Todd Petroleum Mining Company Ltd
Kapuni Production Station
Monitoring Programme
Annual Report
2017-2018

Technical Report 2018-74

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Executive summary

Todd Petroleum Mining Company Ltd (Todd Petroleum) operates the Kapuni Production Station located on Palmer Road in the Kapuni catchment during the period under review. This report for the period July 2017 to June 2018 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

Todd Petroleum holds four resource consents for the production station, which includes a total of 36 conditions setting out the requirements that the Company had to satisfy. The Company holds one consent to discharge stormwater into the Kapuni stream, one consent to discharge emissions into the air, and two consents relating to structures in the Kapuni Stream. Todd Petroleum also hold a further 26 resource consents for production activities at wellsites associated with the Kapuni Production Station.

During the monitoring period, Todd Petroleum Mining Company Ltd demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the year under review included five inspections, one biomonitoring survey of receiving waters, and two ambient air quality analyses.

Receiving water inspections showed that the site discharges were not causing any adverse effects in the Kapuni Stream. This was supported by the findings of the macroinvertebrate survey.

There were no adverse effects on the environment resulting from the exercise of the air discharge consents. The ambient air quality monitoring at the Kapuni Production Station showed that levels of carbon monoxide, combustible gases, PM_{10} particulates and nitrogen oxides were all below levels of concern at the time of sampling. No offensive or objectionable odours were detected beyond the boundaries during inspections and there were no complaints in relation to air emissions from the sites.

During the period under review, Todd Petroleum demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents. There were no unauthorised incidents recorded by the Council in relation to Todd Petroleum's activities. The Kapuni Production Station was well managed and maintained.

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

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

This report includes recommendations for the 2018-2019 year.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2017 to June 2018 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Todd Petroleum Mining Company Ltd (Todd Petroleum). Todd Petroleum operates the Kapuni Production Station situated on Palmer Road, Kapuni, together with its associated wellsites. Management of these facilities was transferred to Todd Petroleum from Shell Taranaki Ltd on 1 August 2017.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Todd Petroleum that relate to discharges of water within the Kapuni catchment, structures in the Kapuni Stream, and emissions to air from the production station site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 28th combined annual report by the Council for the Kapuni Production Station.

1.1.2 Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by Todd Petroleum in the Kapuni 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 Kapuni Production Station.

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

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

Section 4 presents recommendations to be implemented in the 2018-2019 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
b. physical effects on the locality, including landscape, amenity and visual effects;
c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and

e. risks to the neighbourhood or environment.

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

1.1.4 Evaluation of environmental and administrative performance

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

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

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

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

Environmental Performance

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

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

For example:

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

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

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

Administrative performance

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

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

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

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

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

1.2 Process description

The Kapuni Production Station is located approximately in the middle of the Kapuni gas field, and adjacent to the Vector Gas Ltd facility called the Kapuni Gas Treatment Plant (KGTP). Exploration of the Kapuni Field began in 1959, and production began at Kapuni in 1969.

The function of the Kapuni Production Station is to gather the gas and condensate from the wellsites. The gas is delivered to KGTP for processing. The condensate gathered at the production station is treated and stabilised for storage and export to the Paritutu Tank Farm.

Three flares operate continuous pilots, which burn as yellow flames and are visible at night. The Kapuni Stream separates two of the flares from the remainder of the Kapuni Production Station site. The flares are linked to the main site by high and low pressure piping systems carried on a single span girder bridge with vehicular access via a ford through the Kapuni Stream. The flares are surrounded by farmland and the nearest dwelling is more than 300 m from the flare stacks. The other flare is located in the north eastern corner of the site.

Photo 1 Kapuni Production Station

1.3 Resource consents

The Company holds four resource consents relating to the Kapuni Production Station, the details of which are summarised in Table 1 and outlined in sections 1.3.1 to 1.3.3.

Table 1 Resource consents relating to the Kapuni Production Station

Consent number	Purpose	Granted	Review	Expires
0633-3	To discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream.	August 2011	June 2023	June 2029
4054-6	To discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station	November 2017	June 2023	June 2035
5960-1	To erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes.	February 2002	-	June 2023
9555-1	To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber	April 2013	June 2023	June 2029

1.3.1 Water discharge permit

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.

Todd Petroleum holds water discharge permit **0633-3** to discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream. The latest renewal was issued by the Council on 1 August 2011 under Section 87(e) of the RMA. It was transferred to Todd Petroleum Mining Company Ltd on 1 August 2017 and is due to expire on 1 June 2029.

There are 8 special conditions attached to this consent.

Condition 1 requires the consent holder to apply the best practicable option for preventing or minimising environmental effects when exercising the consent.

Conditions 2 and 3 prescribe the size of the stormwater catchment and the controls that must be applied to stormwater.

Conditions 4 and 5 impose limits on contaminants in the discharge, and stipulate that the discharge shall not cause any significant adverse effect on the freshwater biological communities or the water quality of the Kapuni Stream.

Condition 6 requires a contingency plan to be maintained which outlines measures and procedures to prevent spillage or accidental discharge and measures to remedy or mitigate the effects of an accidental spillage or discharge.

Condition 7 makes it clear that any significant plant changes must be evaluated for potential implications for the consent, and condition 8 is the review provision.

The permit is attached to this report in Appendix I.

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

1.3.2 Air discharge permit

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.

