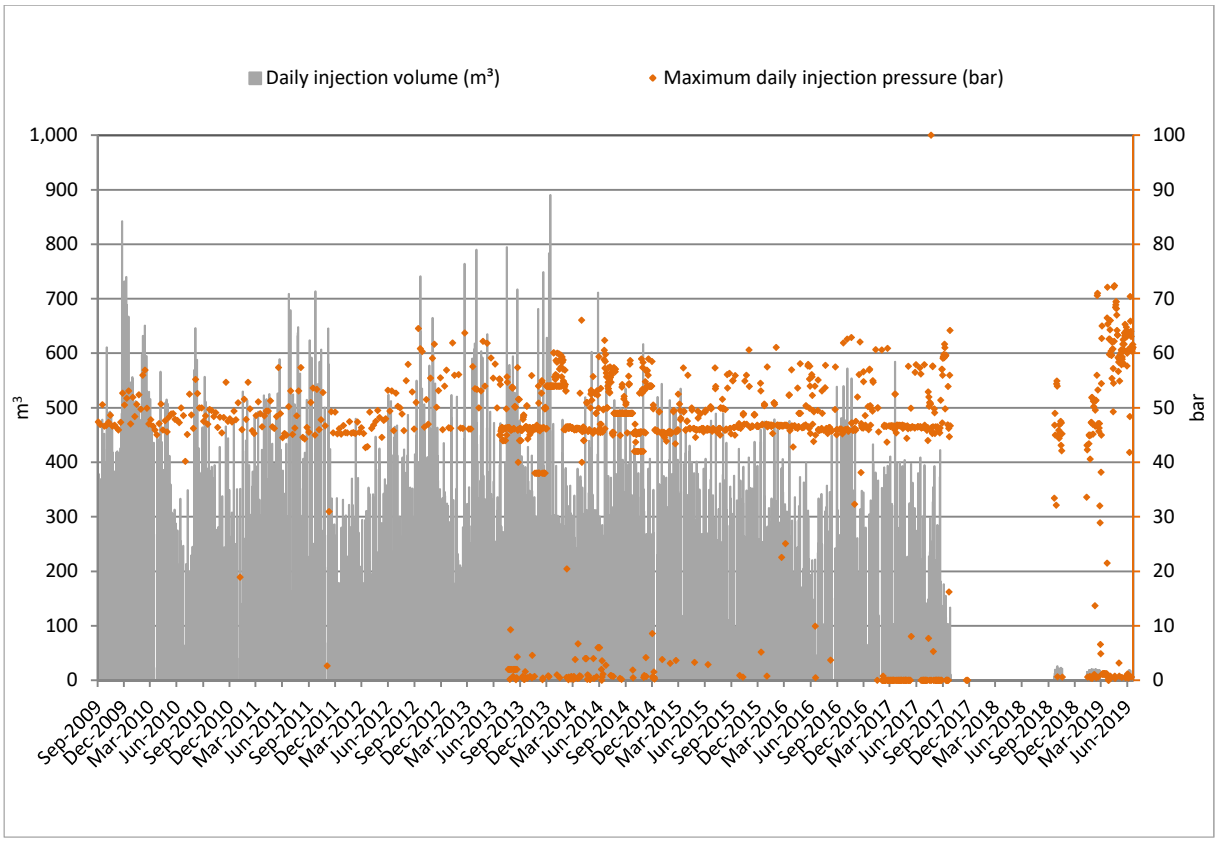

Figure 11 KA9 wellsite: KW2 well daily injection volume and pressure (2009-2019)

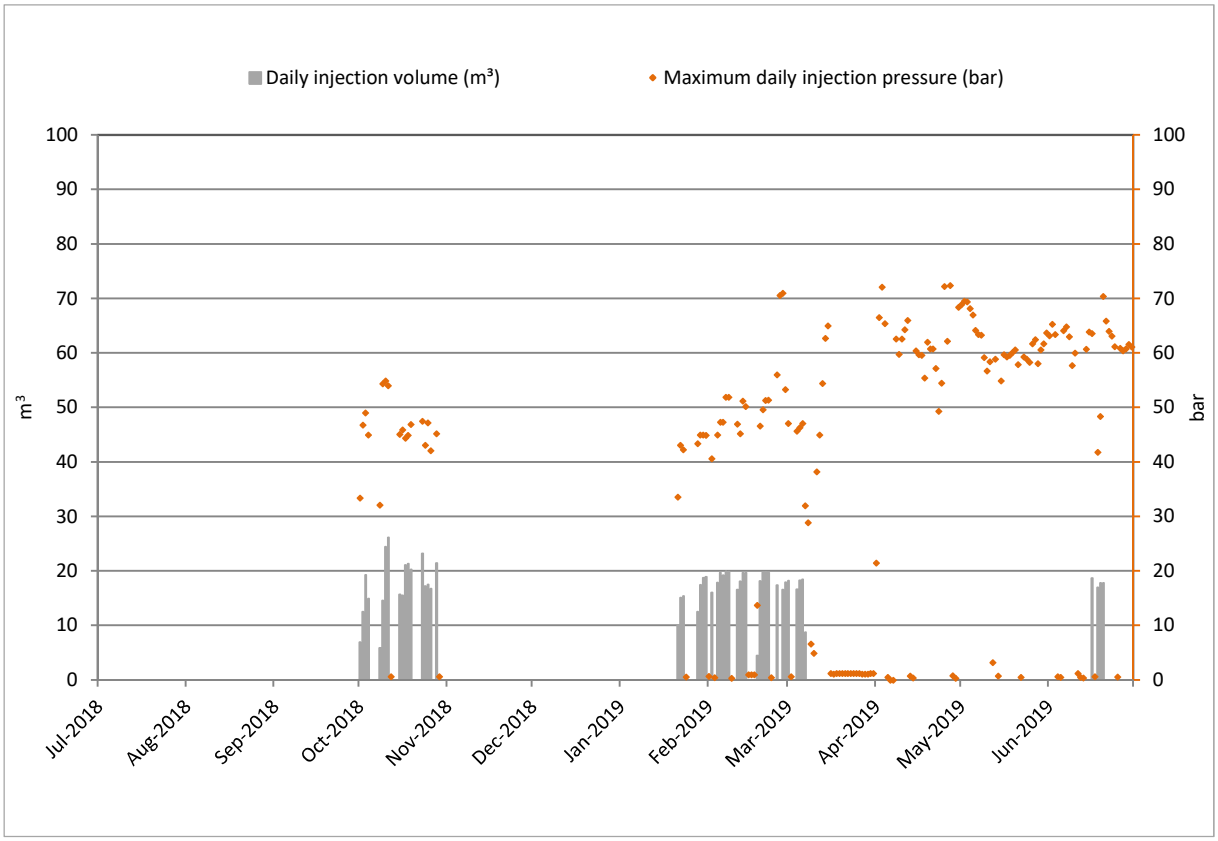

Figure 12 KA9 wellsite: KW2 well daily injection volume and pressure (2018-2019)

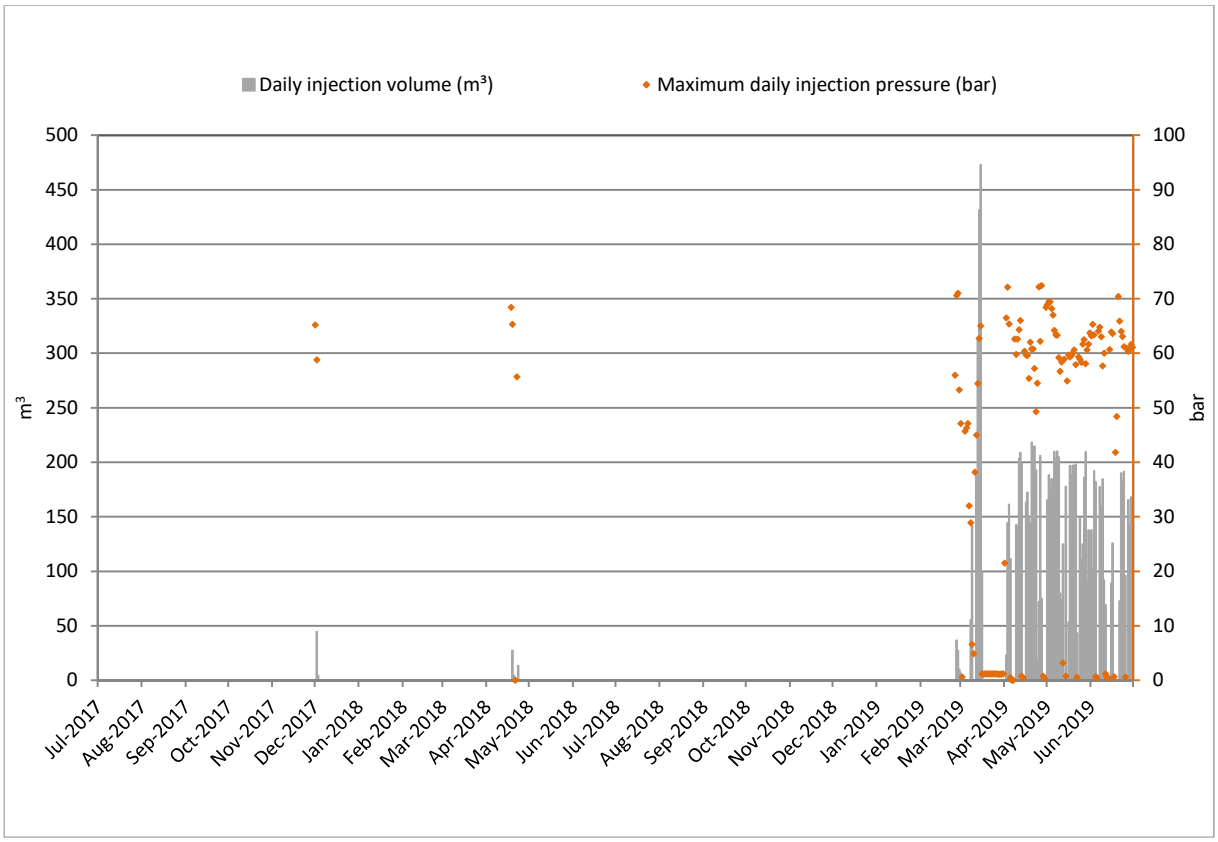

Figure 13 KA9 wellsite: KA16 well daily injection volume and pressure (2017-2019)

