

Greymouth Petroleum Limited
York-A Wellsite
Monitoring Programme Report
2013-2014

Technical Report 2014–25

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Executive summary

Greymouth Petroleum Limited established a hydrocarbon exploration site located on York Road, Midhurst within the Stratford district, in the Waitara catchment. The site is called York-A wellsite. This report covers the period from February 2013 to September 2013. During this period, a wellsite was established, with two wells drilled (York-1 and York-2) and tested. York-1 was plugged and abandoned. York-2 was abandoned and a wellhead installed.

This report for Greymouth Petroleum Limited describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess Greymouth Petroleum Limited's environmental performance in relation to operations at the York-A wellsite during the period under review, and the results and environmental effects of Greymouth Petroleum Limited's activities.

Greymouth Petroleum Limited holds 11 resource consents for the activities at the York-A wellsite, which include a total of 155 consent conditions setting out the requirements that Greymouth Petroleum Limited must satisfy. Greymouth Petroleum Limited holds consent 9486-1 to discharge treated stormwater, treated produced water and surplus drilling water from hydrocarbon exploration to land; consent 9487-1 to discharge contaminants associated with hydraulic fracturing activities into land (not exercised); consent 9488-1 to discharge emissions to air associated with hydrocarbon producing wells (not exercised); consent 9489-1 to discharge contaminants to air from hydrocarbon exploration; consent 9490-1 to take groundwater; consent 9491-1 to discharge stormwater and sediment, deriving from soil disturbance during construction; and consents 9493-1, 9494-1, 9565-1, 9566-1 and 9567-1 to install culverts in either an unnamed tributary of the Manganui Stream or in an unnamed tributary of the Waipuku Stream.

The Council's monitoring programme for the period under review included 16 inspections of the site and surrounding environment, at approximately fortnightly intervals. Ten stormwater samples and four surface water samples were obtained for analysis.

Greymouth Petroleum Limited notified the Council of its intention to combust gas intermittently between 21 June 2013 to 7 July 2013. Although anticipated intermittently for approximately two weeks, gas combustion only occurred intermittently over the course of a few days in conjunction with well testing. No offensive or objectionable odours, smoke or dust associated with activities at the wellsite were observed. The drilling fluids and cuttings were disposed of at a consented off site facility.

The site was generally neat and tidy, yet consistent maintenance was required regarding the ring drains, as silt and sediment build up was excessive. This subsequently resulted in high suspended solid levels on two discharge occasions. Furthermore, five abatement notices were issued in relation to culverts B and C along the access track to the York-A wellsite, which contravened Rule 57 of the Regional Freshwater Plan. These non-compliances included failure to install headwalls, wing-walls, rock rip-rap armouring and concrete aprons. Silt and sediment collection ponds were either installed inappropriately or not at all and the fill over the culvert was not to a satisfactory standard. Furthermore, the culvert was poorly laid and bedded restricting fish passage. Culverts B and C were ultimately deemed structurally inferior.

The five abatement notices issued to Greymouth Petroleum Limited outlined that they must either make the amendments to the culverts to ensure compliance or alternatively remove the culverts. The amendments were made in due course.

During the monitoring period, Greymouth Petroleum Limited demonstrated an improvement required (environmental) level of environmental performance and compliance with the resource consents.

This report includes recommendations for future drilling operations at this site.

This version of the report replaces one published on 14 October 2014. An incorrect reference was found in a recommendation, and one value was incorrect in Table 3. The overall assessment of the site and Company performance remain unchanged.

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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 February 2013 – September 2013 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consent held by Greymouth Petroleum Limited. During this period, a wellsite was established, with two wells drilled (York-1 and York-2) and tested. York-1 was plugged and abandoned. York-2 was abandoned and a wellhead installed.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Greymouth Petroleum Limited that relate to exploration activities at York-A wellsite located off York Road, Midhurst in the Stratford District.

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

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the RMA and the Council's obligations and general approach to monitoring sites through annual programmes, the resource consent held by Greymouth Petroleum Limited in the Waitara catchment, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted at the York-A wellsite during exploration activities.

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

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

Section 4 presents recommendations to be implemented during future drilling operations.

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 *Resource Management Act 1991* (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 socio-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 (eg, recreational, cultural, or aesthetic);
- (e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Taranaki Regional Council is recognising the comprehensive meaning of 'effects' in as much as is appropriate for each activity. Monitoring programmes are not only based on existing 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 performance of resource users against regional plans and consents. Compliance monitoring, including impact monitoring, also enables the Council to continuously assess its own performance in resource management as well as that of resource users particularly consent holders. It further enables the Council to continually re-evaluate its approach and that of consent holders to resource management, and, ultimately, through the refinement of methods, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental and consent performance

Besides discussing the various details of the performance and extent of compliance by the consent holder during the period under review, this report also assigns an overall rating. The categories used by the Council, and their interpretation, are as follows:

- A **high** level of environmental performance and compliance indicates that essentially there were no adverse environmental effects to be concerned about, and no, or inconsequential non-compliance with conditions.
- A **good** level of environmental performance and compliance indicates that adverse environmental effects of activities during the monitoring period were negligible or minor at most, or, 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, or, there were perhaps some items noted on inspection notices for attention but these items were not urgent nor critical, and follow-up inspections showed they have been dealt with, and any inconsequential non-compliances with conditions were resolved positively, co-operatively, and quickly.

- **Improvement required (environmental) or improvement required (administrative)** (as appropriate) indicates that the Council may have been obliged to record a verified unauthorised incident involving measurable environmental impacts, and/or, there were measurable environmental effects arising from activities and intervention by Council staff was required and there were matters that required urgent intervention, took some time to resolve, or remained unresolved at the end of the period under review, and/or, there were on-going issues around meeting resource consent conditions even in the absence of environmental effects. Abatement notices may have been issued.
- **Poor performance (environmental) or poor performance (compliance)** indicates generally that the Council was obliged to record a verified unauthorised incident involving significant environmental impacts, or there were material failings to comply with resource consent conditions that required significant intervention by the Council even in the absence of environmental effects. Typically there were grounds for either a prosecution or an infringement notice.

For reference, in the 2013-2014 year, 60% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 29% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Process description

Site description

Greymouth Petroleum Limited holds a 10 year Petroleum Mining Permit No. 51152 to prospect, explore, and mine for condensate, gas, LPG, oil and petroleum within an area of 53.05 Km². The York-A wellsite is one of many sites within this area that have been established in order to explore, evaluate and produce hydrocarbons.

The York-A wellsite is located approximately 1.65 km along York Road, approximately 3 km from Midhurst, as per Figure 1. The York-A wellsite was established in 2013 and involved the removal of topsoil to create a firm level platform on which to erect a drilling rig and house associated equipment. Site establishment also involved the installation of:

- Wastewater control, treatment and disposal facilities;
- A system to collect and control stormwater and contaminants;
- A gas combustion system; and
- Other on site facilities such as parking and storage.

The nearest residence is approximately 897 m away from the wellsite. Bunding, earthworks and good site location helped minimise any potential for off-site effects for the neighbours.



Figure 1 Aerial view depicting the locality of the York-A wellsite, with approximate regional location (inset)

Well development

The process of drilling a well can take a few weeks to several months, depending on the depth of the well, the geology of the area, and whether the well is vertical or horizontal.

Drilling fluids, more commonly known as 'drilling muds', are required in the drilling process for a number of reasons, including:

- As a safety measure to ensure that any pressurised liquids encountered in the rock formation are contained;
- To transport drill cuttings to the surface;
- To cool and lubricate the drilling bit;
- To provide information to the drillers about what is happening down hole and the actual geology being drilled; and
- To maintain well pressure and lubricate the borehole wall to control cave-ins and wash-outs.

The well is drilled progressively using different sized drill bits. The width of the well is widest at the surface as smaller drill bits are used as the well gets deeper. Once each section of the well is drilled, a steel casing is installed. Cement is then pumped down the well to fill the annulus (the space between the steel casing and the surrounding country rock). This process is repeated until the target depth is reached, with each section of steel casing interlocked with the next.

Production tubing is then fitted within the steel casing to the target depth. A packer is fitted between the production tubing and casing to stop oil/gas/produced water from entering the annulus. The packer is pressure tested to ensure it is sealed. The construction aspects that are most important for a leak-free well include the correct composition and quality of the cement used, the installation method, and the setting time. The aim is to ensure that the cement binds tightly to the steel casing and the rock, and leaves no cavities through which liquids and gases could travel.

Once the well is sealed and tested the casing is perforated at the target depth, allowing fluids and gas to flow freely between the formation and the well.

Management of stormwater, wastewater and solid drilling waste

The York-A wellsite is located approximately 55 m to the north-west of the nearest water body which is an unnamed tributary of the Waipuku Stream.

Management systems were put in place to avoid any adverse effects on the surrounding environment from exploration and production activities on the wellsite. There are several sources of potential contamination from water and solid waste material which require appropriate management. These include:

- Stormwater from 'clean' areas of the site [e.g. parking areas] which run off during rainfall. There is potential that this runoff will pick up small amounts of hydrocarbons and silt due to the nature of the activities on site;
- Stormwater which collects in the area surrounding the drilling platform and ancillary drilling equipment. This stormwater has a higher likelihood of contact with potential contaminants, particularly drilling mud;
- Produced water which flows from the producing formation and is separated from the gas and water phase at the surface; and
- Drill cuttings, mud and residual fluid which are separated from the liquid waste generated during drilling.

An important requirement of the site establishment is to ensure that the site is contoured so that all stormwater and any runoff from 'clean' areas of the site flow into perimeter drains. The drains direct stormwater into a skimmer pit system on site consisting of two settling ponds. Any hydrocarbons present in the stormwater float to the surface and can be removed. The ponds also provide an opportunity for suspended sediment to settle. Treated stormwater is then discharged from the wellsite onto and into land, and consequently into an unnamed tributary in the Waitara catchment.

Drilling mud and cuttings brought to the surface during drilling operations are separated out using a shale shaker. The drilling mud and some of the water is then reused for the drilling process. Cuttings were collected in bins located at the base of the shaker and disposed of at a consented off site facility.

Hydraulic fracturing

In late 2012 the Parliamentary Commissioner for the Environment released an interim report on hydraulic fracturing within New Zealand. The purpose of this report is firstly to assess the environmental risks with hydraulic fracturing, and secondly to assess whether the policies, laws, regulations and institutions in New

Zealand are adequate for managing these risks. The following discussion has been based upon this report.

The first known hydraulic fracturing operation was in 1989 at Petrocorp's Kaimiro-2 gas well in Taranaki. Since then, almost all of the hydraulic fracturing that has taken place in New Zealand has been done within the Taranaki region.

By the early 2000's New Zealand started exploring options for more unconventional ways of getting access to natural gas, and especially oil. These are considered to be more expensive than conventional drilling, but as the price of oil has risen and new technologies have been developed, these unconventional methods are growing.

The most common unconventional source of oil and gas in the Taranaki region has been extracting natural gas and oil from 'tight sands'. The boundary between tight sands and conventional reservoirs is ill-defined and generally based on whether the reservoir will have an economic production flow without hydraulic fracturing.

The process of hydraulic fracturing involves using a fracturing fluid, which is primarily water (typically made up of around 95-97% treated water). This fluid also contains various chemicals, including the three main components, which are:

- An inert proppant which keeps the induced fracture open when pumping is stopped, such as medium grained sand, or small ceramic pellets;
- A gelling substance to carry the proppant into the cracks; and
- A de-gelling substance to thin the gel to allow the fracturing fluid to return to the surface while leaving the proppant in the fractures.

The chemicals associated with the fracturing fluid are trucked to the site, stored in concentrated form, and mixed immediately before the hydraulic fracturing commences.

After the casing is perforated at the desired depth, the fracturing fluid is injected under high pressure into the well and is forced through the small holes into the rocks, creating cracks. This high downhole pressure is maintained for a brief period of time in order to exceed the fracture strength of the reservoir rock and cause artificial fractures.

Once a fracture has been initiated, the fracturing fluid and proppant are carried into the fracture. The placement of proppant in the fractures is assisted by the use of cross-linked gels. These are solutions, which are liquid at the surface but, when mixed, form long-chain polymer bonds and thus become gels that transport the proppant into the formation.

Once in the formation these gels 'break' back with time and temperature to a liquid state and are flowed back to surface as back flow without disturbing the proppant wedge, trapped in the hydraulic fracture. With continued flow, formation hydrocarbon fluids should be drawn into the fracture, through the perforations into the wellbore and to the surface.

Gas combustion from exploration activities

It is possible that gas combustion may occur during the following activities:

- Well testing and clean-up;
- Production testing;
- Emergencies; and
- Maintenance and enhancement activities [well workovers].

1.3 Resource consents

1.3.1 Background

Greymouth Petroleum Limited holds 11 resource consents related to activities at the York-A wellsite site, as follows:

- Discharge Permit 9486-1; granted 15 February 2013,
- Discharge Permit 9487-1; granted 22 February 2013 (not exercised),
- Discharge Permit 9488-1; granted 30 April 2013 (not exercised),
- Discharge Permit 9489-1; granted 18 February 2013,
- Water Permit 9490-1; granted 15 February 2013,
- Discharge Permit 9491-1; granted 8 February 2013,
- Infrastructure Permit 9493-1; granted 25 February 2013,
- Infrastructure Permit 9494-1; granted 2 May 2013,
- Infrastructure Permit 9565-1; granted 9 May 2013,
- Infrastructure Permit 9566-1; granted 9 May 2013,
- Infrastructure Permit 9567-1; granted 9 May 2013

Each of the consent applications were processed on a non-notified basis as Greymouth Petroleum Limited obtained the landowner approvals as an affected party, and the Council were satisfied that the environmental effects of the activity would be minor. The consents are discussed in further detail below.