Todd Petroleum holds air discharge permit **4054-6** to discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station. The latest renewal was issued by the Council on 16 November 2017. The consent expired on 1 June 2017 and the consent holder continued to operate under the expired consent while a new consent was processed. Consent 4054-6 was granted to Todd Petroleum Mining Company Ltd on 16 November 2017 under Section 87(e) of the RMA.

There are 14 special conditions attached to this consent.

Condition 1 requires the consent holder to adopt the best practicable option to prevent or minimise adverse environmental effects.

Conditions 2 to 5 relate to recording and submitting information, including the maintenance of a flare log, supplying monthly flaring information, provision of an annual air report and records for smoke emitting incidents.

Conditions 6, 7 and 8 deal with information and notification relating to analysis of a typical gas stream, alterations to equipment, processes or operations and notification of prolonged flaring.

Conditions 9 to 12 relate to preventing and minimising emissions and require that the discharge shall not give rise to offensive or obnoxious or objectionable odour or dust or smoke at or beyond the site boundary and that the discharge of contaminants is controlled.

Conditions 13 and 14 deal with lapse and review of the consent.

The permit is attached to this report in Appendix I.

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

1.3.3 Land use permits

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

Todd Petroleum holds consent **5960-1** to erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes. The consent was issued on 13 February 2002. It was transferred to Todd Petroleum Mining Company Ltd on 1 August 2017 and is due to expire on 1 June 2023.

There are 8 special conditions attached to this consent.

Condition 1 requires initial construction and any maintenance to only be undertaken between 1 November and 30 April.

Conditions 2 and 3 relate to notification of the Council before undertaking works, and constructing and maintaining the structure in accordance with documentation submitted for the application.

Conditions 4 and 5 require the consent holder to observe every practicable measure to prevent discharges, and to minimise disturbance of the streambed.

Condition 6 stipulates that the structure shall not obstruct fish passage.

Condition 7 requires the structure to be removed and the area reinstated if the structure is no longer required.

Condition 8 provides for review of the consent.

Todd Petroleum holds consent **9555-1** to disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber. The consent was issued on 16 April 2013. It was transferred to Todd Petroleum Mining Company Ltd on 1 August 2017 and is due to expire on 1 June 2029.

There are 7 special conditions attached to this consent.

Condition 1 requires notification to the Council before undertaking works.

Conditions 2 and 3 require the adoption of the best practicable option to avoid or minimise effects on the stream bed and water quality.

Conditions 4 and 5 prohibit instream works between 1 May and 31 October and require that exercise of the consent shall not obstruct fish passage.

Conditions 6 and 7 are lapse and review provisions.

These permits are attached to this report in Appendix I.

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

1.3.4 Associated wellsites

Todd Petroleum also holds consents for production activities at wellsites associated with the Kapuni Production Station and these are summarised in Table 2.

Table 2 Resource consents for production activities at the Kapuni wellsites

Wellsite	Consent	Purpose	Issue Date	Expiry
KA-1/7/19/20	6200-2	To discharge treated stormwater from hydrocarbon exploration and production operations at the KA-1/7/19/20 wellsite onto and into land	17/11/2017	2035
	6646-1	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-1/7 wellsite	18/07/2005	2023
	6822-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-1/7 wellsite	21/03/2006	2023
KA-2	0611-3	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-2 wellsite	18/07/2005	2023
	3267-3	To discharge stormwater from the KA-2 wellsite into the Kapuni Stream	02/08/2011	2029
	6823-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-2 wellsite	21/03/2006	2023
KA-3	0610-3	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-3 wellsite	18/07/2005	2023
	3268-3	To discharge stormwater from the KA-3 wellsite into an unnamed tributary of the Inaha Stream	02/08/2011	2029
	6824-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-3 wellsite	21/03/2006	2023
KA-4/14	2365-3	To discharge stormwater from the KA-4/14 wellsite into an unnamed tributary of the Waiokura Stream	02/08/2011	2029
	6645-1	To take and use groundwater from a bore as a contingency backup supply for fire fighting, well killing, workover and domestic purposes at the KA-4/14 wellsite	18/07/2005	2023
	6825-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-4/14 wellsite	21/03/2006	2023
KA-5/10	6199-2	To discharge treated stormwater from hydrocarbon exploration and production operations at the KA-5/10 wellsite onto and into land	17/11/2017	2035
	6826-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-5/10 wellsite	21/03/2006	2023
KA-6/11/17	3266-3	To discharge stormwater from the KA-6/11/17 wellsite into an unnamed tributary of the Inaha Stream	02/08/2011	2029

Wellsite	Consent	Purpose	Issue Date	Expiry
KA-6/11/17	6827-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-6/11 wellsite	21/03/2006	2023
	7114-1	To discharge liquids onto and into land from a purpose built, blow down pit at the KA-6/11 wellsite	19/06/2007	2023
KA-8/12/15/18	3265-3	To discharge stormwater from the KA-8/12/15/18 wellsite into an unnamed tributary of the Inaha Stream	02/08/2011	2029
	6828-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-8/12/15 wellsite	21/03/2006	2023
	7113-1	To discharge liquids onto and into land from a purpose built, blow down pit at the KA-8/12/15 wellsite	19/06/2007	2023
KA-9	5871-2	To discharge treated stormwater from hydrocarbon exploration and production operations at the KA-9/16 wellsite onto and into land	17/11/2017	2035
	5874-2	To use a pipeline bridge over the Kapuni Stream	16/11/2017	2035
KA-13	1105-3	To discharge stormwater from the KA-13 wellsite into the Kapuni Stream	02/08/2011	2029
	6829-1	To discharge emissions into the air from well workovers and in emergency situations and miscellaneous emissions associated with production activities at the KA-13 wellsite	21/03/2006	2023
	7005-1	To discharge liquids onto and into land from a purpose built, blow down pit at the KA-13 wellsite	24/11/2006	2023
Various	6647-1	To take and use water from the Kapuni Stream for fire fighting, well killing and well workover purposes for emergency backup supply at various wellsites	27/09/2005	2023

1.4 Monitoring programme

1.4.1 Introduction

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

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

The monitoring programme for the Kapuni Production Station consisted of four primary components.