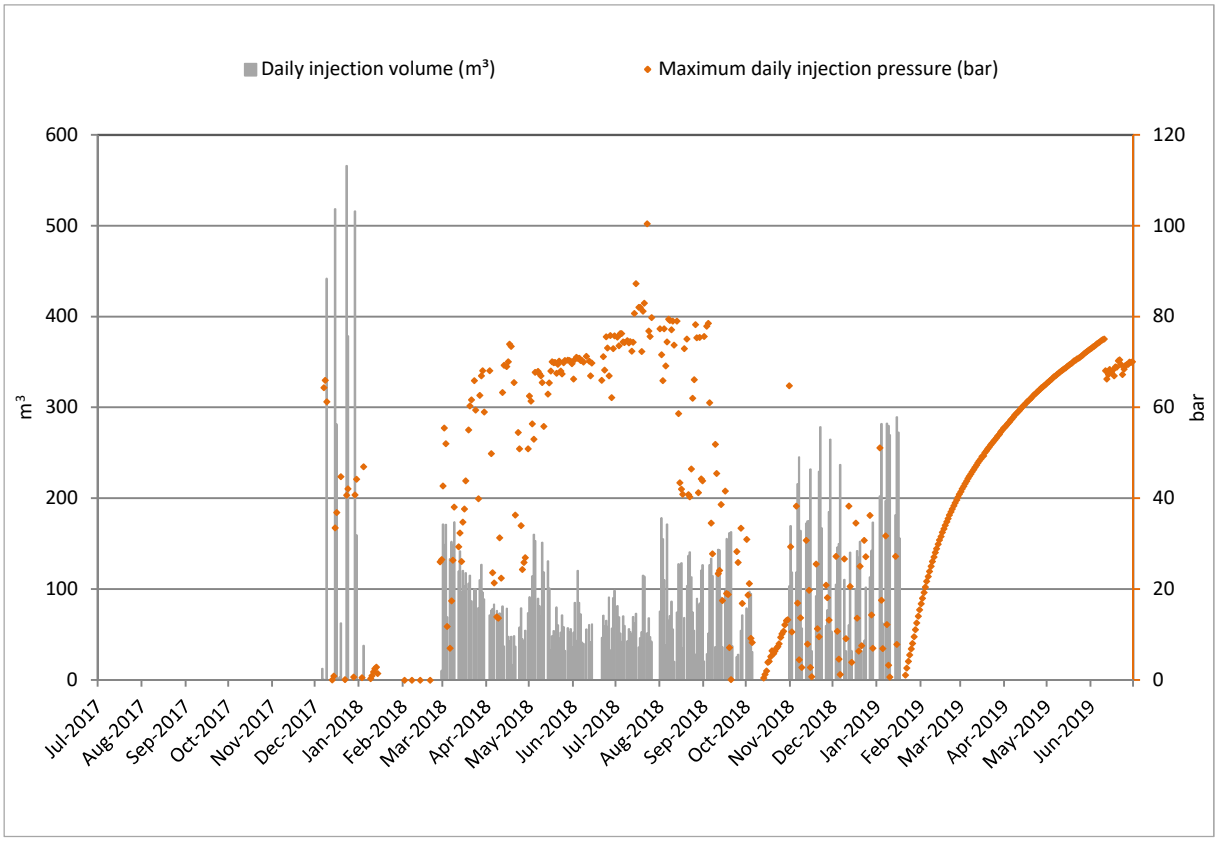

Figure 14 KA1/7/19/20 wellsite: KA1 well daily injection volume and pressure (2017-2019)

2.4.6 Summary of injection activities at the Tuhua-D wellsite (consent 10661-1)

A summary of historical data is provided below in Table 19 and graphically in Figure 15.

A total of 93,705 m^3 of fluid was injected via the Tuhua-4 injection well during the reporting period.

A review of the data indicates that:

- Injection via the Tuhua-4 well commenced 1 October 2018;
- The Tuhua-4 well became the Company's primary injection well from late December; and
- The well operates under a vacuum due to the depletion of the Tuhua reservoir.

Table 19 Summary of injection occurring under consent 10661 (2018-2019)

Deep well injection undertaken at Tuhua-D wellsite via the Tuhua-4 injection well					
Year	**Annual volume (m^3)**	**Max. injection volume (m^3/day)**	**Maximum injection rate (m^3/hr)**	**Max. injection pressure (bar)**	**Avg. injection pressure (bar)**
2018-2019	93,705	684	28.5	No pressure required - vacuum	

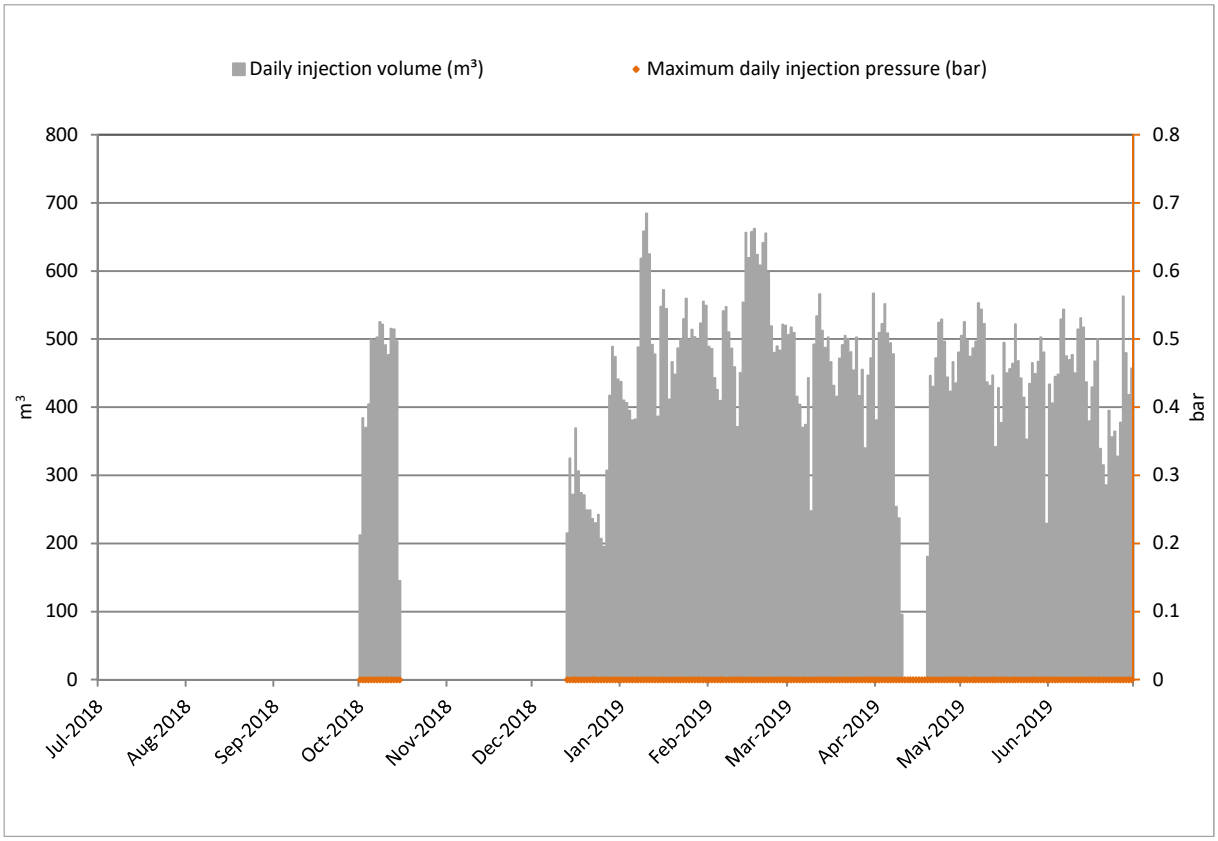

Figure 15 Tuhua-D wellsite: Tuhua-4 well daily injection volume and pressure (2018-2019)

2.5 Incidents, investigations, and interventions

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the Company. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of

potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach, that in the first instance avoids issues occurring, is favoured.

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

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

Table 20 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the Company's DWI activities during the 2018-2019 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

A Council Officer discovered a non-compliance whilst reviewing documentation associated with the DWI activities at the Tuhua-B wellsite on 15 September 2018. Special Condition 3 of resource consent 1315-1.2 stated that there "shall be no injection of any fluids after 1 June 2018". The condition is a standard condition in DWI consents, to enable monitoring to continue for up to 5 years from completion of the activity prior to the consent expiring. The Council Officer found that activities at the Tuhua-B wellsite had been occurring on a regular basis after 1 June 2018 and at the time of reviewing the documents were still ongoing. An abatement notice EAC/22178 was issued on 24 September 2018. The abatement notice required the Company to cease the discharge of fluid waste at the Tuhua-B wellsite, to ensure compliance with the consent. The Company were contacted and an explanation for the non-compliance was provided. The non-compliance was due to an administrative oversight by the Company. To avoid an ongoing non-compliance and enable the Company to continue injecting, whilst collating the information required to renew the consent, an application to vary the consent was submitted to the Council. The variation provided a temporary extension of the Condition 3 date and was granted on 11 October 2018. The consent was renewed on 31 May 2019. There were no environmental impacts associated with the non-compliance and no further action was deemed necessary.

The Company also provided their annual report late. The minor delay in submission was due to an unforeseen increase in the size of the report and the Company's extensive internal review procedures, following the addition of several new wells. As submission was only slightly delayed and the Company contacted the Council prior to the due date, the Company were reminded of their obligations and no further action was deemed necessary.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
24/11/2018	Special condition 3 of Consent 1315-1.2 was not being complied with. Injection occurred after the 1 June 2018 cut-off	N	Abatement notice	Injection ceased until the consent was varied
31/08/2019	The annual report required by consent conditions was provided late	N	Not required	The Council were contacted prior to the due date and the report was subsequently submitted. The explanation for lateness was accepted

Table 20 Incidents, investigations, and interventions summary table

3 Discussion

3.1 Discussion of site performance

During the period under review, the Company exercised five resource consents (1315-2, 4182-2, 5052-2, 9970-1.2 and 10661-1) for the injection of fluids by DWI. No injection took place at the Pouri-A wellsite under consent 5037-2.2. Routine inspections of the Company's sites found them to be in good condition and being well managed. No complaints were received from the public in relation to these consents.

A review of the injection data provided by the Company shows that a total of 253,063 m^3 of fluid was injected over the 2018-2019 monitoring period. The vast majority of this fluid was discharged via the McKe-1 well, under consent 4182-2 and the Tuhua-4 well under consent 10661-1. The total volume of fluids injected was less than that injected over the two previous monitoring periods.

A visual assessment of the Company's injection data indicates that injection pressures generally fluctuate in response to injection volumes, with higher maximum pressures corresponding with higher daily injection volumes. There is no evidence of any sustained increases in injection pressures over time at any injection site.

The operation of the injection wells is monitored by Company staff, and key injection data is recorded as required under the conditions of each consent. During the period being reported this data was submitted to the Council at the specified frequency for review and all injection was undertaken within consented limits.

There were two administrative compliance issues one of which resulted in the Company being issued with an abatement notice (see Section 2.5). The abatement notice was immediately complied and other administrative issues dealt with promptly. The administrative issues recorded did not result in any adverse effects on the environment and overall the Company's environmental performance remains at a high level.