Copies of the consents can be found within Appendix I of this report.

1.3.2 Water discharge permit (treated stormwater and treated produced water)

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.

The Council determined that the application to discharge treated stormwater, treated produced water and surplus drill water fell within Rule 44 of the Regional Fresh Water Plan (RFWP), which provides for a discharge as a discretionary activity.

The discharge of stormwater may result in contaminants (e.g. sediment, oil) entering surface water. These contaminants have the potential to smother or detrimentally affect in-stream flora and fauna. On site management of stormwater, as discussed in Section 1.2 above, is necessary to avoid/remedy any adverse effects on water quality.

Greymouth Petroleum Limited holds water discharge permit 9486-1 to discharge treated stormwater, produced water and surplus drilling water from hydrocarbon exploration and production operations at the York-A wellsite onto and into land.

This permit was issued by the Council on 15 February 2013 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Greymouth Petroleum Limited to ensure that adverse effects were avoided in the first instance. A summary of conditions can be viewed in Table 3, Section 3.3.

1.3.3 Discharges to land (hydraulic fracturing)

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

The discharge of contaminants associated with hydraulic fracturing, onto and into land where contaminants may reach water, is a discretionary activity under Rule 44 of the RFWP.

Rule 44 is a “catch all” rule as there is currently no specific rule for the discharge of hydraulic fracturing contaminants. The Discretionary Activity is set out below:

Discharge of contaminants onto or into land restricted by s15(1)(b) [where contaminants may reach water] and s15(1)(d) [where the discharge is from industrial or trade premises] of the Resource Management Act 1991 which is not expressly provided for in Rules 21-42 or which is provided for but does not meet the standards, terms or conditions and any other discharge of contaminants to land which is provided for in Rules 21-42 but which does not meet the standards, terms or conditions of those rules [irrespective of whether the discharges are from industrial or trade premises or are likely to reach water].

Provided the activities were to be conducted in accordance with the application and in compliance with the recommended special conditions, then no significant effects were anticipated.

Greymouth Petroleum Limited holds discharge permit 9487-1 to discharge contaminants associated with hydraulic fracturing activities into land at depths greater than 3,600 mTVDss beneath the York-A wellsite.

This permit was issued by the Council on 22 February 2013 under Section 87(e) of the RMA. It is due to expire on 1 June 2020.

Consent conditions were imposed on Greymouth Petroleum Limited to ensure that adverse effects are avoided in the first instance. A summary of conditions can be viewed in Table 4, Section 3.3.

1.3.4 Air discharge permit (exploration activities)

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.

The Council determined that the application to discharge emissions to air associated with the exploration activities at the York-A wellsite fell within Rule 9 of the Regional Air Quality Plan (RAQP).

The standard/term/conditions associated with Rule 9 are as follows:

- *Flare or incinerator point is at least 300 metres from any dwelling house;*
- *The discharge to air from the flare must not last longer than 15 days cumulatively, including of testing, clean-up, and completion stages of well development or work-over, per zone to be appraised; and*
- *No material to be flared or incinerated, other than those derived from or entrained in the well steam.*

Provided the activities were conducted in accordance with the applications and in compliance with the recommended special conditions, then no significant effects were anticipated.

Greymouth Petroleum Limited holds air discharge permit 9489-1 to discharge contaminants to air from hydrocarbon exploration at the York-A wellsite, including combustion involving flaring or incineration of petroleum recovered from natural deposits, in association with well development or redevelopment and testing or enhancement of well production flows.

This permit was issued by the Council on 18 February 2013 under Section 87(e) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Greymouth Petroleum Limited to ensure that adverse effects are avoided in the first instance. A summary of conditions can be viewed in Tables 5 and 6, Section 3.3.

1.3.5 Water abstraction permit (groundwater)

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 resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14.

The Council determined that the application to take groundwater fell within Rule 49 of the (RFWP) as the rate and daily volume of the groundwater abstraction might exceeded that of the permitted activity (Rule 48). Rule 49 provides for groundwater abstraction as a controlled activity, subject to two conditions:

- *The abstraction shall cause not more than a 10% lowering of static water-level by interference with any adjacent bore;*
- *The abstraction shall not cause the intrusion of saltwater into any fresh water aquifer.*

Any produced water will be from reserves far below that which is used for domestic or farm purposes. Shallow groundwater (which does not have any saltwater content) was protected by casing within the bore hole. Given these factors, the abstraction would not cause the above effects.

In granting the consent it was considered that the taking of groundwater was unlikely to have any adverse effect on the environment.

The Council was satisfied that the proposed activity would meet all the standards for a controlled activity. It was therefore obliged to grant the consent but imposed conditions in respect of those matters over which it reserved control. Those matters over which the Council reserved its control were:

- Volume and rate of abstraction;
- Daily timing of abstraction;
- Effects on adjacent bores, the aquifer, river levels, wetlands and sea water intrusion;
- Fitting of equipment to regulate flows and to monitor water volumes, levels, flows and pressures;
- Payment of administrative charges;
- Monitoring and report requirements;
- Duration of consent; and
- Review of the conditions of consent and the timing and purpose of the review.

Greymouth Petroleum Limited holds water permit 9490-1 to take groundwater, as 'produced water', during hydrocarbon exploration and production activities at the York-A wellsite.

This permit was issued by the Council on 15 February 2013 under Section 87(d) of the RMA. It is due to expire on 1 June 2027.

Consent conditions were imposed on Greymouth Petroleum Limited to ensure that adverse effects were avoided in the first instance. A summary of conditions can be viewed within Table 7, Section 3.3.

1.3.6 Water discharge permit (stormwater and sediment – earthworks)

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.

Council considered that the application fell under Rule 27 of the RFWP as a controlled activity (which may be non-notified without written approval), subject to one standard/term/condition to be met:

- *A site erosion and sediment control management plan shall be submitted to the Taranaki Regional Council.*

Greymouth Petroleum Limited supplied a site erosion and sediment control management plan in support of the application.

The Council was satisfied that the activity would meet all the standards for a controlled activity. It was therefore obliged to grant the consent but imposed conditions in respect of those matters over which it reserved control. Those matters over which the Council reserved its control were:

- Approval of a site erosion and sediment control management plan and the matters contained therein;

- Setting of conditions relating to adverse effects on water quality and the values of the water body;
- Timing of works;
- Any measures necessary to reinstate the land following the completion of the activity;
- Monitoring and information requirements;
- Duration of consent;
- Review of conditions of consent and the timing and purpose of the review; and
- Payment of administrative charges and financial contributions.

Greymouth Petroleum Limited holds water discharge permit 9491-1 to discharge stormwater and sediment, deriving from soil disturbance undertaken for the purpose of constructing the York-A wellsite, onto land.

This permit was issued by the Council on 8 February 2013 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Consent conditions were imposed on Greymouth Petroleum Limited to ensure that adverse effects are avoided in the first instance. A summary of conditions can be viewed in Table 8, Section 3.3.

1.3.7 Infrastructure permit (culverts)

The Council determined that the application to install a culvert fell within Rule 64 of the (RFPW).

Greymouth Petroleum Limited supplied a site erosion and sediment control management plan in support of the application.

Council was satisfied that the activity would meet all the standards for a discretionary activity. It was therefore obliged to grant the consent but imposed conditions in respect of those matters over which it reserved control. Those matters over which the Council reserved its control were:

- Approval of a site erosion and sediment control management plan and the matters contained therein;
- Matters relating to structural engineering;
- Setting of conditions relating to adverse effects on water quality and the values of the water body;
- Timing of works;
- Monitoring and information requirements;
- Duration of consent; and
- Review of conditions of consent and the timing and purpose of the review;

Greymouth Petroleum Limited holds culvert permits 9493-1, 9494-1, 9565-1, 9566-1 and 9567-1 to install culverts in either an unnamed tributary of the Manganui Stream or in an unnamed tributary of the Waipuku Stream, including associated streambed disturbance and reclamation.

These permits were issued by the Council on 25 February 2013, 2 May and 9 May 2013. They are due to expire on 1 June 2027.

Consent conditions were imposed on Greymouth Petroleum Limited to ensure that adverse effects are avoided in the first instance. A summary of conditions can be viewed in Tables 9 to 13, Section 3.3.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets out obligation/s upon the Council to: gather information, monitor, and conduct research on the exercise of resource consent and the effects arising, within the Taranaki region and report upon these.

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 exploration well sites consists of seven primary components. They are:

- Programme liaison and management;
- Site inspections;
- Chemical sampling;
- Solid wastes monitoring;
- Air quality monitoring;
- Discharges to land (hydraulic fracturing); and
- Biomonitoring surveys.

The monitoring programme for the York-A wellsite focused primarily on programme liaison and management, site inspections, physicochemical sampling and discharges to land. However, all seven components are discussed below.

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 reviews, renewals, or new consents, advice on the Council's environmental management strategies and the content of regional plans, and consultation on associated matters.

1.4.3 Site inspections

Inspection and examination of wellsites is a fundamental and effective means of monitoring and are undertaken to ensure that good environmental practices are adhered to and resource consent special conditions complied with.

The inspections are based on internationally recognised and endorsed wellsite monitoring best-practice checklists developed by the Alberta Energy Resources Conservation Board and the USEPA, adapted for local application.

The inspections also provide an opportunity for monitoring officers to liaise with staff about on site operations, monitoring and supervision; discuss matters of concern; and resolve minor issues in a quick and informal manner.

Inspections pay special attention to the ring drains, mud sumps, treatment by skimmer pits and the final discharge point from the skimmer pit on to land and then any potential receiving waters.

During each inspection the following are checked:

- Weather;
- Flow rate of surface waters in the general vicinity;
- Flow rate of water take;
- Whether pumping of water was occurring;
- General tidiness of site;
- Site layout;
- Ring drains;
- Hazardous substance bunds;
- Treatment by skimmer pits/sedimentation pits;
- Drilling mud;
- Drill cuttings;
- Mud pit capacity and quantity contained in pit;
- Sewage treatment and disposal;
- Cementing waste disposal;
- Surface works;
- Whether gas combustion was in progress, or if there was a likelihood of gas combustion, whether the Council had been advised;
- Discharges;
- Surface waters in the vicinity for effects on colour and clarity, aquatic life and odour;
- Site records;
- General observations; and
- Odour (an indicator for any hydrocarbon and hazardous chemical contamination).

1.4.4 Chemical sampling

The Council may undertake sampling of the discharge from the wellsite and from correlating surface waters upstream and downstream of the discharge point, to ensure that resource consent special conditions are complied with.

1.4.5 Solid wastes

The Council monitors any disposal of drill cuttings on-site via mix-bury cover to ensure compliance with consent conditions.

In recent times consent holders have opted to remove drilling waste from the site by contractor and dispose of it at licensed disposal areas (land farming), which are monitored separately.

1.4.6 Air quality monitoring

Air quality monitoring is carried out in association with the well testing and clean-up phase, where gas combustion can occur.

Assessments are made by Inspecting Officers of the Council during site inspections to ensure that operators undertake all practicable steps to mitigate any effects from gas combustion.

Inspecting Officers check that that plant equipment is working effectively, that there is the provision of liquid and solid separation, and that on site staff have regard to wind direction and speed at the time of gas combustion.

It is also a requirement that the Council and immediate land owners are notified prior to any gas being combusted when practicable. This requirement was checked to ensure compliance with the conditions.

1.4.7 Discharges to land (hydraulic fracturing)

If hydraulic fracturing activities are undertaken at site, sampling and analysis of the hydraulic fracturing, return flow fluids and nearby bores are carried out. These inspections of the site and surrounding land and water are carried out to ensure that no observable effects have occurred as a result of the discharge to land. Pre and post hydraulic fracturing reports are submitted by the consent holder detailing among other things, the effectiveness of the mitigation measures put in place to protect the environment.

1.4.8 Biomonitoring surveys

Biomonitoring surveys in any nearby streams may be carried out pre and post occupation of the well site to assess whether the activities carried out on site, and associated discharges have had any effect on ecosystems. However, as the inspections of the receiving water have not shown any adverse effects from the discharges, no biomonitoring surveys have been undertaken during this monitoring period.

2. Results

2.1 Water

2.1.1 Inspections

The York-A wellsite, adjacent land and streams were inspected 16 times during this monitoring period. Below is a copy of the comments that were noted on the day of each inspection.

27 February 2013

Earthworks had commenced to develop the wellsite. The access track was under construction with two culverts in place. Contractors had planned to install the box drain in the following weeks. No sediment run off was observed during inspection due to dry conditions. The works appeared to be occurring in a clean and tidy fashion with all soil retained on site. Site staff were advised about silt and sediment traps and that another inspection would soon be conducted to ensure sediment control measures were established prior to any significant rainfall.

19 March 2013

During inspection the drill rig was being erected while earthworks were continuing. Large volumes of water were observed on site as a result of recent rainfall. Site staff were advised to monitor the silt fencing and access track, replace silt fencing where it was damaged or overloaded with sediment and to consider the placement of further settling ponds along the access track where high sediment volumes were detected. In addition, discussions were held with on site staff regarding the completion of ring drains, ensuring that all site stormwater (including along the access track) was directed to the settling ponds and that the bunding along the rear of the site was built up to prevent water flow off one site at the northern perimeter. It was noted that ring drains were to be checked and cleaned on a regular basis due to the high sediment run off from the site. Another inspection would soon be conducted to ensure silt and sediment control measures continued to function in an appropriate manner.