1.4.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;

- in discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

The Kapuni Production Station was visited five times during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Chemical sampling

Sampling of both the discharges from the site and the water quality upstream and downstream of the discharge point and mixing zone was scheduled to be carried out during the period under review, however this sampling was not completed during the monitoring period and will next be undertaken during the 2018-2019 year.

The Council undertook sampling of the ambient air quality outside the boundary of the site. A multi-gas meter was deployed on one occasion in the vicinity of the plant, with monitoring consisting of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). A PM_{10} particulate monitor was deployed concurrently with the multi-gas meter. Two nitrogen oxide measuring devices were also deployed in the vicinity of the plant on one occasion during the year under review. Todd Petroleum supplied data on flaring causes and flare volumes throughout the period.

1.4.5 Biomonitoring surveys

A biological survey was performed on one occasion in the Kapuni Stream, to determine whether or not the discharges of stormwater from the Kapuni Production Station were having a detrimental effect upon the communities of the stream.

2 Results

2.1 Water

2.1.1 Inspections

Five inspections were carried out at the Kapuni Production Station in the 2017-2018 period. Inspections were undertaken on 4 October and 8 November 2017, and 8 January, 26 March, and 30 April 2018. The site was found to be neat and tidy and well managed. Ring drains and bunds were secure and any discharges to the stream were clear.

2.1.2 Results of discharge monitoring

Stormwater at the Kapuni Production Station is treated using two oil-water separators. Stormwater captured beneath equipment and in bunded areas around storage facilities is directed to the first separator for initial treatment. It is then treated in a second separator prior to discharge to the Kapuni Stream. Stormwater from other areas, such as roads, is directed to the second separator. The location of the sampling site at the outlet of the second API separator (STW002014) is shown in Figure 1.

Chemical water quality sampling of the treated stormwater discharge from the production station was not undertaken during the 2017-2018 period. It will next be undertaken in 2018-2019.