3.2 Environmental effects of exercise of consents

No adverse environmental effects have been recorded by the Council in relation to any DWI consent exercised by the Company.

The groundwater monitoring component of this programme continued during the period under review, with 20 samples being taken from ten monitoring sites in the vicinity of the Company's DWI wellsites. The results of the monitoring carried out show that the groundwater composition at each site has remained stable since the commencement of monitoring. Some very minor fluctuations in analyte concentrations are attributable to seasonal variations in water composition and standard sampling variability. There is no evidence to suggest that injection activities undertaken by the Company during the review period have had any adverse effect on local groundwater quality.

Compliance with the conditions of the Company's DWI consents exercised during the 2018-2019 monitoring period is summarised below in Section 3.3.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 21 to Table 26 and an evaluation of the Company's environmental performance in relation to their DWI activities since 2009 is presented in Table 27.

Table 21 Summary of performance for consent 1315-2

Purpose: *To discharge fluid waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection at the Tuhua-B wellsite.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. The consent holder shall submit an "Injection Operation Management Plan"	Receipt of satisfactory "Injection Operation Management Plan	Yes
2. Injection well, geological and operational data submission requirements. This information can be included in the "Injection Operation Management Plan"	Receipt of satisfactory information	Yes
3. The consent holder shall monitor the seismic network and report on any events of higher than magnitude 3 within 5 km	Receipt of report	N/A No events recorded
4. Consent holder response if a higher than magnitude 3 seismic event is recorded within 5 km	Notification received	N/A No events recorded
5. No injection permitted after 1 June 2028	Assessment of injection records and site inspection notices	No- injection was undertaken after 1 June 2018
6. The consent holder shall at all times adopt the best practicable option	Assessment of consent holder records and site inspection notices	Yes
7. The injection of fluids shall be confined to the Mount Messenger Formation, deeper than 1,200 m BGL	Review of "Injection Operation Management Plan," well construction log and injection data	Yes
8. The injection of fluids does not result in fracturing of geological seals confining the injection zone	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
9. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable freshwater (groundwater or surface water)	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
10. Limits the range of fluids that can be discharged under the consent	Assessment of consent holder records and injectate sample analysis	Yes

Purpose: *To discharge fluid waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection at the Tuhua-B wellsite.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
11. Maintain full records of injection data	Receipt and assessment of injection data	Yes
12. Maintain records and undertake analysis to characterise each type of waste arriving on-site for discharge	Receipt and assessment of injection data	Yes
13. Ensure that the analysis required by 12 (c) is carried out in an International Accreditation New Zealand (IANZ) accredited laboratory	Assessment of injection data	Yes
14. The data required by conditions 11 & 12 above, for each calendar month, is required to be submitted by the 28th day of the following month	Receipt of satisfactory data by the date specified	Yes
15. The consent holder shall undertake a programme of sampling and testing (the 'Monitoring Programme') that monitors the effects of the exercise of this consent on freshwater resources	Monitoring Programme submitted to the Chief Executive, Taranaki Regional Council, for certification	Yes
16. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for: • pH; • conductivity; • chloride; and • total petroleum hydrocarbons	Implementation of Groundwater Monitoring Programme and assessment of results	Yes
17. All groundwater sampling and analysis shall be undertaken in accordance with a Sampling and Analysis Plan, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken	Receipt of Sampling and Analysis Plan prior to first round of sampling being undertaken	Yes

Purpose: *To discharge fluid waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection at the Tuhua-B wellsite.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
18. The consent holder shall provide to the Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period	Receipt of satisfactory report by 31 August each year	No- submitted late (5/09/2019)
19. Consent review provision	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

N/A = not applicable

Table 22 Summary of performance for consent 4182-2

Purpose: *To discharge fluid waste generated by oil and gas exploration and production activities to the McKee Formation by deep well injection at the McKee-A wellsite.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Prior to exercising the consent, the consent holder shall submit an "Injection Operation Management Plan"	Receipt of satisfactory "Injection Operation Management Plan"	Yes
2. Injection well, geological and operational data submission requirements. This information can be included in the "Injection Operation Management Plan"	Receipt of satisfactory information	Yes
3. No injection permitted after 1 June 2028	Assessment of injection records and site inspection notices	N/A
4. The consent holder shall at all times adopt the best practicable option	Assessment of consent holder records and site inspection notices	Yes
5. The injection of fluids shall be confined to the Mount Messenger Formation, deeper than 1200 m BGL	Review of "Injection Operation Management Plan," well construction log and injection data	Yes

Purpose: *To discharge fluid waste generated by oil and gas exploration and production activities to the McKee Formation by deep well injection at the McKee-A wellsite.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
6. The injection of fluids does not result in fracturing of geological seals confining the injection zone	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
7. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable freshwater (groundwater or surface water)	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
8. Limits the range of fluids that can be discharged under the consent	Assessment of consent holder records and injectate sample analysis	Yes
9. Maintain full records of injection data	Receipt and assessment of injection data	Yes
10. Maintain records and undertake analysis to characterise each type of waste arriving on-site for discharge	Receipt and assessment of injection data	Yes
11. Ensure that the analysis required by 10 (c) is carried out in an International Accreditation New Zealand (IANZ) accredited laboratory	Assessment of injection data	Yes
12. The data required by conditions 9 & 10 above, for each calendar month, is required to be submitted by the 28th day of the following month	Receipt of satisfactory data by the date specified	Yes
13. The consent holder shall undertake a programme of sampling and testing (the 'Monitoring Programme') that monitors the effects of the exercise of this consent on freshwater resources	Monitoring Programme submitted to the Chief Executive, Taranaki Regional Council, for certification	Yes

Purpose: *To discharge fluid waste generated by oil and gas exploration and production activities to the McKee Formation by deep well injection at the McKee-A wellsite.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
14. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for: • pH; • conductivity; • chloride; and • total petroleum hydrocarbons.	Implementation of Groundwater Monitoring Programme and assessment of results	Yes
15. All groundwater sampling and analysis shall be undertaken in accordance with a Sampling and Analysis Plan, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken	Receipt of Sampling and Analysis Plan prior to first round of sampling being undertaken	Yes
16. The consent holder shall provide to the Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period	Receipt of satisfactory report by 31 August each year	No- submitted late (5/09/2019)
17. Consent review provision	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

N/A = not applicable

Table 23 Summary of performance for consent 5037-2.2

Purpose: *To discharge waste drilling fluids, water, produced water and stormwater from hydrocarbon exploration and production operations by deep well injection at the Pouri-A wellsite*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Prior to exercising the consent, the consent holder shall submit an "Injection Operation Management Plan"	Receipt of satisfactory "Injection Operation Management Plan"	Yes
2. Injection well, geological and operational data submission requirements. This information can be included in the "Injection Operation Management Plan"	Receipt of satisfactory information	Yes
3. No injection permitted after 1 June 2028	Assessment of injection records and site inspection notices	N/A
4. The consent holder shall at all times adopt the best practicable option	Assessment of consent holder records and site inspection notices	Yes
5. The injection of fluids shall be confined to the McKee Formation, deeper than 2149 m BGL	Review of "Injection Operation Management Plan," well construction log and injection data	Yes
6. The injection of fluids does not exceed 276 bar	Assessment of injection records	Yes
7. The injection of fluids does not result in fracturing of geological seals confining the injection zone	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
8. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable freshwater (groundwater or surface water)	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
9. Limits the range of fluids that can be discharged under the consent	Assessment of consent holder records and injectate sample analysis	Yes
10. These are the only other fluids that may be injected apart from those listed in condition 9	Assessment of consent holder records and injectate sample analysis	Yes
11. Maintain full records of injection data	Receipt and assessment of injection data	Yes

Purpose: *To discharge waste drilling fluids, water, produced water and stormwater from hydrocarbon exploration and production operations by deep well injection at the Pouri-A wellsite*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
12. Maintain records and undertake analysis to characterise each type of waste arriving on-site for discharge	Receipt and assessment of injection data	Yes
13. Ensure that the analysis required by 12 (c) is carried out in an International Accreditation New Zealand (IANZ) accredited laboratory	Assessment of injection data	Yes
14. The data required by conditions 11 & 12 above, for each calendar month, is required to be submitted by the 28th day of the following month	Receipt of satisfactory data by the date specified	Yes
15. The consent holder shall undertake a programme of sampling and testing (the 'Monitoring Programme') that monitors the effects of the exercise of this consent on freshwater resources	Monitoring Programme submitted to the Chief Executive, Taranaki Regional Council, for certification	Yes
16. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for: • pH; • conductivity; • chloride; and • total petroleum hydrocarbons.	Implementation of Groundwater Monitoring Programme and assessment of results	Yes
17. All groundwater sampling and analysis shall be undertaken in accordance with a Sampling and Analysis Plan, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken	Receipt of Sampling and Analysis Plan prior to first round of sampling being undertaken	Yes

Purpose: *To discharge waste drilling fluids, water, produced water and stormwater from hydrocarbon exploration and production operations by deep well injection at the Pouri-A wellsite*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
18. The consent holder shall provide to the Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period	Receipt of satisfactory report by 31 August each year	No- submitted late (5/09/2019)
19. Consent review provision	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

Table 24 Summary of performance for consent 5052-2

Purpose: *To discharge waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Prior to exercising the consent, the consent holder shall submit an "Injection Operation Management Plan"	Receipt of satisfactory "Injection Operation Management Plan"	Yes
2. Injection well, geological and operational data submission requirements. This information can be included in the "Injection Operation Management Plan"	Receipt of satisfactory information	Yes
3. No injection permitted after 1 June 2028.	Assessment of injection records and site inspection notices.	N/A
4. The consent holder shall at all times adopt the best practicable option	Assessment of consent holder records and site inspection notices	Yes
5. The injection of fluids shall be confined to the Mount Messenger Formation, deeper than 945 m BGL	Review of "Injection Operation Management Plan," well construction log and injection data	Yes
6. The injection of fluids does not result in fracturing of geological seals confining the injection zone	Assessment of injection records and results of groundwater sampling and analysis programme	Yes

Purpose: *To discharge waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
7. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable freshwater (groundwater or surface water)	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
8. Limits the range of fluids that can be discharged under the consent	Assessment of consent holder records and injectate sample analysis	Yes
9. Maintain full records of injection data	Receipt and assessment of injection data	Yes
10. Maintain records and undertake analysis to characterise each type of waste arriving on-site for discharge	Receipt and assessment of injection data	Yes
11. Ensure that the analysis required by 10 (c) is carried out in an International Accreditation New Zealand (IANZ) accredited laboratory	Assessment of injection data	Yes
12. The data required by conditions 9 & 10 above, for each calendar month, is required to be submitted by the 28th day of the following month	Receipt of satisfactory data by the date specified	Yes
13. The consent holder shall undertake a programme of sampling and testing (the 'Monitoring Programme') that monitors the effects of the exercise of this consent on freshwater resources	Monitoring Programme submitted to the Chief Executive, Taranaki Regional Council, for certification	Yes
14. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for: • pH; • conductivity; • chloride; and • total petroleum hydrocarbons.	Implementation of Groundwater Monitoring Programme and assessment of results	Yes