22 March 2013

During inspection the following matters were to be completed prior to the commencement of drilling at the wellsite. Ring drains were to be completed to a high standard, clear of debris and equipment and contoured towards the skimmer pits. Shut off valves were to be installed at the discharge point of the second skimmer pit. Skimmer pit liners were to be installed and of good integrity to ensure contents were contained within the pits. Chemicals were to be bunded (when stocked at site) in an appropriate manner. Consent 9486-1 was also discussed with site staff addressing the requirement to irrigate discharge during periods of wet weather to ensure the discharge did not enter surface water.

23 March 2013

Ring drains were in place and observed to be completed to a good standard. Site staff confirmed to the Council that attention would be given to ring drains to ensure they were kept clean while minor earthworks on site were still in progress. Skimmer pits were complete with the discharge pipe and shut off valve installed. A pipe from the exit of the ring drain to the entry of the skimmer pits was anticipated to be installed later in the day. Mud tanks were to be bunded to prevent spills into the ring drain.

Other equipment was to be banded as it arrived on site, including the cement preparation area. The site was completed to a standard that drilling could commence.

3 April 2013

Inspection was conducted during a heavy rainfall event. The chemical store area was well banded and chemicals were covered from the weather. Site staff were advised to ensure the banding about the cementing area was repaired and capable of containing any potential spills within the area. Site staff were advised to undertake works at the northern corner of the site to ensure that stormwater flowed towards the skimmer pits, as opposed to ponding in the corner of the site. The remainder of the ring drains were directed towards the skimmer pits, yet appeared to need frequent maintenance or until the base material was compacted and sediment runoff had decreased. The second skimmer pit was empty at time of inspection as stormwater from the site was being used for drilling operations. The discharge pipe valve was closed. A sample from the first skimmer pit was obtained to ensure discharges would comply with consent conditions in anticipation of potential discharges.

15 April 2013

Drilling (of York-1) was continuing on site. Ring drains appeared to be in good working order with earth banding in place about the cementing area and storage tanks. The chemical store area also appeared clean and tidy at time of inspection. Overall the site appeared in good condition during inspection. Skimmer pits were inspected and found not to be discharging at the time of inspection. A sample was obtained from the second skimmer pit.

22 April 2013

Inspection was conducted during a rainfall event. Skimmer pits and ring drains appeared to be working well, however the far northern corner of the site needed to be monitored to ensure no pooling was occurring within the ring drain. The site in general appeared to be clean and tidy with areas about the rig well banded. The flare pit was beginning to fill with water, site staff were advised that if it was required to pump out the liquid from the flare pit, that it should be directed back into the ring drain, and subsequently treated via the skimmer pits. Skimmer pits were inspected and found to be discharging at the time of inspection. The discharge was flowing over land then into the swiftly running stream. No visual effects were observed in water quality. A sample was obtained of the discharge.

29 April 2013

Urgent attention was required about the D-tank and cuttings area. A large pile of drill cuttings were observed on the ground with what appeared to be another pile of drill cuttings and mud mixed with wood shavings and gravel within the same area. This material was stock piled adjacent to the ring drain. It was outlined to site staff that should this material have washed into the ring drain, there would be a significant chance that it would enter the skimmer pit system and affect the discharge and subsequently contravene or cause exceedance's of the resource consent compliance limits. The banding about the chemical store area had been opened to allow stormwater to enter the ring drain. Site staff were advised that attention should be given to this area to consider the most effective way to band the chemicals to contain spills, yet prevent the collection of stormwater from the site within this area. Skimmer pits were inspected and found not to be discharging at the time of inspection. A sample was obtained from the second skimmer pit.

8 May 2013

Drilling (of York-1) was continuing on site. The majority of site was found to be in a clean and tidy order. There were noted improvements about the drill cuttings and mud tank areas, however site staff were advised that continued attention was required about this area. In addition, site staff were advised that the sample obtained during the previous inspection returned a suspended solid reading of 100 g/m³. This is the upper limit of consent 9486-1, condition 7 and as such site staff were advised to consider taking action in an attempt to limit the amount of suspended solids entering the skimmer pits. Skimmer pits were inspected and found not to be discharging at the time of inspection. A sample was obtained from the second skimmer pit.

15 May 2013

Inspection found that the site was clean, tidy and dry. Earth bunding about the chemical store and rig equipment was in place. Bunding was also in place and appeared in good condition where the cementing trucks were anticipated to be operating from in coming weeks. During inspection, a digger was working around the drill cuttings and mud tank areas, both of which appeared to be in a reasonable condition. It was outlined that this area of the site should remain as such, and if spills were not contained and quickly cleaned up, they would otherwise be likely to contribute to high suspended solid readings. The sample obtained during the previous inspection returned a suspended solid reading of 110 g/m³, site staff were advised to consider installing silt control measures in the ring drains. Some silt control measures were observed on site with silt weirs and silt fencing observed to have been installed about the entrance and exit to the skimmer pits. Skimmer pits were observed to have been pumped out with the second pit empty and clean. No samples were obtained.

28 May 2013

Drilling (of York-1) was continuing on site. The site appeared clean and tidy, bar for some small muddy areas as a result of truck movements and high rainfall. Ring drains appeared to be maintained on a regular basis. The weirs and silt cloths in the ring drains were operating well and were observed to be retaining sediment. Skimmer pits were inspected and found to be discharging at the time of inspection. A sample was obtained of the discharge. Additional samples were obtained upstream and downstream of the discharge point.

11 June 2013

Cementing was due to commence with no further drilling anticipated. Site inspection was conducted with a representative from BTW. All ring drains appeared to be in good working order. The weirs and silt retention measures placed in the ring drains appeared to be working well. Site staff were advised that some of the weirs could be cleaned out to improve their efficiency, however to be aware that if these works were to be completed the sediment must be disposed of in an appropriate manner and not placed on the outer side of the ring drains. In addition, consideration was to be given with regards to improvements to the north-eastern corner of the ring drain, as there was an indication of some ponding in the area. Earth bunding about the site appeared to be working effectively. It was observed that some drilling mud had spilled within one of the bunded areas as a result of transferring muds on site. Discussions regarding this were held with on site HSE staff and clean up of this area was arranged. The spill was restricted to the bunded areas and had not reached the ring drains. Site staff were advised to assess the sediment retention measures that

were in place on the access track to ensure they were working effectively. Site appeared in a reasonable condition at the time of inspection. Skimmer pits were inspected and found not to be discharging at the time of inspection. A sample was obtained from the second skimmer pit.

27 June 2013

Inspection of the entry track to the site showed silt and sediment retention devices had been improved along the entire length of the track. The silt fences and settling ponds had been maintained to ensure that stormwater passed through these devices rather than by-passing via alternative pathways. Site staff were advised to inspect the area on the mountain side of the track at the last stream crossing to ensure that no stormwater entered the surface water without passing through sediment control devices. Water was being taken from a small tributary on the access road for use at the wellsite. There was no visual change in the static water level of the stream as a result of this permitted activity. The rig remained on site, however was not actively drilling as maintenance work on the rig was being undertaken. Testing had begun on site. One zone was being tested with the gas passing through a separator prior to combustion in the thermal oxidiser. A pilot flare was also burning in the flare pit for safety and emergency situations. The flare from both the thermal oxidiser and flare pit were very clean with no smoke observed from either source. Ring drains about the site were in good condition with sediment control measures remaining in place within the drains. At the time of inspection some of the rig equipment was being stored on the grass verge on the outer side of the ring drain. Site staff were advised to ensure that rig equipment was stored within the ring drain system so that any rainwater runoff that had potential to be contaminated would be treated via the skimmer pits.

12 July 2013

The rig remained on site, however was not actively drilling as maintenance work on the rig was still being undertaken. Testing was complete on site. All equipment was stored on site within the ring drain area. Sediment controls on the access track appeared to be in good operational order. Skimmer pits were inspected and found not to be discharging at the time of inspection. A sample was obtained from the second skimmer pit.

2 September 2013

Drilling of the second well (York-2) had commenced. The wellsite was found to be muddy, this was largely due to the heavy traffic required on site in relation rig repositioning. Ring drains had sediment build up along the base, effectively working in retaining some of the silt and sediment. However, skimmer pits appeared to have a reasonable amount of suspended solids within the water column. Septic tanks appeared to be full and needed to be emptied, this was discussed with on site HSE staff. Bunding about the rig equipment was in place and appeared to be working well retaining and preventing spills from entering the ring drain. A new liner had been installed within the flare pit. Site staff were advised to ensure that the lining about the flare pit wall was re-instated and covered with clay prior to the commencement of flaring within the pit. Sediment controls along the access track appeared to be in good working order. Skimmer pits were inspected and found not to be discharging at the time of inspection. A sample was obtained from the second skimmer pit.

12 September 2013

An inspection was conducted following a heavy rainfall event. Drilling on site was complete with cementing anticipated to occur over the following days. Cementing equipment was on site and located in a suitable area ringed by an earth bund. Bunding about the chemical store was in good working order. Ring drains were full and slowly discharging into the skimmer pit treatment system. Sediment control on the access track remained in place and appeared to be well managed and maintained. On site HSE staff were advised of minor works that would be required to the flare pit if further flaring was to be carried out on site. Skimmer pits were inspected and found to be discharging at the time of inspection. A sample was obtained of the discharge. Additional samples were obtained upstream and downstream of the discharge point.

2.1.2 Results of discharge monitoring

During the period under review a total of 10 stormwater samples were obtained. Stormwater was observed discharging from the wellsite skimmer pits on three occasions, three samples were obtained in conjunction with this. Of the remaining seven samples, one was obtained from the first skimmer pit and the remaining six were obtained from the second skimmer pit to ensure compliance with consent conditions in anticipation of potential discharges.

Analysis of the samples obtained showed that only three of the samples would have been compliant with resource consent conditions should a discharge have occurred. Results are detailed in Table 1.

Table 1 Results of stormwater samples obtained from the York-A wellsite during the monitoring period

Date	Chloride g/m ³	Hydrocarbon g/m ³	pH pH	Suspended solids g/m ³	Sampling location
04 Apr 2013	3.1	4.6	6.5	1620	First skimmer pit
15 Apr 2013	8.5	<0.5	7.0	120	Second skimmer pit
22 Apr 2013	5.5	44	6.8	330	Discharge
29 Apr 2013	8.5	4.9	6.7	100	Second skimmer pit
08 May 2013	13.1	<0.5	7.0	110	Second skimmer pit
28 May 2013	23.3	1.3	7.1	91	Discharge
11 Jun 2013	15.1	0.5	7.1	26	Second skimmer pit
12 Jul 2013	15.7	10	7.4	140	Second skimmer pit
02 Sep 2013	18	1.1	7.3	230	Second skimmer pit
12 Sep 2013	19.0	7.1	7.4	260	Discharge

Samples obtained on 4 April 2013, 15 April 2013, 8 May 2013, 12 July 2013 and 2 September 2013 returned elevated levels of suspended solids. Although the suspended solids values exceed the value set in condition 6 (100 g/m³) of consent 9486-1, no actual non-compliances occurred as these samples were obtained from the skimmer pit to ensure compliance with consent conditions in anticipation of potential discharges. Therefore, no discharges containing elevated levels of suspended solids were released from the skimmer pits into the receiving environment in relation to these samples.

Discharge samples obtained on 22 April 2013 and 12 September 2013 returned elevated levels of hydrocarbons and suspended solids. However, due to the extensive runoff area over land upon discharging, any concentrations of contaminants would have reduced through filtration, sedimentation and dilution prior to entering any surface water bodies. In addition, as the discharge was temporary and in conjunction with a rainfall event, it was therefore unlikely to have had any significant or on-going adverse effect on the receiving environment. Furthermore, upstream and downstream samples were obtained in relation to the discharge sample on 12 September 2013 and returned levels which were not of environmental concern (section 2.1.3, Table 2).

All sewage was directed for treatment through a septic tank system and removed by contractor to a licensed disposal facility.

2.1.3 Results of receiving environment monitoring

During the period under review, four samples were obtained in conjunction with the stormwater discharges on 28 May 2013 and 12 September 2013, from an unnamed tributary of the Waipuku Stream to ensure that the discharges were not having an adverse effect on the receiving stream environment. Of the stream samples obtained, no exceedences were recorded in relation to consent 9486-1. Results are detailed in Table 2.

Table 2 Samples obtained from an unnamed tributary of the Waipuku Stream in conjunction with stormwater discharges

Date	Chloride g/m ³	Hydrocarbon g/m ³	pH pH	Suspended solids g/m ³	Sampling location
28 May 2013	7.6	-	6.5	14	Upstream of discharge
	9.5	-	6.7	3	Downstream of discharge
12 Sep 2013	7.8	<0.5	6.8	4	Upstream of discharge
	7.4	<0.5	6.5	32	Downstream of discharge

The receiving surface water body was inspected regularly in conjunction with site inspections. No effects were observed and the stream appeared clear with no visual change in colour or clarity. In addition, no odour, oil, grease films, scum, foam or suspended solids were observed in the stream during the monitoring period.

2.1.4 Culverts

On 14 March 2013 the Council's River Engineer visited the wellsite, where five abatement notices were issued in relation to culverts B and C installed along the access track to the wellsite (see Figure 2), which contravened Rule 57 of the RFWP.