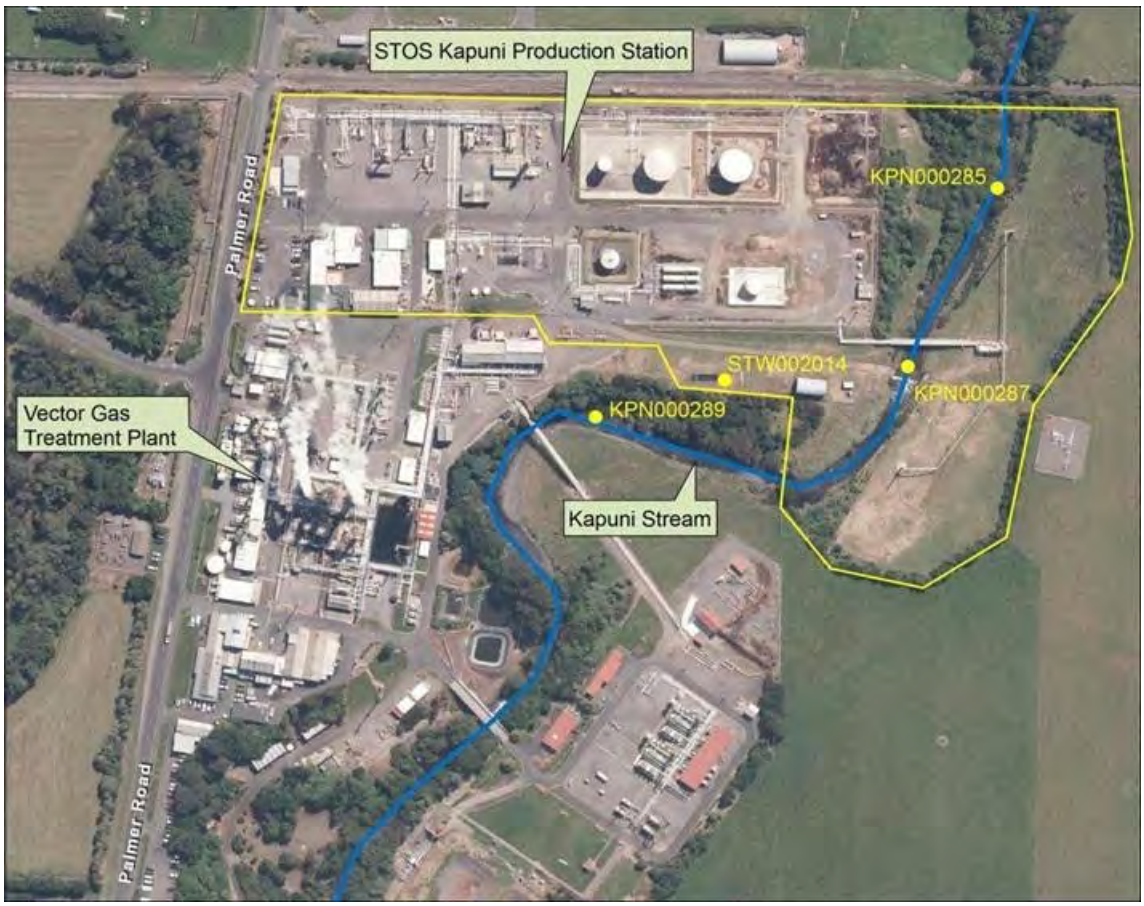

Figure 1 Kapuni Production Station and associated sampling sites

2.1.3 Results of receiving environment monitoring

2.1.3.1 Biomonitoring

The Council's standard 'kick-net' sampling technique was used at two sites on 20 March 2018 to collect streambed macroinvertebrates from the Kapuni Stream to assess whether stormwater discharges from the Kapuni Production Station had had any adverse effects on the macroinvertebrate communities of this stream. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

The March 2018 biological survey of the Kapuni Stream performed under moderate summer flow conditions indicated that stormwater discharges from the Kapuni Production Station had not had any recent significant impacts on the macroinvertebrate communities of the stream. The macroinvertebrate communities had moderate community richnesses and community composition did not vary significantly between the two sites. The MCI scores at both site 2 and 2b were significantly higher than historic medians and site 2 recorded the highest MCI to date. This is considered a reflection of the moderate flow that preceded this survey. The lack of significant changes in MCI scores between the two sites reflects the similar habitat present at both sites, with the lack of periphyton being an important factor. When gravel and cobble substrate supports little periphyton, the habitat is more suited to 'sensitive' taxa such as stoneflies, and was less suited to snails or midge larvae and was indicative of the absence of any recent impacts of any stormwater discharges from the Kapuni Production Station.

The full biomonitoring report is attached to this report in Appendix II.

2.1.4 Consented water abstractions

The fire water system at Kapuni Production Station draws water from the Kapuni Stream under consent 6647-1. This is recycled by the fire pumps to maintain system preparedness. Testing of the fire monitors and deluge cages on site is undertaken approximately weekly and monthly, respectively, resulting in a maximum abstraction rate of 125 m^3/day; within the consented limit of 165 m^3/day.

No water was abstracted under the remaining water take consents for the Kapuni sites during the period under review.

2.2 Air

2.2.1 Inspections

Air inspections were carried out in conjunction with site inspections as discussed in section 2.1.1 above. Air discharges were all found to be satisfactory, and no offensive, obnoxious or objectionable odours were noted during the inspections.

2.2.2 Results of receiving environment monitoring

2.2.2.1 Carbon monoxide and combustible gases

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 28 hours, with the instrument placed in a downwind position at the

start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases). The monitoring sites used in the year under review are shown in Figure 2.

Figure 2 Air monitoring sites at Kapuni Production Station for 2017-2018

Because of the nature of the activities on the site, it was considered that the primary information of interest in respect of gases potentially emitted from the site was the average downwind concentration, rather than any instantaneous peak value. That is, the long-term exposure levels, rather than short-term maxima, are of most interest. The gas meter was therefore set up to create a data set based on recording the average concentration measured during each minute as raw data. The details of the sample run are summarised in Table 3 and the data from the sample run are presented graphically in Figure 3.

The consent covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for carbon monoxide (which are based on health protection) are 30 mg/m^3 averaged over a one hour exposure and 10 mg/m^3 averaged over an eight hour exposure period. The maximum concentration of carbon monoxide found during the monitoring run was 2.2 mg/m^3 while the average concentration for the entire dataset was 0.46 mg/m^3 which comply with the Ministry for the Environment's air quality guidelines. This is consistent with the pattern found in previous years.

Table 3 Results of carbon monoxide and LEL monitoring at Kapuni Production Station

Period (from-to)		13 to 14 June 2018 (28 hours)
Max	CO(ppm)	1.90
	LEL(%)	0.20
Mean	CO(ppm)	0.40
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

Notes: (1) the instrument records in units of ppm. At 25°C and 1 atm, 1 ppm CO = 1.145 mg/m3
(2) because the LEL of methane is equivalent to a mixture of approximately 5% methane in air, then the actual concentration of methane in air can be obtained by dividing the percentage LEL by 20.