Purpose: *To discharge waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deep well injection*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
15. All groundwater sampling and analysis shall be undertaken in accordance with a Sampling and Analysis Plan, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken	Receipt of Sampling and Analysis Plan prior to first round of sampling being undertaken	Yes
16. The consent holder shall provide to the Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period	Receipt of satisfactory report by 31 August each year	No- submitted late (5/09/2019)
17. Lapse clause	Receive notice of exercise of consent	Yes
18. Consent review provision	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

Table 25 Summary of performance for consent 9970-1.2

Purpose: *To discharge waste fluids, associated with hydrocarbon exploration and production by deep well injection, into the Matemateaonga Formation via the KW2 well, or into the Mangahewa Formation via wells KA1 and/or KA7 as a contingency*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. The volume of fluid injected shall not exceed 2000 cubic metres per day	Review and analysis of injection data	Yes
2. The consent holder shall submit an "Injection Operation Management Plan	Receipt of "Injection Operation Management Plan"	Yes
3. Injection well, geological and operational data submission requirements. This information can be included in the "Injection Operation Management Plan"	Receipt of satisfactory information by 1 January 2015	Yes
4. No injection permitted after 1 June 2024	Assessment of injection records and site inspection notices	N/A

Purpose: *To discharge waste fluids, associated with hydrocarbon exploration and production by deep well injection, into the Matemateaonga Formation via the KW2 well, or into the Mangahewa Formation via wells KA1 and/or KA7 as a contingency*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. The consent holder shall at all times adopt the best practicable option	Assessment of consent holder records and site inspection notices	Yes
6. No injection of fluids above 1,200 m BGL	Review of " Injection Operation Management Plan," well construction log and injection data	Yes
7. Before Contingency wells are utilised, an "Injection Operation Management Plan" specific to the well being utilised must be provided to the Council	Receipt of satisfactory "Injection Operation Management Plan	N/A
8. The consent holder shall ensure that the exercise of this consent does not result in the fracturing of the geological seals confining the injection zone	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
9. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water)	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
10. Only the listed fluids may be discharged	Receipt and assessment of injection data	Yes
11. These are the only other fluids that may be injected apart from those listed in condition 10	Receipt and assessment of injection data	Yes
12. Consent holder shall keep daily injection records	Receipt and assessment of injection data	Yes
13. Maintain records an undertake analysis to characterise each type of waste arriving on-site for discharge	Receipt and assessment of injection data	Yes
14. If analysis required by condition 13 is not carried out in an IANZ laboratory, it shall be undertaken in accordance with a Quality Assurance Plan certified by the Council	Receipt and assessment of injection data	Yes

Purpose: *To discharge waste fluids, associated with hydrocarbon exploration and production by deep well injection, into the Matemateaonga Formation via the KW2 well, or into the Mangahewa Formation via wells KA1 and/or KA7 as a contingency*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
15. The data required by conditions 12 & 13 above, for each calendar month, is required to be submitted by the 28th day of the following month	Receipt of satisfactory data by the date specified	Yes
16. The consent holder shall undertake a programme of sampling and testing (the 'Monitoring Programme') that monitors the effects of the exercise of this consent on fresh water resources	Monitoring Programme submitted to the Chief Executive, Taranaki Regional Council	Yes
17. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for: a. pH; b. conductivity; c. chloride; and d. total petroleum hydrocarbons.	Implementation of Groundwater Monitoring Programme and assessment of results	Yes
18. All groundwater sampling and analysis shall be undertaken in accordance with a Sampling and Analysis Plan, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken	Receipt of Sampling and Analysis Plan prior to first round of sampling being undertaken	Yes
19. The consent holder shall provide to the Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period	Receipt of satisfactory report by 31 August each year	No- submitted late (5/09/2019)
20. Lapse Clause	Receive notice of exercise of consent	Yes
21. Consent review clause	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

Table 26 Summary of performance for consent 10661-1

Purpose: *To discharge produced water, well drilling fluids, well work over fluids and hydraulic fracturing fluids from hydrocarbon exploration and production operations into the McKee Formation by deep well injection at the Tuhua-D wellsite*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Prior to exercising the consent, the consent holder shall submit an "Injection Operation Management Plan"	Receipt of satisfactory "Injection Operation Management Plan"	Yes
2. Injection well, geological and operational data submission requirements. This information can be included in the "Injection Operation Management Plan"	Receipt of satisfactory information	Yes
3. No injection permitted after 1 June 2028	Assessment of injection records and site inspection notices	N/A
4. The consent holder shall at all times adopt the best practicable option	Assessment of consent holder records and site inspection notices	Yes
5. The injection of fluids shall be confined to the McKee Formation, deeper than 2,319 m BGL	Review of "Injection Operation Management Plan," well construction log and injection data	Yes
6. The injection of fluids does not result in fracturing of geological seals confining the injection zone	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
7. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable freshwater (groundwater or surface water)	Assessment of injection records and results of groundwater sampling and analysis programme	Yes
8. Limits the range of fluids that can be discharged under the consent	Assessment of consent holder records and injectate sample analysis	Yes
9. Maintain records and undertake analysis to characterise each type of waste arriving on-site for discharge	Receipt and assessment of injection data	Yes
10. Maintain full records of injection data	Receipt and assessment of injection data	Yes

Purpose: *To discharge produced water, well drilling fluids, well work over fluids and hydraulic fracturing fluids from hydrocarbon exploration and production operations into the McKee Formation by deep well injection at the Tuhua-D wellsite*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
11. Ensure that the analysis required by 9 (c) is carried out in an International Accreditation New Zealand (IANZ) accredited laboratory	Assessment of injection data	Yes
12. The data required by conditions 9 & 10 above, for each calendar month, is required to be submitted by the 28th day of the following month	Receipt of satisfactory data by the date specified	Yes
13. The consent holder shall undertake a programme of sampling and testing (the 'Monitoring Programme') that monitors the effects of the exercise of this consent on freshwater resources	Monitoring Programme submitted to the Chief Executive, Taranaki Regional Council, for certification	Yes
14. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for: • pH; • conductivity; • chloride; and • total petroleum hydrocarbons.	Implementation of Groundwater Monitoring Programme and assessment of results	Yes
15. All groundwater sampling and analysis shall be undertaken in accordance with a Sampling and Analysis Plan, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken	Receipt of Sampling and Analysis Plan prior to first round of sampling being undertaken	Yes

Purpose: *To discharge produced water, well drilling fluids, well work over fluids and hydraulic fracturing fluids from hydrocarbon exploration and production operations into the McKee Formation by deep well injection at the Tuhua-D wellsite*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
16. The consent holder shall provide to the Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period	Receipt of satisfactory report by 31 August each year	No- submitted late (5/09/2019)
17. Consent review provision	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

Table 27 Evaluation of environmental performance over time

Year	Consent number	High	Good	Improvement required	Poor
2017-2018	1315	1	-	-	-
	4182	1	-	-	-
	5037	1	-	-	-
	5052	Not exercised			
	9970	1	-	-	-
	10661	Not exercised			
2016-2017	1315	1	-	-	-
	4182	1	-	-	-
	5037	1	-	-	-
	5052	Not exercised			
2015-2016	1315	1	-	-	-
	4182	1	-	-	-
	5037	1	-	-	-
	5052	Not exercised			
2014-2015	1315	1	-	-	-
	4182	1	-	-	-
	5052	Not exercised			
2013-2014	1315	1	-	-	-
	3895	Not exercised			

Year	Consent number	High	Good	Improvement required	Poor
	4182	1	-		-
	5052	Not exercised			
2012-2013	1315	1	-	-	-
	3895	Not exercised			
	4182	1	-	-	-
	5052	Not exercised			
2009-2012	1315	1	-	-	-
	3895	Not exercised			
	4182	-	-	1	-
	5052	Not exercised			
Totals	**-**	**17**	**-**	**1**	**-**

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

3.4 Recommendations from the 2017-2018 Annual Report

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

1. THAT in the first instance, monitoring of consented activities in the 2018-2019 year continue at the same level as in 2017-2018.
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.
3. THAT the option for a review of resource consents in June 2019, as set out in the respective consent conditions not be exercised.

The recommendations above were implemented during the period under review.

3.5 Alterations to monitoring programmes for 2019-2020

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

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

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

It is proposed that for 2019-2020 period the range of monitoring carried out during the 2018-2019 period be continued.

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 2019-2020.

3.6 Exercise of optional review of consent

Resource consents 1315-2, 4182-2, 5037-2.2, 5052-2, 9970-1.2 and 10661-1 all provide for optional reviews in June 2020. The review condition allows the Council to review the consent, if there are grounds that the conditions are not adequate to deal with any adverse effects on the environment arising from the exercise of the resource consent, which were either not foreseen at the time the application was considered or which was not appropriate to deal with at the time.

Based on the results of monitoring in the year under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued or grounds to exercise the review option on any of the above consents.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities in the 2019-2020 year continue at the same level as in 2018-2019.
2. THAT should there be issues with environmental or administrative performance in 2019-2020, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of resource consents in June 2020, as set out in the respective consent conditions not be exercised.

Glossary of common terms and abbreviations

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

Aquifer (freshwater)	A formation, or group or part of a formation that contains sufficient saturated permeable media to yield exploitable quantities of fresh water.
BPO	Best practicable option.
Conductivity	A measure of the level of dissolved salts in a sample. Usually measured at 25°C and expressed as millisiemens per metre (mS/m) or as Total Dissolved Solids (g/m^3).
Confining layer	A geological layer or rock unit that is impermeable to fluids.
Deep well injection (DWI)	Injection of fluids at depth for disposal or enhanced recovery.
Fracture gradient	A measure of how the pressure required to fracture rock in the earth's crust changes with depth. It is usually measured in units of "pounds per square inch per foot" (psi/ft) and varies with the type of rock and the strain of the rock.
g/m^3	Grams per cubic metre. A measure of concentration which is equivalent to milligrams per litre (mg/L), or parts per million (ppm).
Hydraulic fracturing (HF)	The process of increasing reservoir permeability by injecting fluids at pressures sufficient to fracture rock within the reservoir ("fracking").
Injectate	Fluid disposed of by deep well injection.
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.
IR	Unauthorised 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 BGL	Metres below ground level.
m BMP	Metres below measuring point.
mS/m	Millisiemens per metre.
m TVD	Metres true vertical depth.
m TVDBGL	Metres true vertical depth below ground level.
m^3	Cubic metre.
N/A	Not applicable.

pH	Numerical system for measuring acidity in solutions, with 7 as neutral. Values lower than 7 are acidic and higher than 7 are 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.
Produced water	Water associated with oil and gas reservoirs that is produced along with the oil and gas. Typically highly saline with salt concentrations similar to seawater and containing low levels of hydrocarbons.
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).
UI	Unauthorised Incident.
Water flooding	A method of thermal recovery in which hot water is injected into a reservoir through specially distributed injection wells. Hot water flooding reduces the viscosity of the crude oil, allowing it to move more easily toward production wells.