These non-compliances included failure to install headwalls, wing-walls, rock rip-rap armouring and concrete aprons. Silt and sediment collection ponds were either installed inappropriately or not at all and the fill over the culvert was not to a satisfactory standard. Furthermore, the culverts were poorly laid and bedded restricting fish passage. Ultimately, culverts B and C were deemed structurally inferior. The abatement notices issued to Greymouth Petroleum Limited outlined

that they must either make the amendments to the culverts to ensure compliance or alternatively remove the culverts. The amendments were made in due course.



Figure 2 Location of culverts along the York-A wellsite access track

2.2 Air

2.2.1 Inspections

Air quality monitoring inspections were carried out in conjunction with general compliance monitoring inspections. See Section 2.1.1 above for comments concerning site inspections.

2.2.2 Results of discharge monitoring

Greymouth Petroleum Limited notified the Council of its intention to combust gas intermittently at the York-A wellsite between 21 June 2013 to 7 July 2013. Although gas combustion was anticipated intermittently for approximately two weeks, gas combustion only occurred intermittently over the course of a few days in conjunction with well testing. During this time a thermal oxidiser was largely employed for the combustion of gas, with a flare pit utilised occasionally to maintain a pilot flare and for emergency gas combustion / depressurisation.

During routine inspections, no offensive or objectionable odours, smoke or dust associated with activities at York-A wellsite were observed. The flare pit was inspected to ensure that solid and liquid hydrocarbons were not combusted through the gas combustion system and there was no evidence to support or suggest this was occurring.

From observations during site inspections, including the inspection of the flare log maintained by Greymouth Petroleum Limited, it appeared that special conditions relating to the control of emissions to air from the combustion of hydrocarbons were complied with.

2.2.3 Results of receiving environment monitoring

No chemical monitoring of air quality was undertaken during the testing phase of the York-A wellsite as gas combustion activities were minimal and the controls implemented by Greymouth Petroleum Limited did not give rise to any concerns with regard to air quality.

2.2.4 Other ambient monitoring

No other ambient air sampling was undertaken, as the controls implemented by Greymouth Petroleum Limited did not give rise to any concerns with regard to air quality.

2.3 Land

2.3.1 Inspections

Land monitoring inspections were carried out in conjunction with general compliance monitoring inspections. See Section 2.1.1 above for comments concerning site inspections.

2.3.2 Results of receiving environment monitoring (hydraulic fracturing)

Although hydraulic fracturing was anticipated at the York-A wellsite, the Council received notification from Greymouth Petroleum Limited that hydraulic fracturing stimulation would not be undertaken at the wellsite.

2.3.3 Land status

The well site was constructed on a flat rural dairy farming area. Relatively minor earthworks were required to construct the site. The land had not been reinstated at the time of the last inspection on 12 September 2013 as the wellsite was still in use.

2.4 Contingency plan

Greymouth Petroleum Limited has provided a general contingency plan, as required by Condition 10 of resource consent 9486-1 with site specific maps which cover all onshore sites that they operate. The contingency plan has been reviewed and approved by officers of the Council.

2.5 Investigations, interventions and incidents

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Unauthorised Incident Register (UIR) includes events where the company concerned has itself

notified the Council. The register contains details of any investigation and corrective action taken.

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

In the monitoring period under review, there were no incidents recorded during inspections. However, five abatement notices were issued to Greymouth Petroleum Limited in relation to two of the five culverts installed along the access track to the wellsite. The Council's River Engineer visited the site on 14 March 2013 where non-compliances were recorded in relation to culverts B and C, which subsequently contravened Rule 57 of the RFWP. These non-compliances are described in section 2.1.4 of this report.

The Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with Greymouth Petroleum Limited's conditions in resource consents or provisions in Regional Plans.

Any minor actual or potential non-compliance with consent conditions were addressed during site inspections. Greymouth Petroleum Limited staff would quickly take steps to ensure that requests made by Council Inspecting Officers were adhered to without delay.

3. Discussion

3.1 Discussion of consent exercise

Of the eleven resource consents relating to the York-A wellsite, consents 9486-1 (to discharge treated stormwater, treated produced water and surplus drilling water), 9489-1 (to discharge contaminants to air from hydrocarbon exploration), 9490-1 (to take groundwater), and 9491-1 (to discharge stormwater and sediment, deriving from soil disturbance during construction) and 9493-1, 9494-1, 9565-1, 9566-1 and 9567-1 (to install culverts) were exercised and actively monitored.

Drilling waste was transported off site to a consented facility. With the exception of the incident described and discussed in sections 2.1.4 and 2.5, it is considered that all remaining resource consent conditions were complied with during the monitoring period, including the provision of various pieces of information (contingency plan, notifications etc.).

Monitoring has shown that the management on site ensured that no significant adverse effects to the environment occurred during the monitoring period.

3.2 Environmental effects of exercise of consents

Stormwater

The discharge of stormwater from earthworks has the potential for sediment and other contaminants to enter surface water where it may detrimentally affect in-stream flora and fauna. To mitigate these effects, Greymouth Petroleum Limited established perimeter drains during the construction of the wellsite, and care was taken to ensure runoff from disturbed areas was directed into the drains or directed through adequate silt control structures.

Once the well was constructed, attention was given to controlling stormwater that ran off the wellsite and the associated plant and equipment.

Adverse effects on surface water quality can occur if contaminated water escapes through the stormwater system. Interceptor pits are designed to trap sediment and hydrocarbons through gravity separation. Any water that is unsuitable for release via the interceptor pits was directed to the drilling sumps, or removed for off-site disposal.

Greymouth Petroleum Limited also undertook the following mitigation measures in order to minimise off-site adverse effects:

- Most stormwater was directed via perimeter drains to the skimmer pits for treatment prior to discharge;
- Additional bunding was constructed around the bulk fuel tank, chemical storage area, and other areas where runoff from areas containing contaminants could occur;
- Regular inspections of the interceptor pits occurred; and
- Maintenance and repairs were carried out if required.

Interceptor pits do not discharge directly to surface water, instead they discharge onto and into land where the discharge usually soaks into the soil before reaching any surface water. However, if high rainfall had resulted in the discharge reaching the surface water, significant dilution would have occurred. Inspections and sampling of receiving waters found no effects of concern.

There are numerous on site procedures included in drilling and health and safety documentation that are aimed at preventing spills on site, and further procedures that address clean-up to remedy a spill situation before adverse environmental effects have the opportunity to occur (e.g. bunding of chemicals and bulk fuel).

Groundwater

Small amounts of groundwater may have been encountered as produced water during operations at the wellsite. It was anticipated that the abstraction of groundwater would not impact on any groundwater resource and that the groundwater would not be affected as it would be protected by the well casing.

Flaring

The environmental effects from flaring have been evaluated in monitoring reports prepared by the Council in relation to the flaring emissions from specific wells in the region.

The Council has previously undertaken field studies at two wells (one gas, and the other producing oil and heavier condensates); together with dispersion modelling at a third site¹. More recently two studies have focused on field investigations and modelling of emissions from flares involving fracturing fluids.²

In brief, the previous studies found that measurements of carbon monoxide, carbon dioxide, and methane concentrations to be safe at all points downwind, including within 50 m of the flare pit. Measurements of suspended particulate matter found concentrations typical of background levels, and measurements of PM₁₀ found compliance with national standards even in close proximity to the flare. Beyond 120 m from the flare pit, concentrations of polyaromatic hydrocarbons (PAH) approached background levels, as did levels of dioxins beyond 250 m from the flare.

In summary, the studies established that under combustion conditions of high volume flaring of gases with some light entrained liquids etc., atmospheric concentrations of all contaminants had reduced by a distance of 250 m downwind to become essentially typical of or less than elsewhere in the Taranaki environment (e.g. urban areas). These levels are well below any concentrations at which there is any basis for concern over potential health effects.

Thermal oxidisers provide an alternative system for the combustion of volatile organic compounds and are being increasingly adopted by onshore drilling and production operations in Taranaki. Thermal oxidation is the process of oxidizing

¹ Taranaki Regional Council, *Fletcher Challenge Energy Taranaki Ltd, Mangahewa 2 Gas Well Air Quality Monitoring Programme Report 1997 - 98*, August 1998.

² Taranaki Regional Council: *Atmospheric Dispersion Modelling of Discharges to Air from the Flaring of Fracturing Fluid*, Backshall, March 2013; and *Investigation of air quality arising from flaring of fracturing fluids -emissions and ambient air quality*, Technical Report 2012- 03, Taranaki Regional Council May 2012.

combustible materials by raising the temperature of the material above its auto-ignition point in the presence of oxygen, and maintaining it at high temperature for sufficient time to complete combustion to carbon dioxide and water. They are enclosed combustion chamber systems as opposed to direct combustion to atmosphere (flaring) and therefore work to reduce emissions and associated effects (e.g. light pollution from flaring).

The measures to be undertaken by Greymouth Petroleum Limited to avoid or mitigate actual or potential adverse environmental impacts on air quality included:

- The use of a test separator to separate solids and fluids from the gas during all well clean-ups, and workover activities where necessary, thus reducing emissions to air. In particular, this would reduce the potential for heavy smoke incidents associated with elevated PAH and dioxin emissions;
- Records of flaring events are kept by Greymouth Petroleum Limited and provided to the Council;
- Every endeavor was made by Greymouth Petroleum Limited to minimise the total volume of gas flared while ensuring that adequate flow and pressure data was gathered to inform their investment decision; and
- Every endeavor was made by Greymouth Petroleum Limited to minimise smoke emissions from the flare and thermal oxidiser.

Odour and dust

Suppression of dust with water was to be implemented if it was apparent that dust may be travelling in such a direction to adversely affect off-site parties. Odour may stem from the product, gas combustion, or some of the chemicals used on site. Care was taken to minimize the potential for odour emissions (e.g. by keeping containers sealed, and ensuring gas combustion burnt cleanly).

Hazardous substances

The use and storage of hazardous substances on site has the potential to contaminate surface water and soils in the event of a spill. In the unlikely event of a serious spill or fire, the storage of flammable materials could have resulted in air, soil and water contamination.

Greymouth Petroleum Limited was required to implement the following mitigation measures:

- All potentially hazardous material were used and stored in accordance with the relevant Hazardous Substances and New Organisms regulations;
- All areas containing hazardous chemicals were bunded;
- Sufficient separation of chemicals from the flare pit were maintained for safety reasons;
- In the unlikely event of a spill escaping from bunded areas, the site perimeter drain and interceptor pit system was implemented to provide secondary containment on site; and
- A spill contingency plan was prepared that sets out emergency response procedures to be followed in the event of a spill.

In-stream effects

The environmental effects from the installation of culverts have been evaluated and are outlined as follows:

- reduced water quality while the culvert is being installed;
- the culvert having insufficient capacity to pass high flows;
- erosion of the stream bed or banks; and
- obstruction of fish passage.

Greymouth Petroleum Limited was required to implement the following mitigation measures:

- during installation the time spent working in the water is minimised and, where practicable, avoided altogether during the winter months, when fish migration and spawning occurs;
- exposed soil in the work area is stabilised (e.g. by establishing vegetation cover) as soon as practicable after the installation is completed;
- the culvert can pass flood flows that are reasonably likely to occur, and the risk associated with its capacity being exceeded is acceptable;
- there is adequate protection (e.g. rock or concrete armouring) to avoid erosion effects, including those that may affect structural integrity during high flows or overtopping; and
- the installation allows fish passage, for example by ensuring that there is no 'drop off' and the flow velocity is not too high.

Summary

There were no significant adverse environmental effects observed to water, land or air as a result of the wellsite activities during the monitoring period. Specific interventions by the Council were required to ensure stormwater management and culvert emplacements were to the desired standard.

3.3 Evaluation of performance

A tabular summary of Greymouth Petroleum Limited's compliance record for the period under review is set out in Tables 3 to 13.