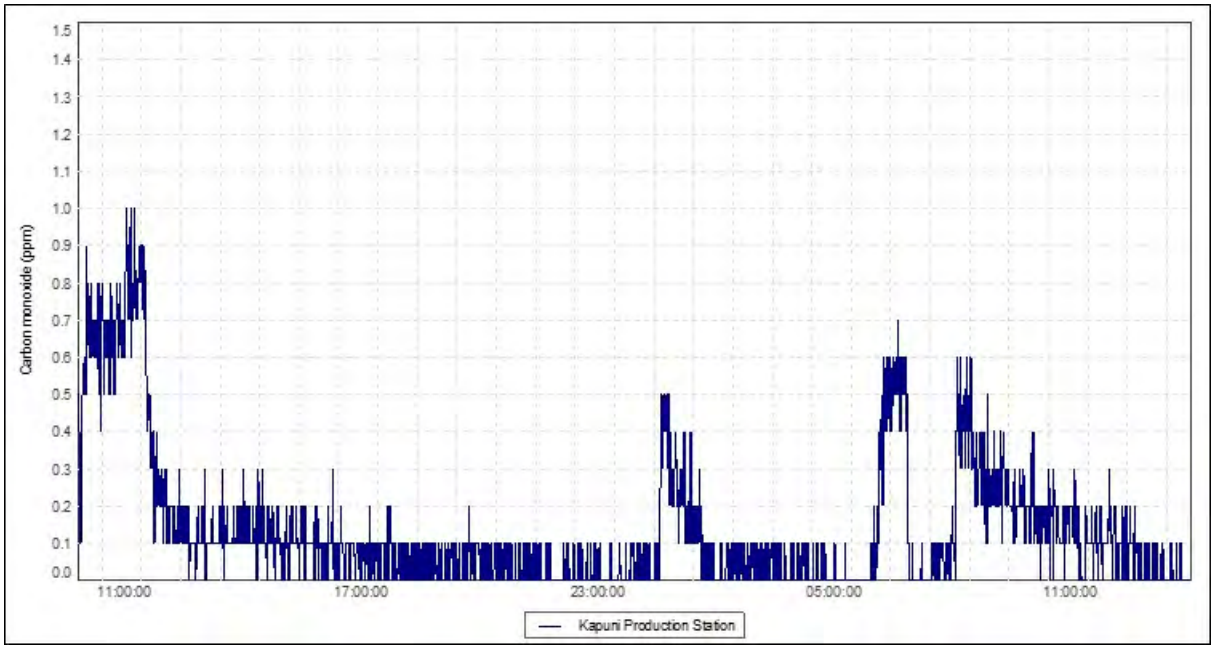

Figure 3 Ambient carbon monoxide levels in the vicinity of Kapuni Production Station

Lower Explosive Limit (LEL) gives the percentage of the lower explosive limit, expressed as methane that is detected in the air sampled. The sensor on the instrument reacts to gases and vapours such as acetone, benzene, butane, methane, propane, carbon monoxide, ethanol, and higher alkanes and alkenes, with varying degrees of sensitivity. The Council's Regional Air Quality Plan has a typical requirement that no discharge shall result in dangerous levels of airborne contaminants, including any risk of explosion. At no time did the level of explosive gases downwind of the Kapuni Production Station reach any more than a trivial level.

2.2.2.2 PM_{10} particulates

In September 2004 the Ministry for the Environment enacted National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM_{10} particulates is 50 µg/m^3 (24-hour average).

Particulates can be derived from many sources, including motor vehicles (particularly diesel), solid and oil-burning processes for industry and power generation, incineration and waste burning, photochemical processes, and natural sources such as pollen, abrasion, and sea spray.

PM_{10} particles are linked to adverse health effects that arise primarily from the ability of particles of this size to penetrate the defences of the human body and enter deep into the lungs, significantly reducing the exchange of gases across the lung walls. Health effects from inhaling PM_{10} include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases.

During the reporting period, a DustTrak PM_{10} monitor was deployed on one occasion in the vicinity of Kapuni Production Station. The deployment lasted approximately 28 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM_{10} concentrations. The location of the DustTrak monitor during the sampling run is shown in Figure 2. The results of the sample run are presented in Table 4 and Figure 4.

Table 4 Daily averages of PM_{10} results from monitoring at Kapuni Production Station

	13 to 14 June 2017 (28 hours)	
24 hr. set	Day 1 (start to 24 hours)	Day 2 (24 hours to end)
Daily average	9.1 µg/m³	N/A
NES	50µg/m³	

During the 28 hour run, from 13 to 14 June 2018, the average recorded PM_{10} concentration for the 24 hour period was 9.1 µg/m³. This daily average equates to 18% of the of the 50 µg/m³ value that is set by the NES. Background levels of PM_{10} in the region have been found to be typically around 11 µg/m³.