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

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Stevens G. (2001): Taranaki: In: *Groundwaters of New Zealand*, M.R, Rosen and P.A. White (eds). New Zealand Hydrological Society Inc., Wellington. P381-386.

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Taranaki Regional Council (2011): *Todd Energy Limited Deep Well Injection Monitoring Programme, Triennial Report (2009-2012)*. Technical Report 2011-86. Document number 1108053.

Appendix I

Resource consents held by Todd Petroleum Limited

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

Consent number	Wellsite	Status	Issued	Review (annual)	Expires or replaced
1315-1.2	Tuhua-B	Replaced	08 Aug 1984	Not applicable	11 Oct 2018
1315-1.3	Tuhua-B	Replaced	11 Oct 2018	Not applicable	31 May 2019
1315-2	Tuhua-B	Active	31 May 2019	June	01 Jun 2033
4182-2	McKee-A	Active	01 Oct 2013	June	01 Jun 2033
5037-2.2	Pouri-A	Active	07 Jun 2018	June	01 Jun 2033
5052-2	McKee-B	Active	27 May 2014	June	01 Jun 2033
9970-1.1	KA9 KA1,7,19,20	Replaced	07 Oct 2014	Not applicable	23 Aug 2018
9970-1.2	KA9 KA1,7,19,20	Active	23 Aug 2018	June	01 Jun 2029
10661-1	Tuhua-D	Active	13 Jun 2018	June	01 Jun 2033

Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited PO Box 802 New Plymouth 4340
Decision Date	31 May 2019
Commencement Date	31 May 2019

Conditions of Consent

Consent Granted:	To discharge fluid waste generated by oil and gas exploration and production activities into the Mount Messenger and McKee Formations by deep well injection at the Tuhua-B wellsite
Expiry Date:	1 June 2033
Review Date(s):	June annually
Site Location:	Tuhua-B wellsite, Foreman Road, Tikorangi
Grid Reference (NZTM)	1716910E-5675270N
Catchment:	Onaero
Tributary:	Pukemai

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. Before 1 December 2019 the consent holder shall submit an "Injection Operation Management Plan" for any injection well currently being used. For future injection wells an "Injection Operation Management Plan" shall be submitted before injection commences. The plans shall include the operational details of the injection activities and identify the conditions that would trigger concerns about the integrity of the injection well, the receiving formation or overlying geological seals. The plan shall also detail the action(s) to be taken by the consent holder if trigger conditions are reached. *If an additional or replacement well is to be utilised during the lifetime of the consent a new Injection Operation Management Plan will be required.*

2. Before 1 December 2019 the consent holder shall provide to the Chief Executive, Taranaki Regional Council for each well:

   (a) a geological assessment of the environment in which the well is located, including the injection zone, the geological seals confining the injection zone and any associated faulting;
   (b) details of the injection well design and its structural integrity; including but not limited to:
      i. the results of pressure testing of tubing and annulus;
      ii. an engineering evaluation of tubing and casing integrity, including burst pressures; and
      iii. an assessment of the current adequacy of the cement bond in providing zonal isolation;
   (c) an overall assessment of the suitability of the injection well for the proposed activity;
   (d) details of how the ongoing integrity of the injection well will be monitored and maintained;
   (e) confirmation of the depth to which fresh water resources, as defined in condition 9, are encountered below the site;
   (f) a chemical assessment of the receiving formation water which confirms its Total Dissolved Solids (TDS) concentration, and also demonstrates that the mixing of formation and injection fluids will not result in any adverse effects on the receiving formation or the injection well; and
   (g) maps showing any identified faults (active or inactive) within 2 km of the modelled injection plume and the potential for adverse environmental effects due to the presence of the identified faults.

   (Note: The information required by condition 2 may be included within the "Injection Operation Management Plan" required by condition 1).

3. If the GeoNet seismic monitoring network records a seismic event higher than a Modified Mercalli intensity of magnitude 3 within 5 km of the downhole injection location of an injection well located at the Tuhua-B wellsite within the McKee Formation, the consent holder shall provide a report to the Chief Executive, Taranaki Regional Council on the likelihood of the seismic event being induced by the exercise of this consent within 2 working days of the event.

4. If the GeoNet seismic monitoring network records a seismic event higher than a Modified Mercalli intensity of magnitude 3 within 5 km of the downhole injection location of an injection well located at the Tuhua-B wellsite within the Mount Messenger Formation:

   (a) if deep well injection is currently being undertaken into the Mount Messenger Formation it shall cease immediately and not recommence; or
   (b) if a deep well injection has occurred into the Mount Messenger Formation within the previous 72 hours no further deep well injection shall occur into the Formation;
   (c) the consent holder shall provide a report to the Chief Executive, Taranaki Regional Council on the likelihood of the seismic event being induced by the exercise of this consent; and
   (d) deep well injection may only then continue into the Formation once the Chief Executive, Taranaki Regional Council has considered the report and concluded that the environmental risk of recommencing injection is acceptable and has advised the consent holder accordingly.

5. There shall be no injection of any fluids after 1 June 2028.

6. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment.

7. The injected fluids shall be confined to the Mount Messenger or McKee Formations, deeper than 1,200 metres below ground level.

8. The consent holder shall ensure that the discharge authorised by this consent does not result in the fracturing of the geological seals confining the injection zone.

9. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water). Useable fresh groundwater is defined as any groundwater having a TDS concentration of less than 1,000 mg/l.

10. Only the following fluids may be discharged:

    (a) produced water;
    (b) well workover fluids, including hydraulic fracturing return fluids;
    (c) well drilling fluids;
    (d) production sludges;
    (e) contaminated stormwater; and
    (f) other fluids that if discharged will cause no greater environmental risk than those fluids listed above, and certified as such by the by the Chief Executive, Taranaki Regional Council.

11. Once the consent is exercised, the consent holder shall keep daily records of the:

    (a) injection hours;
    (b) volume of fluid discharged; and
    (c) maximum and average injection pressure.

12. For each waste stream arriving on site for discharge, the consent holder shall characterise the fluids by recording the following information:

    (a) type of fluid (as listed in condition 10);
    (b) source of fluid (site name and company);
    (c) an analysis of a representative sample of the fluid for:
        (i) pH;
        (ii) conductivity;
        (iii) suspended solids concentration;
        (iv) temperature;
        (v) salinity;
        (vi) chloride concentration; and
        (vii) total hydrocarbon concentration.

    The analysis required by condition 12(c) above is not necessary if a sample of the same type of fluid, from the same source, has been taken, analysed and provided to the Chief Executive, Taranaki Regional Council within the previous 6 months.

13. If the analysis required by condition 12(c) above is not carried out in an International Accreditation New Zealand (IANZ) accredited laboratory, it shall be undertaken in accordance with a "Quality Assurance (QA) Plan" that has been certified by the Chief Executive, Taranaki Regional Council, as meeting the requirements of condition 12. The Taranaki Regional Council may also, at its discretion, carry out an audit of the consent holder's sampling and analysis regime to assess adherence to the QA plan.

14. The information required by conditions 11 and 12 above, for each calendar month, shall be provided to the Chief Executive, Taranaki Regional Council before the 28th day of the following month.

15. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water resources within an Area of Review (AoR) to assess compliance with condition 9 (the 'Monitoring Programme'). The Monitoring Programme shall be designed to characterise local groundwater quality, and be submitted to the Chief Executive, Taranaki Regional Council, for certification before exercising the consent, and shall include:

    (a) the location of sampling sites;
    (b) well/bore construction details; and
    (c) sampling frequency.

    The AoR shall extend 1,000 m from the point of injection. It is a requirement that at least one suitable monitoring bore be located within 500 metres of the well head. If no suitable existing bores are available, it will be necessary for the Monitoring Programme to include installation of, and sampling from, a suitable bore. The bore would be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council and installed in accordance with NZS 4411:2001.

16. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:

    (a) pH;
    (b) conductivity;
    (c) chloride; and
    (d) total petroleum hydrocarbons.

    Note: The samples required, under conditions 15 and 16, could be taken and analysed by the Council or other contracted party on behalf of the consent holder.

17. All groundwater sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken. This Plan shall specify the use of standard protocols recognised to constitute good professional practice including quality control and assurance. An IANZ accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive, Taranaki Regional Council within 30 days of sampling and shall include supporting quality control and assurance information.

    Note: The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 15.

18. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period. Based on the data provided, the report shall also provide:

    a) an assessment of injection well performance;
    b) details of the injection well design and its structural integrity; including but not limited to:
        i. an assessment of the current adequacy of the cement bond in providing zonal isolation; and
        ii. the results of annual annulus pressure testing and/or continuous pressure monitoring;
    c) results of the most recent five yearly casing inspection or engineering evaluation confirming the ongoing security of the casing;
    d) an assessment of the on-going integrity and isolation of the receiving formation;
    e) an updated injection modeling report, demonstrating the ability of the receiving formation to continue to accept additional waste fluids and an estimation of remaining storage capacity;
    f) an updated map showing any identified faults (active or inactive) within 2 km of the modelled injection plume; and
    g) The results of any seismic monitoring undertaken in compliance with condition 3 of the consent.

19. 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 each year, 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 31 May 2019

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited P O Box 802 NEW PLYMOUTH 4340
Decision Date (Change):	1 October 2013
Commencement Date (Change):	1 October 2013 (Granted: 24 June 2003)

Conditions of Consent

Consent Granted:	To discharge fluid waste generated by oil and gas exploration and production activities to the Mckee Formation by deep well injection at the McKee-A wellsite
Expiry Date:	1 June 2033
Review Date(s):	June Annually
Site Location:	McKee-A wellsite, Otaraoa Road, Tikorangi
Legal Description:	Pt Lot 6 DP 658 Blk XIV Waitara SD (Discharge source & site)
Grid Reference (NZTM)	1715113E-5670963N
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. By 1 January 2014, the consent holder shall submit an "Injection Operation Management Plan." The plan shall include the operational details of the injection activities and identify the conditions that would trigger concerns about the integrity of the injection well, the receiving formation or overlying geological seals. The plan shall also detail the action(s) to be taken by the consent holder if trigger conditions are reached.

2. By 1 January 2014, the consent holder shall provide to the Chief Executive, Taranaki Regional Council:

   (a) a geological assessment of the environment in which the well is located, including the injection zone, the geological seals confining the injection zone and any associated faulting;
   (b) details of the injection well design and its structural integrity;
   (c) an assessment of the suitability of the injection well for the proposed activity;
   (d) details of how the integrity of the injection well will be monitored and maintained;
   (e) confirmation of the depth to which fresh water resources, as defined in condition 7, are encountered below the site; and
   (f) a chemical assessment of the receiving formation water which confirms its Total Dissolved Solids (TDS) concentration, and also demonstrates that the mixing of formation and injection fluids will not result in any adverse effects on the receiving formation or the injection well.