Table 3 Summary of performance for Consent 9486-1 to discharge treated stormwater, treated produced water and surplus drilling water from hydrocarbon exploration and production operations at the York-A wellsite onto and into land where it will enter an unnamed tributary of the Manganui Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt best practicable option at all times	Inspections, procedures and processes	Mostly – continued issues with silt and sediment controls at site
2. Maximum stormwater catchment area shall be no more than 14,000 m ²	Plans, procedures and processes	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. All discharges to be directed for treatment through skimmer pits	Inspection of stormwater system	Mostly – some site ponding, ring drains abundant with silt and sediment
4. Stormwater pits to be lined with impervious material	Inspection	Yes
5. Skimmer pits shall have a combined capacity of no less than 295 m ³ and retain hydrocarbons	Inspection and physicochemical sampling	No – one hydrocarbon exceedance detected in discharge
6. Constituents in discharges shall meet the following standards: a) pH 6.0 – 9.0 b) Suspended solids <100 g/m ³ c) Hydrocarbon <15 g/m ³ d) Chloride 50 g/m ³	Physicochemical sampling	No – two exceedences detected in discharge
7. Following a mixing zone of 25 m , discharges shall not give rise to a temperature increase of more than 2°C	Physicochemical sampling	Yes
8. Following the mixing zone, the discharge shall not give rise to adverse effects in/on the receiving waters	Inspection	Yes
9. Five days written notice provided to the Council prior to site works and drilling	Notification received	Yes
10. Council to approve prepared contingency plan in relation to the wellsite prior to exercise of consent	Contingency plan approved	Yes
11. The stormwater system shall be designed, managed and maintained in accordance with information submitted	Confirming discharges were undertaken in accordance with information submitted	Yes
12. The Council shall be advised in writing 48 hrs prior to reinstatement of the site	Notification	N/A
13. Consent shall lapse if not implemented	Exercise of consent confirmed by inspection	N/A
14. Notice of Council to review consent	No provision for review during period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Improvement required

Table 4 Summary of performance for Consent 9487-1 to discharge contaminants associated with hydraulic fracturing activities into land at depths greater than 3,600 m TVDss beneath the York-A wellsite

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Any discharge shall occur below 3,600 m TVDss	Inspection of company records	N/A
2. There shall be no discharge of hydraulic fracturing fluids into the reservoir after 1 June 2015	Inspection of Company records	N/A
3. Exercise of consent shall not contaminate or put at risk freshwater aquifers	Sampling fresh water bores pre/post discharge	N/A
4. Consent holder shall undertake sampling	Inspection and sampling fresh water bores pre/post discharge	N/A
5. Groundwater monitoring bores may be installed as required	Site assessment	N/A
6. Sampling programmes shall follow recognised field parameters	Inspection, procedures and processes	N/A
7. Sampling programme shall follow recognised field procedures	Inspection, procedures and processes	N/A
8. Consent holder to undertake well and equipment pressure testing	Inspection of company records	N/A
9. A pre-fracturing discharge report is to be provided to the Council 14 days prior to the second and subsequent discharges	Pre-fracturing discharge report	N/A
10. Consent holder shall provide notification prior to each hydraulic fracture discharge	Notification	N/A
11. A post-fracturing discharge report is to be provided to the Council within 60 days after the discharge has ceased	Post-fracturing discharge report	N/A
12. The reports outlined in conditions 9 and 11 must be emailed to consents@trc.govt.nz	Reports via email	N/A
13. The consent holder shall provide access to a location where samples of hydraulic fracturing fluids and return fluids can be obtained by the Council officers	Access	N/A
14. Consent holder to adopt best practicable option	Inspection, procedures and processes	N/A
15. The fracture fluid shall be comprised of no less than 95% water	Sample of discharge and return fluids	N/A
16. Notice of Council to review consent	No provision for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A - Consent not exercised

Table 5 Summary of performance for consent 9488-1 to discharge emissions to air associated with hydrocarbon producing wells at the York-A wellsite

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Council must be notified 24 hrs prior to flaring when practicable	Notification	N/A
2. At least 24 hrs notice prior to flaring required to notify nearby residents when practicable	Notification	N/A
3. Flaring shall only occur in an impermeable flare pit or thermal oxidiser at or about NZTM 1706952E – 5652491N	Inspection	N/A
4. No material to be flared or incinerated, other than those derived from or entrained in the well stream	Inspection	N/A
5. All gas flared must first be treated by effective liquid and solid separation and recovery	Inspection	N/A
6. Best practicable option to be adopted	Inspections, procedures and processes	N/A
7. No offensive or objectionable odour or smoke at or beyond the boundary	Inspection	N/A
8. All permanent tanks used as hydrocarbons storage vessels fitted with vapour recovery systems	Inspection	N/A
9. Control of carbon monoxide, nitrogen dioxide, sulphur dioxide and fine particles	Inspection of company records	N/A
10. Control of other emissions	Inspection of company records	N/A
11. Analysis of typical gas and condensate stream from the field to be made available to the Council	Available upon request	N/A
12. Log all flaring including time, duration, zone, volumes flared and smoke events	Inspection of company records	N/A
13. Consent shall lapse if not implemented	Lapse date 31 March 2018	N/A
14. Notice of Council to review consent	No provision for review during period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A - Consent not exercised

Table 6 Summary of performance for Consent 9489-1 to discharge contaminants to air from hydrocarbon exploration at the York-A wellsite, including combustion involving flaring or incineration of petroleum recovered from natural deposits, in association with well development or redevelopment and testing or enhancement or well production flows

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent shall not be exercised for more than an accumulated duration of 45 days per zone	Inspection of records	Yes
2. Flare pit shall be lined with impermeable material	Inspection	Yes
3. Council must be notified 24hrs prior to initial flaring of each zone	Notification received	Yes
4. At least 24hrs notice prior to flaring required to notify nearby residents when practicable	Notification received	Yes
5. No material to be flared or incinerated, other than those derived from or entrained in the well stream	Inspection of thermal oxidiser and flare pit	Yes
6. All gas flared must first be treated by effective liquid and solid separation and recovery	Inspection of thermal oxidiser and flare pit	Yes
7. Only substances originating from the well stream shall be combusted	Inspection of thermal oxidiser and flare pit	Yes
8. If condition 7 not achievable, report to be provided to the Council within five days substantiating why it was not achieved	Not required	N/A
9. Best practicable option to be adopted	Inspections, procedures and processes	Yes
10. No offensive or objectionable odour or smoke at or beyond the boundary	Inspection	Yes
11. Control of carbon monoxide, nitrogen dioxide, sulphur dioxide and fine particles	Inspection of company records	Yes
12. Control of other emissions	Inspection of company records	Yes
13. Analysis of typical gas and condensate stream from field to be made available to the Council	Available upon request	N/A
14. All permanent tanks used as hydrocarbon storage vessels fitted with vapour recovery systems	Inspection	Yes
15. Log all flaring including time, duration, zone, volumes flared and smoke events	Inspection of Company records	Yes
16. Consent shall lapse if not implemented	Consent exercised	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
17. Notice of Council to review consent	No provision for review during period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

Table 7 Summary of performance for Consent 9490-1 to take groundwater, as 'produced water', during hydrocarbon exploration and production activities at the York-A wellsite

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. The abstraction must not cause more than a 10% lowering of static water level by interference with any adjacent bore	Complaints and sampling	Yes
2. The abstraction does not cause the intrusion of salt water into any freshwater aquifer	Water sampling adjacent bores pre/post drilling	Yes
3. A well log to 1,000 m must be submitted to the Council	Well log received	Yes
4. Consent shall lapse if not implemented by date specified	Notification received and confirmed by inspection	N/A
5. Notice of Council to review consent	Notice of intention /not served	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

Table 8 Summary of performance for Consent 9491-1 to discharge stormwater and sediment, deriving from soil disturbance undertaken for the purpose of constructing the York-A wellsite, onto land where it may enter an unnamed tributary of the Manganui Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt best practicable option at all times	Visually inspecting site, procedures and processes	Yes
2. Consent holder to adopt best practicable option at all times	Inspection, procedures and processes	Mostly – continued issues with silt and sediment controls at site
3. Seven days written notice prior to site earthworks commencing	Notification received	Yes
4. All runoff shall pass through skimmer pits with a minimum total capacity of 100 m ³	Site erosion and sediment control plan submitted	Mostly – some site ponding, ring drains abundant with silt and sediment
5. Condition 4 will not apply when site is stabilised	Inspection	Yes
6. All earth worked areas shall be stabilised as soon as practicable	Inspection	N/A – site still in use

Condition requirement	Means of monitoring during period under review	Compliance achieved?
Overall assessment of consent compliance and environmental performance in respect of this consent		Improvement required

Table 9 Summary of performance for consent 9493-1 to install a culvert in an unnamed tributary of the Manganui Stream, including the associated disturbance of the stream bed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Description of consent	-	N/A
2. The culvert shall be designed, managed and maintained in accordance with information submitted	Inspection, procedures and processes	No – multiple variances
3. Culvert pipe shall be no less than 45 m and a diameter no less than 1200 mm	Inspection	Yes
4. Fill shall be no deeper than 1.2 metres	Inspection	No – fill exceeded approximately 3 metres; abatement notice issued
5. Consent holder shall notify the Council two days prior to the commencement of work	Notification received	Yes
6. Gradient of the culvert shall reflect that of the stream	Inspection	Yes
7. Rock rip rap armouring placed over 8 m, 1.15 m thick and extend along the banks of the stream	Inspection	No – not initially installed; abatement notice issued
8. Rock rip rap armouring shall comply with specific grading	Inspection	No – not initially installed; abatement notice issued
9. Invert of the culvert set below the existing streambed	Inspection	Yes
10. Consent holder to ensure bank batter slope shall have a slope no steeper than 1 horizontal to 1 vertical	Inspection	Yes
11. Ensure area and volume of stream bed disturbance is minimised and areas that are disturbed reinstated	Inspection	Yes
12. Exercise of consent shall not restrict fish passage	Inspection	Yes
13. Consent holder to minimise sediment discharge to the stream	Inspection	No – silt / sediment controls initially installed were inadequate; abatement notice issued

Condition requirement	Means of monitoring during period under review	Compliance achieved?
14. All earthworks stabilised as soon as practicable following completion of soil disturbance activity	Inspection	No – silt / sediment controls initially installed were inadequate; abatement notice issued
15. Consent holder shall maintain culvert	Inspection	Yes
16. Discovery of archaeological remains	No remains discovered	Yes
17. Consent shall lapse if not implemented by date specified	Confirmed by inspection	Yes
18. Notice of Council to review consent	Notice of intention not served	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Poor

Table 10 Summary of performance for consent 9494-1 to install a box culvert in an unnamed tributary of the Manganui Stream, including the associated disturbance of the stream bed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Description of consent	-	N/A
2. The culvert shall be designed, managed and maintained in accordance with information submitted	Inspection, procedures and processes	No – multiple variances
3. Culvert pipe shall be 4x4 m wide, 2 m high, 2.4 m long with headwall, wingwall and concrete aprons at the inlet and outlet	Inspection	No – headwall, wingwalls and concrete aprons not initially installed; abatement notice issued
4. Fill shall be no deeper than 3 metres	Inspection	Yes
5. Consent holder shall notify the Council two days prior to the commencement of work	Notification received	Yes
6. Gradient of the culvert shall reflect that of the stream	Inspection	Yes
7. Rock rip rap armouring, geotextile fabric and lay flat socks are installed to appropriate specifications	Inspection	No – rock rip rap walls not initially installed; abatement notice issued
8. Rock rip rap armouring shall comply with specific grading	Inspection	No - rock rip rap walls not initially installed; abatement notice issued

Condition requirement	Means of monitoring during period under review	Compliance achieved?
9. Rock rip rap armouring upstream and downstream of the concrete aprons shall be a minimum of 200 mm higher than the culvert invert	Inspection	No – rock rip rap walls not initially installed; abatement notice issued
10. Consent holder to ensure bank batter slope matches existing batter slopes	Inspection	Yes
11. Ensure area and volume of stream bed disturbance is minimised and areas that are disturbed reinstated	Inspection	No – initially poorly laid and bedded; abatement notice issued
12. Exercise of consent shall not restrict fish passage	Inspection	No – stream initially flowed under culvert; abatement notice issued
13. Consent holder to minimise sediment discharge to the stream	Inspection	Yes
14. All earthworks stabilised as soon as practicable following completion of soil disturbance activity	Inspection	Yes
15. Consent holder shall maintain culvert	Inspection	Yes
16. Discovery of archaeological remains	No remains discovered	Yes
17. Notice of Council to review consent	Notice of intention not served	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Poor

Table 11 Summary of performance for consent 9565-1 to install a culvert in an unnamed tributary of the Waipuku Stream, including associated streambed disturbance and reclamation

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. The culvert shall be designed, managed and maintained in accordance with information submitted	Inspection, procedures and processes	Yes
2. Culvert pipe shall be no longer than 15 metres	Inspection	Yes
3. Consent holder shall install wingwalls, headwalls and aprons at the outlet and inlet	Inspection	Yes
4. Fill shall be no deeper than 1.5 metres	Inspection	Yes
5. Consent holder shall notify the Council two days prior to the commencement of work	Notification received	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
6. Gradient of the culvert shall reflect that of the stream	Inspection	Yes
7. Final slope of the channel banks shall be no steeper than 1 horizontal to 1 vertical	Inspection	Yes
8. Invert of the culvert set below the existing streambed	Inspection	Yes
9. Ensure area and volume of stream bed disturbance is minimised and areas that are disturbed reinstated	Inspection	Yes
10. Exercise of consent shall not restrict fish passage	Inspection	Yes
11. Consent holder to minimise sediment discharge to the stream	Inspection	Yes
12. All earthworks stabilised as soon as practicable following completion of soil disturbance activity	Inspection	Yes
13. Consent holder shall maintain culvert	Inspection	Yes
14. Discovery of archaeological remains	No remains discovered	Yes
15. Consent shall lapse if not implemented by date specified	Confirmed by inspection	Yes
16. Notice of Council to review consent	Notice of intention not served	Yes
Overall assessment of consent compliance and environmental performance in respect of this consent		High

Table 12 Summary of performance for consent 9566-1 to install a culvert in an unnamed tributary of the Manganui Stream, including associated streambed disturbance and reclamation

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. The culvert shall be designed, managed and maintained in accordance with information submitted	Inspection, procedures and processes	Yes
2. Culvert pipe shall be no longer than 22.5 metres	Inspection	Yes
3. Consent holder shall install wingwalls, headwalls and aprons at the outlet and inlet	Inspection	Yes
4. Fill shall be no deeper than 4 metres	Inspection	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Consent holder shall notify the Council two days prior to the commencement of work	Notification received	Yes
6. Gradient of the culvert shall reflect that of the stream	Inspection	Yes
7. Final slope of the channel banks shall be no steeper than 1 horizontal to 1 vertical	Inspection	Yes
8. Invert of the culvert set below the existing streambed	Inspection	Yes
9. Ensure area and volume of stream bed disturbance is minimised and areas that are disturbed reinstated	Inspection	Yes
10. Exercise of consent shall not restrict fish passage	Inspection	Yes
11. Consent holder to minimise sediment discharge to the stream	Inspection	Yes
12. All earthworks stabilised as soon as practicable following completion of soil disturbance activity	Inspection	Yes
13. Consent holder shall maintain culvert	Inspection	Yes
14. Discovery of archaeological remains	No remains discovered	Yes
15. Consent shall lapse if not implemented by date specified	Confirmed by inspection	Yes
16. Notice of Council to review consent	Notice of intention not served	Yes
Overall assessment of consent compliance and environmental performance in respect of this consent		High

Table 13 Summary of performance for consent 9567-1 to install a culvert in an unnamed tributary of the Manganui Stream, including associated streambed disturbance and reclamation

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. The culvert shall be designed, managed and maintained in accordance with information submitted	Inspection, procedures and processes	Yes
2. Culvert pipe shall be no longer than 17.5 metres	Inspection	Yes
3. Consent holder shall abide by erosion protection measures	Inspection	Yes
4. Fill shall be no deeper than 3 metres	Inspection	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Consent holder shall notify the Council two days prior to the commencement of work	Notification received	Yes
6. Gradient of the culvert shall reflect that of the stream	Inspection	Yes
7. Final slope of the channel banks shall be no steeper than 1 horizontal to 1 vertical	Inspection	Yes
8. Invert of the culvert set below the existing streambed	Inspection	Yes
9. Ensure area and volume of stream bed disturbance is minimised and areas that are disturbed reinstated	Inspection	Yes
10. Exercise of consent shall not restrict fish passage	Inspection	Yes
11. Consent holder to minimise sediment discharge to the stream	Inspection	Yes
12. All earthworks stabilised as soon as practicable following completion of soil disturbance activity	Inspection	Yes
13. Consent holder shall maintain culvert	Inspection	Yes
14. Discovery of archaeological remains	No remains discovered	Yes
15. Consent shall lapse if not implemented by date specified	Confirmed by inspection	Yes
16. Notice of Council to review consent	Notice of intention not served	Yes
Overall assessment of consent compliance and environmental performance in respect of this consent		High

During the monitoring period, Greymouth Petroleum Limited overall demonstrated an improvement required (environmental) level of environmental performance and compliance with the resource consents. The incidents that occurred during the period under review have been discussed in Section 2.5. Across individual consents, performance ranged from 'high' (five consents), to 'poor' (two consents).