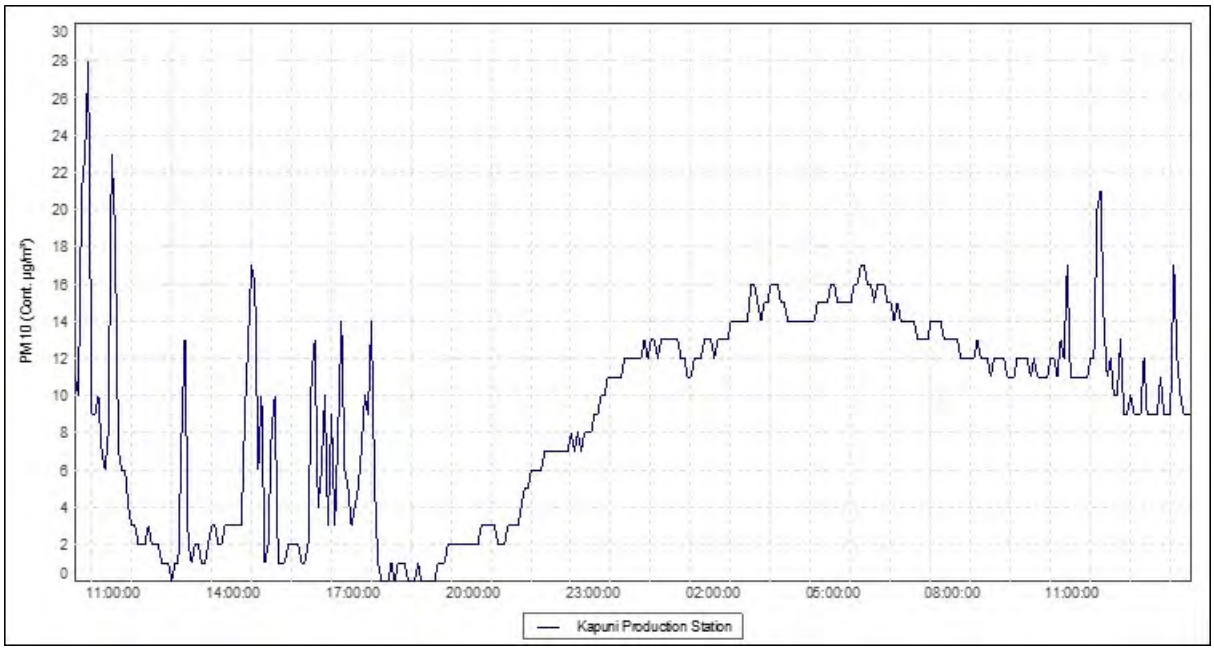

Figure 4 PM_{10} concentrations (µg/m³) at Kapuni Production Station

2.2.2.3 Nitrogen oxides

From 2014 onwards, the Council implemented a coordinated region-wide compliance monitoring programme to measure nitrogen oxides (NOx). The programme involves deploying measuring devices at 28 NOx monitoring sites (including two sites in the vicinity of Kapuni Production Station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

Consent 4054-5 covering air discharges from the Kapuni Production Station did not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for nitrogen dioxide are 200 µg/m³ for a one hour average or 100 µg/m³ for a 24 hour average exposure.

NOx passive adsorption discs were placed at two locations in the vicinity of the Kapuni Production Station on one occasion during the year under review. The discs were left in place for a period of 21 days. The calculated one hour and 24 hour theoretical maximum NOx concentrations found at Kapuni Production Station during the year under review equate to 13.4 µg/m³ and 7.1 µg/m³, respectively. The results show that the ambient ground level concentration of NOx is well below the limits set out by the Ministry for the Environment's air quality guidelines.

The full air monitoring reports are attached to this report in Appendix III.

2.2.3 Summary of flaring volumes reported by Todd Petroleum

Todd Petroleum provided the Council with an annual report on flaring and emissions during the 2017-2018 period, as required by consent 4054-6. A summary of flaring volumes at Kapuni Production Station is provided in Figure 5. The total volume flared in the 2017-2018 year was 262,100 m^3 of gas, which was a small increase compared to the amount of gas flared in the previous year (186,500 m^3).

Of the 99 flaring events reported in the period, 50 lasted for five minutes or more and 21 generated light smoke which was localised and dissipated quickly. The majority of events related to re-starting low pressure wells, plant trips or upsets, or planned maintenance. Planned Emergency Shutdowns occurred in February 2018 resulting in increased flaring during depressurisation of the plant. The increase in flaring in May 2018 was due to several compressor trips and a compressor shutdown for repair. The median duration of these events was five minutes. No complaints were received from the public regarding flaring at the production station.

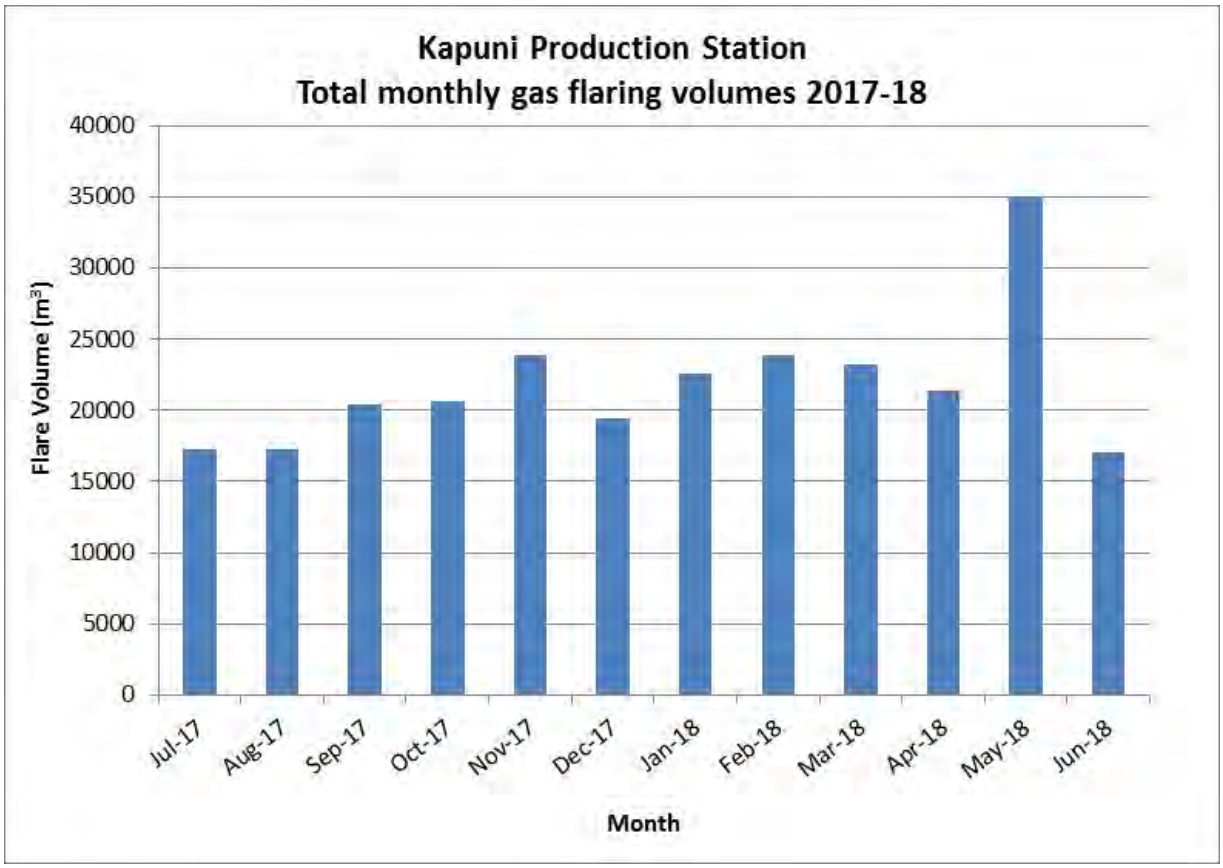

Figure 5 Monthly gas flaring for Kapuni Production Station under consent 4054-6

2.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the Company. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