   (Note: The information required by condition 2 may be included within the "Injection Operation Management Plan" required by condition 1.)

3. There shall be no injection of any fluids after 1 June 2028.

4. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment.

5. The injected fluids shall be confined to the McKee Formation, deeper than 2,300 metres below ground level.

6. The consent holder shall ensure that the discharge authorised by this consent does not result in the fracturing of the geological seals confining the injection zone.

7. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water). Useable fresh groundwater is defined as any groundwater having a TDS concentration of less than 1,000 mg/l.

8. Only the following fluids may be discharged:

   (a) produced water;
   (b) well workover fluids, including hydraulic fracturing return fluids;
   (c) well drilling fluids;
   (d) production sludges;
   (e) contaminated stormwater; and
   (f) other fluids, that if discharged, will cause no greater environmental risk than those fluids listed above, and certified as such by the by the Chief Executive, Taranaki Regional Council.

9. Once the consent is exercised, the consent holder shall keep daily records of the:

   (a) injection hours;
   (b) volume of fluid discharged; and
   (c) maximum and average injection pressure.

10. For each waste stream arriving on site for discharge, the consent holder shall characterise the fluids by recording the following information:

   (a) type of fluid (as listed in condition 8);
   (b) source of fluid (site name and company);
   (c) an analysis of a representative sample of the fluid for:
      (i) pH;
      (ii) conductivity;
      (iii) suspended solids concentration;
      (iv) temperature;
      (v) salinity;
      (vi) chloride concentration; and
      (vii) total hydrocarbon concentration.

   The analysis required by condition 10(c) above is not necessary if a sample of the same type of fluid, from the same source, has been taken, analysed and provided to the Chief Executive, Taranaki Regional Council within the previous 6 months.

11. If the analysis required by condition 10(c) above is not carried out in an International Accreditation New Zealand (IANZ) accredited laboratory, it shall be undertaken in accordance with a "Quality Assurance (QA) Plan" that has been certified by the Chief Executive, Taranaki Regional Council, as meeting the requirements of condition 10. The Taranaki Regional Council may also, at its discretion, carry out an audit of the consent holder's sampling and analysis regime to assess adherence to the QA plan.

12. The information required by conditions 9 and 10 above, for each calendar month, shall be provided to the Chief Executive, Taranaki Regional Council before the 28th day of the following month.

13. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water resources within an Area of Review (AoR) to assess compliance with condition 7 (the 'Monitoring Programme'). The Monitoring Programme shall be designed to characterise local groundwater quality, and be submitted to the Chief Executive, Taranaki Regional Council, for certification before 1 January 2014, and shall include:

    (a) the location of sampling sites;
    (b) well/bore construction details; and
    (c) sampling frequency.

    The AoR shall extend 1,000 m from the point of injection. It is a requirement that at least one suitable monitoring bore be located within 500 metres of the well head. If no suitable existing bores are available, it will be necessary for the Monitoring Programme to include installation of, and sampling from, a suitable bore. The bore would be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council and installed in accordance with NZS 4411:2001.

14. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:

    (a) pH;
    (b) conductivity;
    (c) chloride; and
    (d) total petroleum hydrocarbons.

    Note: *The samples required, under conditions 0 and 14, could be taken and analysed by the Council or other contracted party on behalf of the consent holder.*

15. All groundwater sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken. This Plan shall specify the use of standard protocols recognised to constitute good professional practice including quality control and assurance. An IANZ accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive, Taranaki Regional Council within 30 days of sampling and shall include supporting quality control and assurance information.

    Note: *The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 0.*

16. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period. Based on the data provided, the report shall also provide:

    a) an assessment of injection well performance;
    b) an assessment of the on-going integrity and isolation of the wellbore;
    c) an assessment of the on-going integrity and isolation of the receiving formation; and
    d) an updated injection modeling report, demonstrating the ability of the receiving formation to continue to accept additional waste fluids and an estimation of remaining storage capacity.

17. 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 each year, 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 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited PO Box 802 New Plymouth 4340	
Decision Date (Change):	7 June 2018	
Commencement Date (Change):	7 June 2018	(Granted Date: 20 November 2003)

Conditions of Consent

Consent Granted:	To discharge waste drilling fluids, water, produced water and stormwater from hydrocarbon exploration and production operations by deepwell injection at the Pouri-A wellsite
Expiry Date:	1 June 2033
Review Date(s):	June annually
Site Location:	Pouri-A wellsite, Foreman Road, Tikorangi (Property owner: FD & KS Wyatt)
Grid Reference (NZTM)	1715348E-5673407N & 1715410E-5673360N
Catchment:	Onaero
Tributary:	Mangahewa

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. Before exercising this consent, the consent holder shall submit an "Injection Operation Management Plan." The plan shall include the operational details of the injection activities and identify the conditions that would trigger concerns about the integrity of the injection well, the receiving formation or overlying geological seals. The plan shall also detail the action(s) to be taken by the consent holder if trigger conditions are reached.

2. Before exercising this consent, the consent holder shall provide to the Chief Executive, Taranaki Regional Council:

   a) a geological assessment of the environment in which the well is located, including the injection zone, the geological seals confining the injection zone and any associated faulting;
   b) details of the injection well design and its structural integrity;
   c) an assessment of the suitability of the injection well for the proposed activity;
   d) details of how the integrity of the injection well will be monitored and maintained;
   e) confirmation of the depth to which fresh water resources, as defined in condition 8, are encountered below the site; and
   f) a chemical assessment of the receiving formation water which confirms its Total Dissolved Solids (TDS) concentration, and also demonstrates that the mixing of formation and injection fluids will not result in any adverse effects on the receiving formation or the injection well.

   (Note: The information required by condition 2 may be included within the "Injection Operation Management Plan" required by condition 1).

3. There shall be no injection of any fluids after 1 June 2028.

4. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment.

5. The injection of fluids shall be confined to the McKee Formation, and be injected at a minimum depth of 2149 metres true vertical depth below ground level.

6. The injection pressure at the wellhead shall not exceed 4,000 psi (276 bars). If exceeded, the injection operation shall cease immediately and the Chief Executive, Taranaki Regional Council informed immediately.

7. The consent holder shall ensure that the discharge authorised by this consent does not result in the fracturing of the geological seals confining the injection zone.

8. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water). Useable fresh groundwater is defined as any groundwater having a TDS concentration of less than 1,000 mg/l.

9. Only the following types of fluid may be discharged:

    a. produced water;
    b. well workover fluids, including hydraulic fracturing return fluids;
    c. well drilling fluids;
    d. production sludges;
    e. contaminated stormwater; and
    f. other fluids in accordance with condition 10 below.

10. The fluids discharged under this consent shall only be those listed in condition 9(a) to 9(e) above, and other fluids that:

    a) can reasonably be expected to be used in petrochemical well maintenance and development in accordance with industry best practice;
    b) have environmental effects that are no more adverse than those listed in 9(a) to 9(e) above;
    c) have been certified by the Chief Executive, Taranaki Regional Council as complying with 9(a) to 9(e) above; and
    d) have been the subject of a specific request for certification, in accordance with 9(a) to 9(e) above, that includes details of the proposed contaminant.

11. Once the consent is exercised, the consent holder shall keep daily records of the:

    a) injection hours;
    b) volume of fluid discharged; and
    c) maximum and average injection pressure.

12. For each waste stream arriving on site for discharge, the consent holder shall characterise the fluids by recording the following information:

    a) type of fluid (as listed in condition 9);
    b) source of fluid (site name and company);
    c) an analysis of a representative sample of the fluid for:
        i. pH;
        ii. conductivity;
        iii. suspended solids concentration;
        iv. temperature;
        v. salinity;
        vi. chloride concentration; and
        vii. total hydrocarbon concentration.

    The analysis required by condition 12(c) above is not necessary if a sample of the same type of fluid, from the same source, has been taken, analysed and provided to the Chief Executive, Taranaki Regional Council within the previous 6 months.

13. If the analysis required by condition 12(c) above is not carried out in an International Accreditation New Zealand accredited laboratory, it shall be undertaken in accordance with a "Quality Assurance (QA) Plan" that has been certified by the Chief Executive, Taranaki Regional Council, as meeting the requirements of condition 12. The Council may also, at its discretion, carry out an audit of the consent holder's sampling and analysis regime to assess adherence to the QA plan.

14. The information required by conditions 11 and 12 above, for each calendar month, shall be provided to the Chief Executive, Taranaki Regional Council before the 28th day of the following month.

15. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water resources within an Area of Review (AoR) to assess compliance with condition 9 (the 'Monitoring Programme'). The Monitoring Programme shall be designed to characterise local groundwater quality, and be submitted to the Chief Executive, Taranaki Regional Council, for certification before the exercising of this consent, and shall include:

    a) the location of sampling sites;
    b) well/bore construction details; and
    c) sampling frequency.

    The AoR shall extend 1,000 metres from the point of injection. It is a requirement that at least one suitable monitoring bore be located within 500 metres of the well head. If no suitable existing bores are available, it will be necessary for the Monitoring Programme to include installation of, and sampling from, a suitable bore. The bore would be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council and installed in accordance with NZS 4411:2001. The bore shall be completed no later than 6 months after granting this consent.

16. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:

    a) pH;
    b) conductivity;
    c) chloride; and
    d) total petroleum hydrocarbons.

    Note: The samples required, under conditions 15 and 16, could be taken and analysed by the Taranaki Regional Council or other contracted party on behalf of the consent holder.

17. All groundwater sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken. This Plan shall specify the use of standard protocols recognised to constitute good professional practice including quality control and assurance. An IANZ accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive, Taranaki Regional Council within 30 days of sampling and shall include supporting quality control and assurance information.

    Note: The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 15.

18. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period. Based on the data provided, the report shall also provide:

    a) an assessment of injection well performance;
    b) an assessment of the on-going integrity and isolation of the wellbore;
    c) an assessment of the on-going integrity and isolation of the receiving formation; and
    d) an updated injection modelling report, demonstrating the ability of the receiving formation to continue to accept additional waste fluids and an estimation of remaining storage capacity.

19. 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 each year, 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 7 June 2018

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited PO Box 802 NEW PLYMOUTH 4340
Decision Date:	27 May 2014
Commencement Date:	27 May 2014

Conditions of Consent

Consent Granted:	To discharge fluid waste generated by oil and gas exploration and production activities to the Mount Messenger Formation by deepwell injection
Expiry Date:	01 June 2033
Review Date(s):	June Annually
Site Location:	McKee-B wellsite, Otaraoa Road, Tikorangi
Legal Description:	Lot 1 DP 14374 Blk X Waitara SD (Discharge source & site)
Grid Reference (NZTM)	1715303E-5671934N
Catchment:	Onaero
Tributary:	Mangahewa

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. Before exercising this consent, the consent holder shall submit an "Injection Operation Management Plan." The plan shall include the operational details of the injection activities and identify the conditions that would trigger concerns about the integrity of the injection well, the receiving formation or overlying geological seals. The plan shall also detail the action(s) to be taken by the consent holder if trigger conditions are reached.