3.4 Exercise of optional review of consents

Each resource consent includes a condition which allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the resource consent, which were not foreseen at the time the application was considered or which it was not appropriate to deal with at the time. The next provisions for review are in 2015.

Based on the results of monitoring during the period under review, it is considered that there are no grounds that require a review to be pursued. A recommendation to this effect is presented in section 4.

3.5 Alterations to monitoring programmes

In designing and implementing the monitoring programmes for air and water discharges and water abstractions at wellsites in the region, the Council takes into account the extent of information made available by previous and other authorities, its relevance under the Act, the obligations of the Act in terms of monitoring emissions/ discharges and effects, and of subsequently reporting to the regional community, the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of wellsite processes within Taranaki.

The Council has routinely monitored wellsite activities for more than 20 years in the region. This work has included in the order of hundreds of water samples and biomonitoring surveys in the vicinity of wellsites, and has demonstrated robustly that a monitoring regime based on frequent and comprehensive inspections is rigorous and thorough, in terms of identifying any adverse effects from wellsite and associated activities. Furthermore, with regard to hydraulic fracturing activities, baseline groundwater monitoring samples have demonstrated that hydraulic fracturing discharges have not given rise to any significant adverse effects on groundwater aquifers within the region. However, the Council had for a time not routinely required the imposition of additional targeted physicochemical and biological monitoring unless a site-specific precautionary approach indicated this would be warranted for certainty and clarity around site effects.

In addition, the Council has also noted a desire by some community areas or individuals for a heightened level of information feedback and certainty around the results and outcomes of monitoring at wellsites. The Council has therefore moved to extend the previous regime, to make the sampling and extensive analysis of groundwater and surface waters in the general vicinity of a wellsite where hydraulic fracturing occurs, and biomonitoring of surface water ecosystems, an integral part of the basic monitoring programme for such activities.

It is proposed that for any further work at the York-A wellsite, the new standard programme will be implemented with the inclusion of biomonitoring surveys, notwithstanding the lack of any effects or concerns previously found. A recommendation to this effect is attached to this report.

4. Recommendations

1. THAT this report be forwarded to the Company, and to any interested parties upon request;
2. THAT the monitoring of future consented activities include sampling and extensive analysis of both groundwater and surface waters in the general vicinity of the wellsite if hydraulic fracturing is to commence at the York-A wellsite;
3. THAT the monitoring of future consented activities at York-A wellsite be extended to include a biomonitoring survey;
4. THAT, subject to the findings of monitoring of any further activities at the York-A wellsite consents 9486-1, 9487-1, 9488-1, 9489-1, 9490-1, 9493-1, 9494-1, 9565-1, 9566-1 and 9567-1 shall not be reviewed in 2015.

Glossary of common terms and abbreviations

The following abbreviations and terms may have been used within this report:

Al*	Aluminium.
As*	Arsenic.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cu*	Copper.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m ³	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.

l/s	Litres per second.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH ₄	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH ₃	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO ₃	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (for example hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (for example temperature, clarity, density) and chemical determinants (for example metals and nutrients) to characterise the state of an environment.
PM ₁₀	Relatively fine airborne particles (less than 10 micrometre diameter).
Resource consent	Refer Section 87 of the RMA. Resource consent 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).
RFWP	Regional Freshwater Plan.
RMA	Resource Management Act 1991 and subsequent amendments.
SS	Suspended solids.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
TVDss	Total Vertical Depth Sub-Surface.
UI	Unauthorised Incident.
UIR	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.
Zn*	Zinc.

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

For further information on analytical methods, contact the Council's laboratory.

Appendix I

Resource consents

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date: 8 February 2013

Commencement
Date: 8 February 2013

Conditions of Consent

Consent Granted: To discharge stormwater and sediment, deriving from soil disturbance undertaken for the purpose of constructing the York-A wellsite, onto land where it may enter an unnamed tributary of the Manganui Stream at or about (NZTM) 1706878E-5652474N

Expiry Date: 1 June 2018

Site Location: York-A wellsite, 149 York Road, Midhurst
(Property owner: P & A Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist (Discharge source & site)

Catchment: Waitara

Tributary: Manganui

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

General condition

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

Special conditions

1. This consent authorises the discharge of stormwater from earthworks undertaken for the purpose of establishing the York-A wellsite as shown on drawing numbers 12226-101 and 12226-02 provided with application 7339.
2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.
3. At least 7 working days before the commencement of earthworks for the purpose of wellsite construction and establishment, the consent holder shall notify the Taranaki Regional Council of the proposed start date for the earthworks. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz.
4. All run off from any area of exposed soil shall pass through skimmer pits with a minimum total capacity of:
 - a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and
 - b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.
5. The obligation described in condition 4 above shall cease to apply, and accordingly the erosion and sediment control measures may be removed, in respect of any particular area, only when the area is stabilised.

Note: For the purpose of conditions 5 and 6, "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in the Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an officer of the Taranaki Regional Council, an 80% vegetative cover has been established.

Consent 9491-1

6. All earthworked areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after the completion of soil disturbance activities.

Note: For the purposes of this condition "stabilised" has the same definition as that set out in condition 5.

Signed at Stratford on 8 February 2013

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date: 15 February 2013

Commencement Date: 15 February 2013

Conditions of Consent

Consent Granted: To take groundwater, as 'produced water', during hydrocarbon exploration and production activities at the York-A wellsite

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhirst
(Property owner: P & A Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist (Site of take)

Grid reference (NZTM) 1706878E-5652474N

Catchment: Waitara

Tributary: Manganui

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

General condition

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

Special conditions

1. The consent holder shall ensure the abstraction does not cause more than a 10% lowering of static water-level by interference with any adjacent bore.
2. The consent holder shall ensure the abstraction does not cause the intrusion of salt water into any freshwater aquifer.
3. The consent holder shall submit a summary well log to a depth of 1000 metres, within three months of the completion of drilling. The report shall:
 - a) include confirmation of the datum from which measurements are referenced;
 - b) provide a log to show the true vertical depth to all geological formation tops intersected within the freshwater zone;
 - c) identify the true vertical depth to, and thickness of, any freshwater aquifers intersected by the well; and
 - d) identify the true vertical depth to the freshwater-saline water interface in the well.
4. This consent shall lapse on 31 March 2018, 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.
5. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 15 February 2013

For and on behalf of
Taranaki Regional Council

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: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date: 22 February 2013

Commencement Date: 22 February 2013

Conditions of Consent

Consent Granted: To discharge contaminants associated with hydraulic fracturing activities into land at depths greater than 3600 mTVDss beneath the York-A wellsite

Expiry Date: 1 June 2020

Review Date(s): June annually

Site Location: York-A wellsite, 149 York Road, Midhirst
(Property owner: P & A Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist (Discharge source & site)

Grid Reference (NZTM) 1706878E-5652474N

Catchment: Waitara

Tributary: Manganui
Waipuku

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

General condition

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

Special Conditions

1. The discharge point shall be deeper than 3600 mTVDss.

Note: mTVDss = metres true vertical depth subsea, i.e. the true vertical depth in metres below mean sea level.

2. There shall be no discharge of hydraulic fracturing fluids into the reservoir after 1 June 2015.
3. 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 Total Dissolved Solids concentration of less than 1000 mg/l.
4. 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 3 (the 'Monitoring Programme'). The Monitoring Programme shall be certified by the Chief Executive, Taranaki Regional Council ('the Chief Executive'), before this consent is exercised, and shall include:
 - (a) the location of the discharge point(s);
 - (b) the location of sampling sites; and
 - (c) sampling frequency with reference to a hydraulic fracturing programme.
5. Depending on the suitability of existing bores within 500 metres of the wellsite for obtaining a representative groundwater sample, it may be necessary for the Monitoring Programme to include installation of, and sampling from, a dedicated monitoring 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.
6. All water samples taken for monitoring purposes shall be taken in accordance with recognised field procedures and analysed for:
 - (a) pH;
 - (b) conductivity;
 - (c) total dissolved solids;
 - (d) major ions (Ca, Mg, K, Na, total alkalinity, bromide, chloride, nitrate-nitrogen, and sulphate);
 - (e) trace metals (barium, copper, iron, manganese, nickel, and zinc);
 - (f) total petroleum hydrocarbons;
 - (g) formaldehyde;
 - (h) dissolved methane and ethane gas;
 - (i) methanol;

- (j) glycols;
- (k) benzene, toluene, ethylbenzene, and xylenes (BTEX); and
- (l) carbon-13 composition of any dissolved methane gas discovered ($^{13}\text{C-CH}_4$).

Note: The samples required, under conditions 4 and 6 could be taken and analysed by the Council or other contracted party on behalf of the consent holder.

7. All sampling and analysis shall be undertaken in accordance with a *Sampling and Analysis Plan*, which shall be submitted to the Chief Executive 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 International Accreditation New Zealand (IANZ) accredited laboratory shall be used for all sample analysis. Results shall be provided to the Chief Executive within 30 days of sampling and shall include supporting quality control and assurance information. These results will be used to assess compliance with condition 3.

Note: The Sampling and Analysis Plan may be combined with the Monitoring Programme required by condition 4.

8. The consent holder shall undertake well and equipment pressure testing prior to any hydraulic fracture programme on a given well to ensure any discharge will not affect the integrity of the well and hydraulic fracturing equipment.
9. Any hydraulic fracture discharge shall only occur after the consent holder has provided a comprehensive 'Pre-fracturing discharge report' to the Chief Executive. The report shall be provided at least 14 days before the discharge is proposed to commence and shall detail the hydraulic fracturing programme proposed, including as a minimum:
- (a) the specific well in which each discharge is to occur, the intended fracture interval(s) ('fracture interval' is the discrete subsurface zone to receive a hydraulic fracture treatment), and the duration of the hydraulic fracturing programme;
 - (b) the number of discharges proposed and the geographical position (i.e. depth and lateral position) of each intended discharge point;
 - (c) the total volume of fracture fluid planned to be pumped down the well, including mini-fracture treatments, and their intended composition, including a list of all contaminants and Material Safety Data Sheets for all the chemicals to be used;
 - (d) the results of the reviews required by condition 14;
 - (e) results of modelling showing an assessment of the likely extent and dimensions of the fractures that will be generated by the discharge;
 - (f) the preventative and mitigation measures to be in place to ensure the discharge does not cause adverse environmental effects and complies with condition 2;
 - (g) the extent and permeability characteristics of the geology above the discharge point to the surface;
 - (h) any identified faults within the modeled fracture length plus a margin of 50%, and the potential for adverse environmental effects due to the presence of the identified faults;
 - (i) the burst pressure of the well and the anticipated maximum well and discharge pressures and the duration of the pressures; and
 - (j) details of the disposal of any returned fluids, including any consents that are relied on to authorise the disposal.

Note: For the avoidance of doubt, the information provided with a resource consent application would usually be sufficient to constitute a 'Pre-fracturing discharge report' for any imminent hydraulic fracturing discharge. The Pre-fracturing discharge report provided for any later discharge may refer to the resource consent application or earlier Pre-fracturing discharge reports noting any differences.