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

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

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

3 Discussion

3.1 Discussion of site performance

Inspections of the Kapuni Production Station during the 2017-2018 year found that the site was well managed. All consent conditions relating to site operations and management were complied with.

3.2 Environmental effects of exercise of consents

Stormwater discharge inspections showed that discharges from the site complied with consent conditions. This was supported by the findings of the macroinvertebrate survey carried out in the stream.

There were no adverse effects on the environment resulting from the exercise of the air discharge consent. The ambient air quality monitoring at the site showed that levels of carbon monoxide, combustible gases, PM_{10} particulates and nitrogen oxides were all below levels of concern at the time of sampling. No offensive or objectionable odours were detected beyond the boundary during inspections and there were no complaints in relation to air emissions from the site.

3.3 Evaluation of performance

A summary of the consent holder's compliance record for the year under review is set out in Tables 5-8.

Table 5 Summary of performance for consent 0633-3

Purpose: ***To discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse effects	Site inspections and liaison with consent holder	Yes
2. Catchment area not to exceed 4 ha	Site inspections	Yes
3. Stormwater to be directed through a treatment system	Site inspections	Yes
4. Limit on the concentration of pH, suspended solids, hydrocarbons and chloride	Not assessed during period under reveiw	N/A
5. In-stream effects	Inspections, biomonitoring	Yes
6. Contingency plan	Plan reviewed and approved	Yes
7. Consent holder to notify Council of significant changes to processes or operations	Site inspections and liaison with consent holder	Yes
8. Review of consent	Next option for review in June 2023	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 6 Summary of performance for consent 4054-6

Purpose: *To discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable option to minimise adverse effects	Site inspections and liaison with consent holder	Yes
2. Maintenance of log of continuous flaring incidents	Information received	Yes
3. Provision of monthly flaring information	Information received	Yes
4. Provision of annual report on flaring to council	Report received	Yes
5. Record of smoke emitting events and complaints	Site inspections, records kept by consent holder, and liaison with consent holder	Yes
6. Provide analysis of typical gas stream on request	Not requested during period under review	N/A
7. Consultation with Council prior to significant alterations to plant, processes, or operations	Site inspections and liaison with consent holder	Yes
8. Notification of flaring more than five minutes in duration	Flaring notifications received	Yes
9. No offensive, obnoxious or objectionable odours, dust or smoke beyond site boundary	Site inspections	Yes
10. No discharge of hazardous, noxious or toxic contaminants beyond site boundary	Site inspections and air quality monitoring	Yes
11. Control levels of CO, NO_2, PM_{10} and SO_2 to comply with NES	Air quality monitoring	Yes
12. Control discharges to the atmosphere to comply with WES	Air quality monitoring	Yes
13. Lapse of consent	Consent exercised	N/A
14. Optional review provision re environmental effects, best practicable option or mass discharge quantities or ambient concentrations	Next option for review June 2023	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 7 Summary of performance for consent 5960-1

Purpose: *To erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Construction and maintenance only between 1 November and 30 April	Inspections. No maintenance undertaken during this monitoring period	N/A
2. Notify Council before undertaking construction and maintenance works	Inspections. No maintenance undertaken during this monitoring period	N/A
3. Constructed and maintained in accordance with application	Inspections. No maintenance undertaken during this monitoring period	N/A
4. During maintenance works observe measures to prevent discharge and minimise disturbance	Inspections. No maintenance undertaken during this monitoring period	N/A
5. Minimise disturbance and reinstate any disturbed areas	Inspections. No maintenance undertaken during this monitoring period	N/A
6. The structure shall not obstruct fish passage	Site inspection	Yes
7. Structures to be removed and area reinstated when no longer required	Structures still in use	N/A
8. Review of consent	No further provision for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 8 Summary of performance for Consent 9555-1

Purpose: *To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Notify Council before undertaking maintenance works	Notification received	Yes
2. Adopt best practicable option to avoid or minimise effects	Inspections, liaison with consent holder	Yes
3. Restrict area and volume of disturbance to a practicable minimum	Inspections, liaison with consent holder	Yes
4. No instream works between 1 May and 31 October	Maintenance carried out in February 2018	Yes

Purpose: *To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Exercise of consent shall not obstruct fish passage	Inspections, liaison with consent holder	Yes
6. Lapse of consent	Consent has been exercised	N/A
7. Review of consent	Next option for review in June 2023	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

Table 9 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2009-10	0633-2, 4054-5, 5120-1, 5960-1	4			
2010-11	0633-2, 4054-5, 5120-1, 5960-1	4			
2011-12	0633-2, 4054-5, 5960-1	3			
2012-14	0633-2, 4054-5, 5960-1,	3			
2014-15	0633-3, 4054-5, 5960-1, 9555-1	4			
2015-16	0633-3, 4054-5, 5960-1, 9555-1	4			
2016-17	0633-3, 4054-5, 5960-1, 9555-1	4			
Totals		26	0	0	0

During the year, Todd Petroleum demonstrated an overall high level of both environmental performance and administrative compliance with the resource consents as defined in Section 1.1.4. There were no unauthorised incidents recorded by the Council in relation to Todd Petroleum's activities. The Kapuni Production Station was well managed and maintained.