2. Before exercising this consent, the consent holder shall provide to the Chief Executive, Taranaki Regional Council:

   (a) a geological assessment of the environment in which the well is located, including the injection zone, the geological seals confining the injection zone and any associated faulting;
   (b) details of the injection well design and its structural integrity;
   (c) an assessment of the suitability of the injection well for the proposed activity;
   (d) details of how the integrity of the injection well will be monitored and maintained;
   (e) confirmation of the depth to which fresh water resources, as defined in condition 7, are encountered below the site; and
   (f) a chemical assessment of the receiving formation water which confirms its Total Dissolved Solids (TDS) concentration, and also demonstrates that the mixing of formation and injection fluids will not result in any adverse effects on the receiving formation or the injection well.

   (Note: The information required by condition 2 may be included within the "Injection Operation Management Plan" required by condition 1).

3. There shall be no injection of any fluids after 1 June 2028.

4. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment.

5. The injection of fluids shall be confined to the Mount Messenger Formation, and be injected at a minimum depth of 945 metres true vertical depth below ground level.

6. The consent holder shall ensure that the discharge authorised by this consent does not result in the fracturing of the geological seals confining the injection zone.

7. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water). Useable fresh groundwater is defined as any groundwater having a TDS concentration of less than 1,000 mg/l.

8. Only the following types of fluid may be discharged:

   (a) produced water;
   (b) well workover fluids, including hydraulic fracturing return fluids;
   (c) well drilling fluids;
   (d) production sludges;
   (e) contaminated stormwater; and
   (f) any other fluids approved in writing by the Chief Executive, Taranaki Regional Council.

9. Once the consent is exercised, the consent holder shall keep daily records of the:

   (a) injection hours;
   (b) volume of fluid discharged; and
   (c) maximum and average injection pressure.

10. For each waste stream arriving on site for discharge, the consent holder shall characterise the fluids by recording the following information:

   (a) type of fluid (as listed in condition 8);
   (b) source of fluid (site name and company);
   (c) an analysis of a representative sample of the fluid for:
      (i) pH;
      (ii) conductivity;
      (iii) suspended solids concentration;
      (iv) temperature;
      (v) salinity;
      (vi) chloride concentration; and
      (vii) total hydrocarbon concentration.

   The analysis required by condition 10(c) above is not necessary if a sample of the same type of fluid, from the same source, has been taken, analysed and provided to the Chief Executive, Taranaki Regional Council within the previous 6 months.

11. If the analysis required by condition 10(c) above is not carried out in an International Accreditation New Zealand (IANZ) accredited laboratory, it shall be undertaken in accordance with a "Quality Assurance (QA) Plan" that has been certified by the Chief Executive, Taranaki Regional Council, as meeting the requirements of condition 10. The Council may also, at its discretion, carry out an audit of the consent holder's sampling and analysis regime to assess adherence to the QA plan.

12. The information required by conditions 9 and 10 above, for each calendar month, shall be provided to the Chief Executive, Taranaki Regional Council before the 28th day of the following month.

13. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water resources within an Area of Review (AoR) to assess compliance with condition 7 (the 'Monitoring Programme'). The Monitoring Programme shall be designed to characterise local groundwater quality, and be submitted to the Chief Executive, Taranaki Regional Council, for certification before the exercising of this consent, and shall include:

    (a) the location of sampling sites;
    (b) well/bore construction details; and
    (c) sampling frequency.

    The AoR shall extend 1,000 metres from the point of injection. It is a requirement that at least one suitable monitoring bore be located within 500 metres of the well head. If no suitable existing bores are available, it will be necessary for the Monitoring Programme to include installation of, and sampling from, a suitable bore. The bore would be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council and installed in accordance with NZS 4411:2001.

14. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:

    (a) pH;
    (b) conductivity;
    (c) chloride; and
    (d) total petroleum hydrocarbons.

    Note: *The samples required, under conditions 13 and 14, could be taken and analysed by the Taranaki Regional Council or other contracted party on behalf of the consent holder.*

15. All groundwater sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken. This Plan shall specify the use of standard protocols recognised to constitute good professional practice including quality control and assurance. An IANZ accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive, Taranaki Regional Council within 30 days of sampling and shall include supporting quality control and assurance information.

    Note: *The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 13.*

16. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period. Based on the data provided, the report shall also provide:

    a) an assessment of injection well performance;
    b) an assessment of the on-going integrity and isolation of the wellbore;
    c) an assessment of the on-going integrity and isolation of the receiving formation; and
    d) an updated injection modeling report, demonstrating the ability of the receiving formation to continue to accept additional waste fluids and an estimation of remaining storage capacity.

17. This consent shall lapse on 30 June 2019, 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.

18. 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 each year, 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 May 2014

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Petroleum Mining Company Limited PO Box 802 New Plymouth 4340
Decision Date (Change):	23 August 2018
Commencement Date (Change):	23 August 2018 (Granted Date: 7 October 2014)

Conditions of Consent

Consent Granted:	To discharge waste fluids, associated with hydrocarbon exploration and production by deep well injection, into the Matemateaonga Formation via the KW-2 and KW-16 wells, or into the Mangahewa Formation via the KA-1 and/or KA-7 wells or Moki and Matemateaonga Formations via the KA-20A well as a contingency
Expiry Date:	1 June 2029
Review Date(s):	June annually
Site Location:	KA-09 wellsite (KW-2/KA-16), 83 Lower Duthie Road & KA-1/7/19/20 wellsite (KA-01/KA-07/KA-20A), 360 Palmer Road, Kapuni
Grid Reference (NZTM)	1702850E-5629709N 1701152E-5630141N
Catchment:	Inaha Kapuni

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

General condition

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

Special conditions

1. The volume discharged shall not exceed 2,000 cubic metres per day.

2. The consent holder shall submit an updated "Injection Operation Management Plan" prior to any future deep well injection activities. The plan shall include the operational details of the injection activities and identify the conditions that would trigger concerns about the integrity of any injection well, the receiving formation or overlying geological seals. The plan shall also detail the action(s) to be taken by the consent holder if trigger conditions are reached.

3. Before exercising this consent, the consent holder shall provide to the Chief Executive, Taranaki Regional Council:

   (a) a geological assessment of the environment in which the well is located, including the injection zone, the geological seals confining the injection zone and any associated faulting;
   (b) details of the injection well design and its structural integrity;
   (c) an assessment of the suitability of the injection well for the proposed activity;
   (d) details of how the integrity of the injection well will be monitored and maintained;
   (e) confirmation of the depth to which fresh water resources, as defined in condition 9, are encountered below the site; and
   (f) a chemical assessment of the receiving formation water which confirms its Total Dissolved Solids (TDS) concentration, and also demonstrates that the mixing of formation and injection fluids will not result in any adverse effects on the receiving formation or the injection well.

   (Note: The information required by condition 3 may be included within the "Injection Operation Management Plan" required by condition 2).

4. There shall be no injection of any fluids after 1 June 2024.

5. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment.

6. Fluids shall be injected at a minimum depth of 1,200 mbgl.

7. Before any contingency back-up well is utilised for injection purposes, the consent holder must provide to the Chief Executive, Taranaki Regional Council an Injection Operation Management Plan specific to the well to be used, which includes all information required by condition 3.

8. The consent holder shall ensure that the discharge authorised by this consent does not result in the fracturing of the geological seals confining the injection zone.

9. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water). Useable fresh groundwater is defined as any groundwater having a TDS concentration of less than 1,000 mg/l.

10. Only the following types of fluid may be discharged:

    (a) produced water;
    (b) hydraulic fracturing and return fluids;
    (c) well workover fluids;
    (d) well servicing and intervention fluids;
    (e) well drilling fluids;
    (f) production chemicals
    (g) production sludges;
    (h) contaminated stormwater; and
    (i) other fluids in accordance with condition 11 below.

11. The fluids discharged under this consent shall only be those listed in condition 10(a) to 10(h) above, and other fluids that:

    (a) Can reasonably be expected to be used in petrochemical well maintenance and development in accordance with industry best practice;
    (b) Have environmental effects that are no more adverse than those listed in 10(a)–10(h) above;
    (c) Have been certified by the Chief Executive, Taranaki Regional Council as complying with 11(a) and 11(b) above; and
    (d) Have been the subject of a specific request for certification, in accordance with 11(c) above, that includes details of the proposed contaminant.

12. Once the consent is exercised, the consent holder shall keep daily records of the:

    (a) injection hours;
    (b) volume of fluid discharged; and
    (c) maximum and average injection pressure.

13. For each waste stream arriving on site for discharge, the consent holder shall characterise the fluids by recording the following information:

    (a) type of fluid (as listed in condition 10);
    (b) source of fluid (site name and company);
    (c) an analysis of a representative sample of the fluid for:
        (i) pH;
        (ii) conductivity;
        (iii) suspended solids concentration;
        (iv) temperature;
        (v) salinity;
        (vi) chloride concentration; and
        (vii) total hydrocarbon concentration.

    (Note: The analysis required by condition 13 above is not necessary if a sample of the same type of fluid, from the same source, has been taken, analysed and provided to the Chief Executive, Taranaki Regional Council within the previous 6 months).

14. If the analysis required by condition 13 above is not carried out in an International Accreditation New Zealand (IANZ) accredited laboratory, it shall be undertaken in accordance with a "Quality Assurance (QA) Plan" that has been certified by the Chief Executive, Taranaki Regional Council, as meeting the requirements of condition 13. The Council may also, at its discretion, carry out an audit of the consent holder's sampling and analysis regime to assess adherence to the QA plan.

15. The information required by conditions 12 and 13 above, for each calendar month, shall be provided to the Chief Executive, Taranaki Regional Council before the 28th day of the following month.

16. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water resources within an Area of Review (AoR) to assess compliance with condition 9 (the 'Monitoring Programme'). The Monitoring Programme shall be designed to characterise local groundwater quality, and be submitted to the Chief Executive, Taranaki Regional Council, for certification before the exercising of this consent, and shall include:

    (a) the location of sampling sites;
    (b) wellsite/wellbore construction details; and
    (c) sampling frequency.

    The AoR shall extend 1,000 metres from the point of injection. It is a requirement that at least one suitable monitoring bore be located within 500 metres of the injection well. If no suitable existing bores are available, it will be necessary for the Monitoring Programme to include installation of, and sampling from, a suitable bore. The bore would be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council and installed in accordance with NZS 4411:2001.

17. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:

    (a) pH;
    (b) conductivity;
    (c) chloride; and
    (d) total petroleum hydrocarbons.