10. The consent holder shall notify the Taranaki Regional Council of each discharge by emailing worknotification@trc.govt.nz. Notification shall include the date that the discharge is to occur and identify the 'Pre-fracturing discharge report', required by condition 9, which details the discharge. Where practicable and reasonable notice shall be given between 3 days and 14 days before the discharge occurs, but in any event 24 hours notice shall be given.
11. At the conclusion of a hydraulic fracturing programme on a given well, the consent holder shall submit a comprehensive 'Post-fracturing discharge report' to the Chief Executive. The report shall be provided within 60 days after the programme is completed and, as a minimum, shall contain:
 - (a) confirmation of the interval(s) where fracturing occurred for that programme, and the geographical position (i.e. depth and lateral position) of the discharge point for each fracture interval;
 - (b) the contaminant volumes and compositions discharged into each fracture interval;
 - (c) the volume of return fluids from each fracture interval;
 - (d) an analysis for the constituents set out in conditions 6(a) to 6(k), in a return fluid sample taken within the first two hours of flow back, for each fracture interval if flowed back individually, or for the well if flowed back with all intervals comingled;
 - (e) an estimate of the volume of fluids (and proppant) remaining underground;
 - (f) the volume of water produced with the hydrocarbons (produced water) over the period beginning at the start of the hydraulic fracturing programme and ending 50 days after the programme is completed, or after that period of production;
 - (g) an assessment of the extent and dimensions of the fractures that were generated by the discharge, based on modelling undertaken after the discharge has occurred and other diagnostic techniques, including production analysis, available to determine fracture length, height and containment;
 - (h) the results of pressure testing required by condition 8, and the top hole pressure (psi), slurry rate (bpm), surface proppant concentration (lb/gal), bottom hole proppant concentration (lb/gal), and calculated bottomhole pressure (psi), as well as predicted values for each of these parameters; prior to, during and after each hydraulic fracture treatment;
 - (i) details of the disposal of any returned fluids, including any consents that are relied on to authorise the disposal;
 - (j) details of any incidents where hydraulic fracture fluid is unable to pass through the well perforations (screen outs) that occurred, their likely cause and implications for compliance with conditions 1 and 2; and
 - (k) an assessment of the effectiveness of the mitigation measures in place with specific reference to those described in the application for this consent.
12. The reports described in conditions 9 and 11 shall be emailed to consents@trc.govt.nz with a reference to the number of this consent.

Consent 9487-1

13. The consent holder shall provide access to a location where the Taranaki Regional Council officers can obtain a sample of the hydraulic fracturing fluids and the return fluids.
14. 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 minimize any actual or likely adverse effect of the activity on the environment by, as a minimum, ensuring that:
 - (a) the discharge is contained within the fracture interval;
 - (b) regular reviews are undertaken of the preventative and mitigation measures adopted to ensure the discharge does not cause adverse environmental effects; and
 - (c) regular reviews of the chemicals used are undertaken with a view to reducing the toxicity of the chemicals used.
15. The fracture fluid shall be comprised of no less than 95% water and proppant by volume.
16. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June each year, for the purposes of:
 - (a) ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this 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; and/or
 - (b) further specifying the best practicable option as required by condition 14; and/or
 - (c) ensuring hydraulic fracturing operations appropriately take into account any best practice guidance published by a recognised industry association or environmental regulator.

Signed at Stratford on 22 February 2013

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date (Change): 30 April 2013

Commencement Date
(Change): 30 April 2013 (Granted: 18 February 2013)

Conditions of Consent

Consent Granted: To discharge contaminants to air from hydrocarbon exploration at the York-A wellsite, including combustion involving flaring or incineration of petroleum recovered from natural deposits, in association with well development or redevelopment and testing or enhancement of well production flows

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021 and in accordance with special condition 17

Site Location: York-A wellsite, 149 York Road, Midhirst
(Property owner: P & A Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist (Discharge source & site)

Grid Reference (NZTM) 1706952E-5652491N

*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. Flaring shall not occur on more than 15 days, cumulatively, per zone for each well (with a maximum of 4 zones per well), for up to 8 wells.
2. Flaring shall only occur in a flare pit or a thermal oxidiser that is located at or about NZTM 1706952E-5652491N. The flare pit shall be lined with impermeable material that prevents any liquid from leaking through its base or sidewalls.
3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 24 hours before the initial flaring of each zone being commenced. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
4. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to the occupants of all dwellings within 300 m of the wellsite of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.
5. No material shall be flared or incinerated, other than those derived from or entrained in the well stream.
6. To the greatest extent possible, all gas that is flared must first be treated by effective liquid and solid separation and recovery.
7. Only gaseous hydrocarbons originating from the well stream shall be combusted, except that if, for reasons beyond the control of the consent holder, effective separation cannot be achieved and combustion of liquid hydrocarbon is unavoidable, the consent holder shall reinstate effective separation as soon as possible and if separation cannot be achieved within 3 hours combustion must cease.
8. If liquid hydrocarbon is combusted in accordance with the exception provided for in condition 7 the consent holder shall prepare a report that details:
 - a) the reasons that separation could not be achieved;
 - b) the date and time that separation was lost and reinstated;
 - c) what was done to attempt to reinstate separation and, if it the attempt was unsuccessful the reasons why.

The report shall be provided to the Chief Executive, Taranaki Regional Council within 5 working days from the date of combustion of liquid hydrocarbon.

9. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare, including, but not limited to, having regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects (other than for the maintenance of a pilot flare flame).
10. The discharge shall not cause any objectionable or offensive odour or objectionable or offensive smoke at or beyond the boundary of the property where the wellsite is located.
11. The consent holder shall control all emissions of carbon monoxide, nitrogen dioxide, fine particles (PM₁₀) and sulphur dioxide to the atmosphere from the site, in order that the maximum ground level concentration of any of these contaminants arising from the exercise of this consent measured under ambient conditions does not exceed the relevant ambient air quality standard as set out in the Resource Management (National Environmental Standards for Air Quality Regulations, 2004) at or beyond the boundary of the property on which the wellsite is located.
12. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than those expressly provided for under special condition 11, in order that they do not individually or in combination with other contaminants cause a hazardous, noxious, dangerous, offensive or objectionable effect at or beyond the boundary of the property on which the wellsite is located.
13. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C₆ or higher number of compounds.
14. All permanent tanks used as hydrocarbon storage vessels, shall be fitted with vapour recovery systems.
15. The consent holder shall record and make available to the Chief Executive, Taranaki Regional Council upon request, a 'flaring log' that includes:
 - a) the date, time and duration of all flaring episodes;
 - b) the zone from which flaring occurred;
 - c) the volume of substances flared;
 - d) whether there was smoke at any time during the flaring episode and if there was, the time, duration and cause of each 'smoke event'.
16. This consent shall lapse on 31 March 2018, 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.

Consent 9489-1

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:
- a) during the month of June 2015 and/or June 2021; and/or
 - b) within 1 month of receiving a report provided in accordance with condition 8; for any of the following purposes:
 - i. dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or
 - ii. requiring the consent holder to adopt specific practices in order to achieve the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or
 - iii. to alter, add or delete limits on mass discharge quantities or ambient concentrations of any contaminant; and
 - iv. reducing emissions or environmental effects that may arise from any loss of separation.

Signed at Stratford on 30 April 2013

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date (Change): 30 April 2013

Commencement Date (Change): 30 April 2013 (Granted: 18 February 2013)

Conditions of Consent

Consent Granted: To discharge emissions to air associated with hydrocarbon producing wells at the York-A wellsite

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhurst
(Property owner: P & A Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist (Discharge source & site)

Grid Reference (NZTM) 1706952E-5652491N

*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. Other than in emergencies, the consent holder shall notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons (other than purge gas) is expected to occur for more than five minutes in duration. Notification shall be no less than 24 hours before the flaring commences. Notification shall include the consent number and be emailed to worknotification@trc.govt.nz.
2. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to the occupants of all dwellings within 300 metres of the wellsite, of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.
3. Flaring shall only occur in a flare pit or a thermal oxidiser that is located at or about NZTM 1706952E-5652491N. The flare pit shall be lined with impermeable material that prevents any liquid from leaking through its base or sidewalls.
4. No material shall be flared or incinerated, other than those derived from or entrained in the well stream.
5. To the greatest extent possible, all gas that is flared must first be treated by effective liquid and solid separation and recovery.
6. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare, including, but not limited to, having regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects (other than for the maintenance of a pilot flare flame).
7. The discharge shall not cause any objectionable or offensive odour or objectionable or offensive smoke at or beyond the boundary of the property where the wellsite is located.
8. All permanent tanks used as hydrocarbon storage vessels, shall be fitted with vapour recovery systems.
9. The consent holder shall control all emissions of carbon monoxide, nitrogen dioxide, fine particles (PM₁₀) and sulphur dioxide to the atmosphere from the site, in order that the maximum ground level concentration of any of these contaminants arising from the exercise of this consent measured under ambient conditions does not exceed the relevant ambient air quality standard as set out in the Resource Management (National Environmental Standards for Air Quality Regulations, 2004) at or beyond the boundary of the property on which the wellsite is located.

Consent 9488-1

10. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than those expressly provided for under special condition 9, in order that they do not individually or in combination with other contaminants cause a hazardous, noxious, dangerous, offensive or objectionable effect at or beyond the boundary of the property on which the wellsite is located.
11. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C₆ or higher number of compounds.
12. The consent holder shall record and make available to the Chief Executive, Taranaki Regional Council, a 'flaring log' that includes:
 - a) the date, time and duration of all flaring episodes;
 - b) the zone from which flaring occurred;
 - c) the volume of substances flared;
 - d) whether there was smoke at any time during the flaring episode and if there was, the time, duration and cause of each 'smoke event'.
13. This consent shall lapse on 31 March 2018, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for any of the following purposes:
 - a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or
 - b) requiring the consent holder to adopt specific practices in order to achieve the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; and/or
 - c) to alter, add or delete limits on mass discharge quantities or ambient concentrations of any contaminant.

Signed at Stratford on 30 April 2013

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date (Change): 2 May 2013

Commencement Date (Change): 2 May 2013 (Granted: 25 February 2013)

Conditions of Consent

Consent Granted: To install a box culvert in an unnamed tributary of the Manganui Stream, including the associated disturbance of the streambed

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhirst
(Property owner: PS & AJ Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist & Sec 298 Blk XIII Huiroa SD & Lot 2
DP 431337 (Site of structure)

Grid Reference (NZTM) 1706915E-5652141N

Catchment: Waitara

Tributary: Manganui

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

General condition

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

Special conditions

1. The consent authorises the placement of box culvert in the bed of the newly constructed channel of the unnamed tributary of the Manganui Stream, at approximate grid reference (NZTM) 1706915E-5652141N.
2. The culvert shall be constructed in accordance with the details provided in the following documents:
 - a. Stormwater Design Report for York-A, prepared by BTW Company Limited, referenced 12226-12/2012, and dated 20 December 2012;
 - b. Email for Amended Box culvert designs received 13 February 2013;
 - c. Plan View drawing, prepared by BTW Company Limited, referenced 12226-08, Rev B, Sheet 1 and dated 25 March 2013; and
 - d. Plan View- Culvert B drawing, prepared by BTW Company Limited, referenced 12226-08, Rev A, Sheet 5 and dated 25 March 2013.

In the case of any contradiction between the drawing(s) and the conditions of this consent, the conditions of this consent shall prevail.

3. The culvert dimensions shall be 4 x 4 metre wide x 2 metre high x 2.4 metre long, with precast headwall and wingwall structures and cast insitu concrete apron at the inlet and outlet.
4. The fill over the top of the box culvert shall be no deeper than 3 metres and shall be stabilised with appropriate retaining and deemed by a suitably qualified engineer to prevent erosion.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing as soon as practicable, two working days prior to the commencement of work. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
6. The gradient of the culvert shall be installed at a gradient that reflects the proposed upstream-downstream gradient of the realigned section of stream channel.
7. The consent holder shall ensure that:
 - a. Rock rip rap armouring (which replaces wingwalls) is provided as shown in the Plan View- Culvert B drawing prepared by BTW Company Limited, referenced 12226-08, Revision A, Sheet 5 and dated 25 March 2013;
 - b. Geotextile fabric is laid against the culvert fill and stream banks prior to rock rip rap armouring; and
 - c. Lay flat" socks are installed at the discharge points of surface water.

Consent 9494-1

8. The consent holder shall ensure that the grading of the rock rip rap is of the following specification:
 - a. 100% less than 900 mm diameter;
 - b. 50% greater than 700 mm diameter; and
 - c. 90% greater than 400 mm diameter.
9. The rock rip rap armouring of the wetted stream bed both upstream and downstream of the concrete aprons shown in the drawing prepared by BTW Company Limited, referenced 12226-08, Revision A, Sheet 5 and dated 25 March 2013, shall be a minimum of 200 mm higher than the culvert invert and shall follow the natural gradient of the stream bed.
10. On completion of works, the consent holder shall ensure that the bank batter slope matches the existing batter slopes.
11. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.
12. The exercise of this consent shall not restrict fish passage.
13. The consent holder shall take all reasonable steps to:
 - a. minimise the amount of sediment discharged to the stream;
 - b. minimise the amount of sediment that becomes suspended in the stream; and
 - c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region*, by the Taranaki Regional Council, will achieve compliance with this condition.

14. All earthwork areas shall be stabilised as soon as is practicable immediately following the completion of soil disturbance activity.

Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

15. The culvert and rip rap structures shall remain the responsibility of the consent holder and be maintained so that:
 - a. the culvert does not become blocked and at all times allows the free flow of water through it;
 - b. the rock rip rap structure continues to function effectively for the purpose they were designed; and
 - c. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.

Consent 9494-1

16. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisation, or consent, have been obtained.
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 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 2 May 2013

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date (Change): 2 May 2013

Commencement Date (Change): 2 May 2013 (Granted: 25 February 2013)

Conditions of Consent

Consent Granted: To install a culvert in an unnamed tributary of the Manganui Stream, including the realignment of a section of the stream and associated disturbance of the streambed and reclamation

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhurst
(Property owner: PS & AJ Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist & Sec 298 Blk XIII Huiroa SD & Lot 2
DP 431337 (Site of structure)

Grid Reference (NZTM) Between 1706968E-5652062N and 1706938E-5651994N

Catchment: Waitara

Tributary: Manganui

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

General condition

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

Special conditions

1. The consent authorises the:
 - a. placement of the culvert in the bed of the newly constructed channel of the unnamed tributary of the Manganui Stream, between grid references (NZTM) 1706938E-5651994N and 1706968E-5652062N; and
 - b. permanent diversion of the full stream flow, the laying of pipe in the streambed and subsequently filling the reach through a constructed channel, and the reclamation of the stream channel between grid references (NZTM) 1706938E-5651994N and 1706968E-5652062N.
2. The culvert shall be constructed in accordance with the details provided in the:
 - a. Stormwater Design Report for York-A wellsite, prepared by BTW Company Limited, referenced 12226-12/2012, and dated 20 December 2012;
 - b. Plan View drawing, prepared by BTW Company Limited, referenced 12226-08, Rev B, Sheet 1 and dated 25 March 2013; and
 - c. Plan View- Culvert C drawing, prepared by BTW Company Limited, referenced 12226-08, Revision B, Sheet 4 and dated 25 March 2013.

In the case of any contradiction between the drawing(s) and the conditions of this consent, the conditions of this consent shall prevail.

3. The culvert pipe shall:
 - a. be no more than 75 metres; and
 - b. have a diameter no less than 1200 mm, with precast headwall and wingwall structures at its inlet and outlet.
4. The fill over the top of the culvert shall be no deeper than 7 metres.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing as soon as practicable, two working days prior to the commencement of work. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
6. The gradient of the culvert shall be installed at a gradient that reflects the proposed upstream-downstream gradient of the realigned section of stream channel.

7. Rock rip rap armouring shall be provided as shown in the Plan View- Culvert C drawing prepared by BTW Company Limited, referenced 12226-08, Revision B, Sheet 4 and dated 25 March 2013.
8. The consent holder shall ensure that the grading of the rock rip rap is of the following specification:
 - a. 100% less than 750 mm diameter;
 - b. 50% greater than 550 mm diameter; and
 - c. 90% greater than 300 mm diameter.
9. The rock rip rap armouring of the wetted stream bed shall be a minimum of 250 mm higher than the culvert invert and follow the natural gradient of the stream bed.
10. The invert of the culvert shall be set below the existing streambed by at least 20% of the culvert diameter so that it fills with bed material and simulates the natural bed.
11. The consent holder shall ensure that rock baffles are fixed to the invert of the culvert at distances no greater than 2.5 metres apart.
12. On completion of works, the consent holder shall ensure that the bank batter slope shall have a slope no steeper than 1 horizontal to 1 vertical. This condition does not apply to the bank slopes of the unaltered stream bed.
13. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.
14. The exercise of this consent shall not restrict fish passage.
15. The consent holder shall take all reasonable steps to:
 - a. minimise the amount of sediment discharged to the stream;
 - b. minimise the amount of sediment that becomes suspended in the stream; and
 - c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region*, by the Taranaki Regional Council, will achieve compliance with this condition.

16. All earthwork areas shall be stabilised as soon as is practicable immediately following the completion of soil disturbance activity.

Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

Consent 9493-1

17. The culvert and rip rap structures shall remain the responsibility of the consent holder and be maintained so that:
 - a. the culvert does not become blocked and at all times allows the free flow of water through it;
 - b. the rock rip rap structure continues to function effectively for the purpose they were designed; and
 - c. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.

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

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 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 2 May 2013

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date: 9 May 2013

Commencement Date: 9 May 2013

Conditions of Consent

Consent Granted: To install a culvert in an unnamed tributary of the Waipuku Stream, including associated streambed disturbance and reclamation

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhirst

Legal Description: Pt Sec 247 Moa Dist XIII Huiroa SD (Site of structure)

Grid Reference (NZTM) 1706862E-5652349N

Catchment: Waitara

Tributary: Manganui
Waipuku

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

General condition

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

Special conditions

1. The culvert shall be constructed in accordance with the details provided in the following documents:

- a. Drawing number 12226-08, Rev B, Sheet 1, dated 25 March 2013;
- b. Drawing number 12226-08, Rev A, Sheet 6, dated 25 March 2013; and
- c. Engineer's Stormwater Design Report for York-A wellsite, prepared by BTW Company Limited, referenced 12226 - 12/2012 and dated 12 December 2012.

In the case of any contradiction between the drawing(s) and the conditions of this consent, the conditions of this consent shall prevail.

2. The culvert shall be no longer than 15 metres.
3. The consent holder shall install wingwalls, headwalls and apron at the outlet and inlet of the culvert.
4. The fill over the top of each culvert shall be no deeper than 1.5 metres.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of the outstanding works. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
6. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site
7. The final slope of the channel banks shall be no steeper than 1 horizontal to 1 vertical.
8. The invert of the culvert shall be set below the existing streambed by at least 20% of the culvert diameter so that it fills with bed material and simulates the natural bed.
9. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.
10. The exercise of this consent shall not restrict fish passage.
11. The consent holder shall take all reasonable steps to:
 - a. minimise the amount of sediment discharged to the stream;
 - b. minimise the amount of sediment that becomes suspended in the stream; and
 - c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region*, by the Taranaki Regional Council, will achieve compliance with this condition.

12. All earthwork areas shall be stabilised as soon as is practicable immediately following the completion of soil disturbance activity.

Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

13. The culvert structure shall remain the responsibility of the consent holder and be maintained so that:
- a. the culvert does not become blocked and at all times allows the free flow of water through them; and
 - b. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.
14. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisation, or consent, have been obtained.
15. This consent shall lapse on 30 June 2018, 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.
16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 9 May 2013

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date: 9 May 2013

Commencement Date: 9 May 2013

Conditions of Consent

Consent Granted: To install a culvert in an unnamed tributary of the Manganui Stream, including associated streambed disturbance and reclamation

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhirst

Legal Description: Pt Sec 247 Moa Dist Blk XIII Huiroa SD (Site of structure)

Grid Reference (NZTM) 1707011E-5651769N

Catchment: Waitara

Tributary: Manganui

*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.

Special conditions

1. The culvert shall be constructed in accordance with the details provided in the following documents:

- a. Drawing number 12226-08, Rev B, Sheet 1, dated 25 March 2013;
- b. Drawing number 12226-08, Rev A, Sheet 2, dated 25 March 2013; and
- c. Engineer's Stormwater Design Report for York-A wellsite, prepared by BTW Company Limited, referenced 12226 - 12/2012 and dated 12 December 2012.

In the case of any contradiction between the drawing(s) and the conditions of this consent, the conditions of this consent shall prevail.

2. The culvert shall be no longer than 22.5 metres.
3. The consent holder shall install wingwalls, headwalls and apron at the outlet and inlet of the culvert.
4. The fill over the top of each culvert shall be no deeper than 4 metres.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of the outstanding works. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
6. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site
7. The final slope of the channel banks shall be no steeper than 1 horizontal to 1 vertical.
8. The invert of the culvert shall be set below the existing streambed by at least 20% of the culvert diameter so that it fills with bed material and simulates the natural bed.
9. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.
10. The exercise of this consent shall not restrict fish passage.
11. The consent holder shall take all reasonable steps to:
 - a. minimise the amount of sediment discharged to the stream;
 - b. minimise the amount of sediment that becomes suspended in the stream; and
 - c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region*, by the Taranaki Regional Council, will achieve compliance with this condition.

12. All earthwork areas shall be stabilised as soon as is practicable immediately following the completion of soil disturbance activity.

Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

13. The culvert structure shall remain the responsibility of the consent holder and be maintained so that:
- a. the culvert does not become blocked and at all times allows the free flow of water through them; and
 - b. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.
14. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisation, or consent, have been obtained.
15. This consent shall lapse on 30 June 2018, 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.
16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 9 May 2013

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date: 9 May 2013

Commencement Date: 9 May 2013

Conditions of Consent

Consent Granted: To install a culvert in an unnamed tributary of the Manganui Stream, including associated streambed disturbance and reclamation

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhirst

Legal Description: Pt Sec 247 Moa Dist Blk XIII Huiroa SD (Site of structure)

Grid Reference (NZTM) 1706984E-5651873N

Catchment: Waitara

Tributary: Manganui

*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.

Special conditions

1. The culvert shall be constructed in accordance with the details provided in the following documents:
 - a. Drawing number 12226-08, Rev B, Sheet 1, dated 25 March 2013;
 - b. Drawing number 12226-08, Rev A, Sheet 3, dated 25 March 2013; and
 - c. Engineer's Stormwater Design Report for York-A wellsite, prepared by BTW Company Limited, referenced 12226 - 12/2012 and dated 12 December 2012.

In the case of any contradiction between the drawing(s) and the conditions of this consent, the conditions of this consent shall prevail.

2. The culvert shall be no longer than 17.5 metres.
3. The consent holder shall the erosion protection measures detailed in Drawing number 12226-08, Rev A, Sheet 3 and dated 25 March 2013.
4. The fill over the top of each culvert shall be no deeper than 3 metres.
5. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of the outstanding works. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.
6. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site
7. The final slope of the channel banks shall be no steeper than 1 horizontal to 1 vertical.
8. The invert of the culvert shall be set below the existing streambed by at least 20% of the culvert diameter so that it fills with bed material and simulates the natural bed.
9. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.
10. The exercise of this consent shall not restrict fish passage.
11. The consent holder shall take all reasonable steps to:
 - a. minimise the amount of sediment discharged to the stream;
 - b. minimise the amount of sediment that becomes suspended in the stream; and
 - c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with *Guidelines for Earthworks in the Taranaki region*, by the Taranaki Regional Council, will achieve compliance with this condition.

Consent 9567-1

12. All earthwork areas shall be stabilised as soon as is practicable immediately following the completion of soil disturbance activity.

Note: For the purpose of this condition "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an Investigating Officer, Taranaki Regional Council, an 80% vegetative cover has been established.

13. The culvert structure shall remain the responsibility of the consent holder and be maintained so that:
 - a. the culvert does not become blocked and at all times allows the free flow of water through them; and
 - b. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.
14. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisation, or consent, have been obtained.
15. This consent shall lapse on 30 June 2018, 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.
16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 9 May 2013

For and on behalf of
Taranaki Regional Council

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: Greymouth Petroleum Limited
P O Box 3394
NEW PLYMOUTH 4341

Decision Date (Change): 29 May 2013

Commencement Date 29 May 2013 (Granted: 15 February 2013)
(Change):

Conditions of Consent

Consent Granted: To discharge treated stormwater, treated produced water and surplus drilling water from hydrocarbon exploration and production operations at the York-A wellsite onto and into land where it will enter an unnamed tributary of the Manganui Stream

Expiry Date: 1 June 2027

Review Date(s): June 2015, June 2021

Site Location: York-A wellsite, 149 York Road, Midhirst
(Property owner: P & A Uhlenberg)

Legal Description: Pt Sec 247 Moa Dist (Discharge source & site)

Grid Reference (NZTM) 1706991E-5652448N

Catchment: Waitara

Tributary: Manganui

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

General condition

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.
2. Stormwater discharged shall be collected from a catchment area of no more than 14,000 m².
3. All discharges from the site, including from any containment pit or flare pit, shall flow to a perimeter drain and skimmer pit. Perimeter drains shall be designed, including by having a positive grade and low permeability, to ensure that runoff flows directly to the skimmer pit without ponding.
4. All skimmer pits and any other stormwater retention areas shall be lined with an impervious material to prevent seepage through the bed and sidewalls, and all skimmer pits shall have a valve that can be shut off to prevent any discharge from the site.
5. Skimmer pits shall have a combined capacity of no less than 295 m³, and be designed to retain any hydrocarbons that enter them.
6. Constituents in the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
total recoverable hydrocarbons	Concentration not greater than 15 gm ⁻³ [as determined by infrared spectroscopic technique]
chloride	Concentration not greater than 50 gm ⁻³

7. After allowing for a mixing zone of 25 metres, the discharge shall not give rise to an increase in the temperature of the receiving waters of more than 2 degrees Celsius.

Consent 9486-1

8. After allowing for a mixing zone of 25 metres, the discharge shall not give rise to any of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) the rendering of fresh water unsuitable for consumption by farm animals;
 - e) any significant adverse effects on aquatic life.
9. At least 5 working days prior, the consent holder shall advise the Chief Executive, Taranaki Regional Council of the date of each of the following events:
 - a) commencement of any site works; and
 - b) commencement of any well drilling operation.

If either of these events is rescheduled or delayed, the consent holder shall immediately provide further notice advising of the new date.

Any advice given in accordance with this condition shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

10. The consent holder shall maintain a contingency plan that, to the satisfaction of the Chief Executive, Taranaki Regional Council, details measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge. The contingency plan shall be provided to the Taranaki Regional Council prior to discharging from the site.
11. Subject the other conditions of this consent the design, management and maintenance of the stormwater system shall be undertaken in accordance with the information submitted in support of the consent application 7334 and in particular, the:
 - a) Assessment of environmental effects submitted with the application;
 - b) Stormwater management plan provided in Appendix F of the assessment of environmental effects; and
 - c) Stormwater pond design report for York-A wellsite provided, dated 20 December 2012.
12. The consent holder shall advise the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise adverse effects on stormwater quality. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

Consent 9486-1

13. This consent shall lapse on 31 March 2018, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 29 May 2013

For and on behalf of
Taranaki Regional Council

Director-Resource Management