    Note: The samples required, under conditions 16 and 17, could be taken and analysed by the Taranaki Regional Council or other contracted party on behalf of the consent holder.

18. All groundwater sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken. This Plan shall specify the use of standard protocols recognised to constitute good professional practice including quality control and assurance. An IANZ accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive, Taranaki Regional Council within 30 days of sampling and shall include supporting quality control and assurance information.

    Note: The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 16.

19. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period. Based on the data provided, the report shall also provide:

    a) A summary of injection activities over the period being reported;
    b) an assessment of injection well performance;
    c) an assessment of the on-going integrity and isolation of the wellbore; and
    d) an assessment of the on-going integrity and isolation of the receiving formation.

20. This consent shall lapse on 31 December 2019, 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.

21. 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 each year, 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 23 August 2018

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Energy Limited PO Box 802 New Plymouth 4340
Decision Date:	13 June 2018
Commencement Date:	13 June 2018

Conditions of Consent

Consent Granted:	To discharge produced water, well drilling fluids, well work over fluids and hydraulic fracturing fluids from hydrocarbon exploration and production operations into the McKee Formation by deep well injection at the Tuhua-D wellsite
Expiry Date:	1 June 2033
Review Date(s):	June annually
Site Location:	Tuhua-D wellsite, Foreman Road, Tikorangi (Property owner: Cheryll & Lynn Foreman)
Grid Reference (NZTM)	1716441E-5673950N
Catchment:	Onaero
Tributary:	Pouri

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. Before exercising the consent, the consent holder shall submit an "Injection Operation Management Plan." The plan shall include the operational details of the injection activities and identify the conditions that would trigger concerns about the integrity of the injection well, the receiving formation or overlying geological seals. The plan shall also detail the action(s) to be taken by the consent holder if trigger conditions are reached.

2. Before exercising the consent, the consent holder shall provide to the Chief Executive, Taranaki Regional Council:

   (a) a geological assessment of the environment in which the well is located, including the injection zone, the geological seals confining the injection zone and any associated faulting;
   (b) details of the injection well design and its structural integrity;
   (c) an assessment of the suitability of the injection well for the proposed activity;
   (d) details of how the integrity of the injection well will be monitored and maintained;
   (e) confirmation of the depth to which fresh water resources, as defined in condition 7, are encountered below the site; and
   (f) a chemical assessment of the receiving formation water which confirms its Total Dissolved Solids (TDS) concentration, and also demonstrates that the mixing of formation and injection fluids will not result in any adverse effects on the receiving formation or the injection well.

   (Note: The information required by condition 2 may be included within the "Injection Operation Management Plan" required by condition 1).

3. There shall be no injection of any fluids after 1 June 2028.

4. The consent holder shall at all times adopt the best practicable option, as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment.

5. The injection of fluids shall be confined to the McKee Formation, and be injected at a minimum depth of 2,319 metres true vertical depth below ground level.

6. The consent holder shall ensure that the discharge authorised by this consent does not result in the fracturing of the geological seals confining the injection zone.

7. The consent holder shall ensure that the exercise of this consent does not result in contaminants reaching any useable fresh water (groundwater or surface water). Useable fresh groundwater is defined as any groundwater having a TDS concentration of less than 1,000 mg/L.

8. Only the following types of fluid may be discharged:

   (a) produced water;
   (b) well drilling fluids;
   (c) well workover fluids, including hydraulic fracturing fluids; and
   (d) contaminated stormwater/wastewater.

9. For each waste stream arriving on site for discharge, the consent holder shall characterise the fluids by recording the following information:

   (a) type of fluid (as listed in condition 8);
   (b) source of fluid (site name and company);
   (c) an analysis of a representative sample of the fluid for:
      (i) pH;
      (ii) conductivity;
      (iii) suspended solids concentration;
      (iv) temperature;
      (v) salinity;
      (vi) chloride concentration; and
      (vii) total hydrocarbon concentration.

   The analysis required by condition 9(c) above is not necessary if a sample of the same type of fluid, from the same source, has been taken, analysed and provided to the Chief Executive, Taranaki Regional Council within the previous 6 months.

10. Once the consent is exercised, the consent holder shall keep daily records of the:

    (a) injection hours;
    (b) volume of fluid discharged; and
    (c) maximum and average injection pressure.

11. If the analysis required by condition 9(c) above is not carried out in an International Accreditation New Zealand (IANZ) accredited laboratory, it shall be undertaken in accordance with a "Quality Assurance (QA) Plan" that has been certified by the Chief Executive, Taranaki Regional Council, as meeting the requirements of condition 9. The Council may also, at its discretion, carry out an audit of the consent holder's sampling and analysis regime to assess adherence to the QA plan.

12. The information required by conditions 9 and 10 above, for each calendar month, shall be provided to the Chief Executive, Taranaki Regional Council before the 28th day of the following month.

13. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water resources to assess compliance with condition 7 (the 'Monitoring Programme'). The Monitoring Programme shall be submitted to the Chief Executive, Taranaki Regional Council, for certification before exercising the consent, and shall include:

    (a) the location of sampling sites;
    (b) well/bore construction details; and
    (c) sampling frequency.

    It is a minimum requirement that at least one suitable monitoring bore be located within 500 metres of the well head. If no suitable existing bores are available, it will be necessary for the Monitoring Programme to include installation of, and sampling from, a suitable bore. The bore would be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council and installed in accordance with NZS 4411:2001.

14. All groundwater samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:

    (a) pH;
    (b) conductivity;
    (c) chloride; and
    (d) total petroleum hydrocarbons.

    Note: The samples required, under conditions 13 and 14, could be taken and analysed by the Council or other contracted party on behalf of the consent holder.

15. All groundwater sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive, Taranaki Regional Council for review and certification before the first sampling is undertaken. This Plan shall specify the use of standard protocols recognised to constitute good professional practice including quality control and assurance. An IANZ accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive, Taranaki Regional Council within 30 days of sampling and shall include supporting quality control and assurance information.

    Note: The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 13.

16. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, before 31 August each year, a summary of all data collected and a report detailing compliance with consent conditions over the previous 1 July to 30 June period. Based on the data provided, the report shall also provide:

    a) an assessment of injection well performance;
    b) an assessment of the on-going integrity and isolation of the wellbore;
    c) an assessment of the on-going integrity and isolation of the receiving formation; and
    d) an updated injection modeling report, demonstrating the ability of the receiving formation to continue to accept additional waste fluids and an estimation of remaining storage capacity.

17. 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 each year, 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 13 June 2018

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Appendix II

Baseline Groundwater Quality
Tuhua-B and Tuhua-D wellsites

Tuhua- B wellsite GND3018 baseline groundwater quality

Sample details	GND3018				
	Units	-	Sample details	Units	-
TRC sample number	TRC184963		TRC sample number	TRC184963	
Sample date	30-Nov-18		Sample date	30-Nov-18	
Sample time	11:24		Sample time	11:24	
pH	pH	6.9	Chloride	g/m^3	19.5
Electrical Conductivity	mS/m	20.8	Nitrite-N	g/m^3	0.007
Sample Temperature	°C	16.9	Nitrate-N	g/m^3	0.078
Total Alkalinity	g/m^3 as $CaCO_3$	68	Nitrate-N + Nitrite-N	g/m^3	0.086
Bicarbonate	g/m^3 at 25°C	83	Sulphate	g/m^3	2.3
Total Hardness	g/m^3 as $CaCO_3$	74	Benzene	g/m^3	< 0.0010
Dissolved Barium	g/m^3	0.009	Ethane	g/m^3	< 0.003
Dissolved Calcium	g/m^3	14.7	Ethylene	g/m^3	< 0.004
Dissolved Copper	g/m^3	< 0.0005	Methane	g/m^3	0.145
Dissolved Iron	g/m^3	1.28	Toluene	g/m^3	< 0.0010
Dissolved Magnesium	g/m^3	9.1	Ethylbenzene	g/m^3	< 0.0010
Dissolved Manganese	g/m^3	0.56	m&p-Xylene	g/m^3	< 0.002
Dissolved Mercury	g/m^3	< 0.00008	o-Xylene	g/m^3	< 0.0010
Dissolved Nickel	g/m^3	< 0.0005	C7 - C9	g/m^3	< 0.06
Dissolved Potassium	g/m^3	1.54	C10 - C14	g/m^3	< 0.2
Dissolved Sodium	g/m^3	11.7	C15 - C36	g/m^3	< 0.4
Dissolved Zinc	g/m^3	0.0063	Total petroleum hydrocarbons	g/m^3	< 0.7
Bromide	g/m^3	0.08	-	-	-

Tuhua- D wellsite GND3023 baseline groundwater quality

Sample details	GND3023				
	Units	-	Sample details	Units	-
TRC sample number	TRC184962		TRC sample number	TRC184962	
Sample date	**22-Jan-19**		Sample date	**22-Jan-19**	
Sample time	10:05		Sample time	10:05	
pH	pH	7.3	Chloride	g/m^3	14.7
Electrical Conductivity	mS/m	24.6	Nitrite-N	g/m^3	0.005
Sample Temperature	°C	17.1	Nitrate-N	g/m^3	< 0.002
Total Alkalinity	g/m^3 as $CaCO_3$	101	Nitrate-N + Nitrite-N	g/m^3	0.004
Bicarbonate	g/m^3 at 25°C	123	Sulphate	g/m^3	0.6
Total Hardness	g/m^3 as $CaCO_3$	96	Benzene	g/m^3	< 0.0010
Dissolved Barium	g/m^3	0.013	Ethane	g/m^3	< 0.003
Dissolved Calcium	g/m^3	18.7	Ethylene	g/m^3	< 0.004
Dissolved Copper	g/m^3	< 0.0005	Methane	g/m^3	0.65
Dissolved Iron	g/m^3	1.6	Toluene	g/m^3	< 0.0010

Sample details	GND3023				
	Units	-	Sample details	Units	-
TRC sample number	**TRC184962**		**TRC sample number**	**TRC184962**	
Sample date	**22-Jan-19**		Sample date	**22-Jan-19**	
Sample time	10:05		Sample time	10:05	
Dissolved Magnesium	g/m^3	11.9	Ethylbenzene	g/m^3	< 0.0010
Dissolved Manganese	g/m^3	0.42	m&p-Xylene	g/m^3	< 0.002
Dissolved Mercury	g/m^3	< 0.00008	o-Xylene	g/m^3	< 0.0010
Dissolved Nickel	g/m^3	< 0.0005	C7 - C9	g/m^3	< 0.06
Dissolved Potassium	g/m^3	1.19	C10 - C14	g/m^3	< 0.2
Dissolved Sodium	g/m^3	12.2	C15 - C36	g/m^3	< 0.4
Dissolved Zinc	g/m^3	0.001	Total petroleum hydrocarbons	g/m^3	< 0.7
Bromide	g/m^3	0.07	-	-	-