3.4 Recommendations from the 2016-2017 Annual Report

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

1. THAT in the first instance, monitoring of consented activities at the Kapuni Production Station in the 2017-2018 year continue at the same level as in 2016-2017.
2. THAT should there be issues with environmental or administrative performance in 2017-2018, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation one was implemented, while it was not considered necessary to undertake additional monitoring as per recommendation two.

3.5 Alterations to monitoring programmes for 2018-2019

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

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

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

It is proposed that for 2018-2019 monitoring of consented activities at Kapuni Production Station continue at a similar level to that of 2017-2018, with the addition of a one-off round of BTEX (benzene toluene, ethylbenzene and total xylenes) monitoring. This is in response to public concerns regarding benzene emissions from petroleum facilities, and this monitoring will be added to all petroleum industry compliance programmes in the 2018-2019 year.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2018-2019.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at Kapuni Production Station in the 2018-2019 year continue at a similar level as in 2017-2018, with the addition of a one-off round of BTEX monitoring.
2. THAT should there be issues with environmental or administrative performance in 2018-2019, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
BTEX	benzene toluene, ethylbenzene and total xylenes
Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
LEL	Lower Explosive Limit. The percentage of the lower explosive limit, expressed as methane, that is detected in the air sampled.
m^2	Square Metres.
mg/m^3	Milligrams per cubic metre.
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.
NES	National Environmental Standards
NOx	Nitrogen oxides.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The

	scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM_{10}	Relatively fine airborne particles (less than 10 micrometre diameter, respectively).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act 1991* and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
$\mu g/m^3$	Micrograms per cubic metre of air

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

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Appendix I

Resource consents held by Todd Petroleum Mining Company Ltd

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

Discharge Permit

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

Name of Consent Holder:	Todd Petroleum Mining Company Limited PO Box 802 New Plymouth 4340
Decision Date:	1 August 2011
Commencement Date:	1 August 2011

Conditions of Consent

Consent Granted:	To discharge treated stormwater from the Kapuni Production Station into the Kapuni Stream
Expiry Date:	1 June 2029
Review Date(s):	June 2023 and in accordance with special condition 8
Site Location:	Kapuni Production Station, Palmer Road, Kapuni
Grid Reference (NZTM)	1701051E-5629618N
Catchment:	Kapuni

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

General condition

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

Special conditions

1. The 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 adverse effects on the environment from the exercise of this consent.

2. The stormwater discharged shall be from a catchment area not exceeding four hectares.

3. All stormwater shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.

4. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
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}
chloride	Concentration not greater than 50 gm^{-3}

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the Kapuni Stream:

   a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
   b) any conspicuous change in the colour or visual clarity;
   c) any emission of objectionable odour;
   d) the rendering of fresh water unsuitable for consumption by farm animals;
   e) any significant adverse effects on aquatic life.

6. The consent holder shall maintain a contingency plan. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail 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.

7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site, that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act.

8. 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 2017 and/or June 2023; and/or
   b) within 3 months of receiving a notification under special condition 7 above;

   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.

Transferred at Stratford on 1 August 2017

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Todd Petroleum Mining Company Limited PO Box 802 New Plymouth 4340
Decision Date:	16 November 2017
Commencement Date:	16 November 2017

Conditions of Consent

Consent Granted:	To discharge emissions into the air from combustion involving flaring of petroleum products incidental to the treatment of gas at the Kapuni Production Station
Expiry Date:	1 June 2035
Review Date(s):	June 2023, June 2029
Site Location:	Kapuni Production Station, 318 Palmer Road, Kapuni
Grid Reference (NZTM)	1701129E-5629766N

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

Exercise of consent

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 effects on the environment associated with the discharge of contaminants into the environment arising from the emissions to air from the flare.

Recording and submitting information

2. The consent holder shall keep and maintain a log of all continuous flaring incidents lasting longer than 5 minutes and any intermittent flaring lasting for an aggregate of 10 minutes or longer in any 60-minute period. The log shall contain the date, the start and finish times, the quantity and type of material flared, and the reason for flaring. The log shall be made available to the Chief Executive, Taranaki Regional Council, upon request, and summarised annually in the report required under condition 4. Flaring, under normal operation in the low pressure flare, of rich mono-ethylene glycol degasser vapour, condensate tank vapours, non-condensibles from tri-ethylene glycol/mono-ethylene glycol regeneration and purge gas shall be excluded from this requirement.

3. The consent holder shall supply to the Taranaki Regional Council each month a copy of flaring information comprising: the type and amount of material flared (including any gas used to maintain a pilot flame), the date this was flared, the reason why flaring was undertaken, and an indication of whether smoke was produced from such flaring events.

4. The consent holder shall provide to the Taranaki Regional Council during August of each year, for the duration of this consent, a report:

    a) detailing gas combustion at the production station flare, including but not restricted to routine operational flaring and flaring logged in accordance with condition 2.
    b) detailing any measures that have been undertaken by the consent holder to improve the energy efficiency of the production station;
    c) detailing any measures to reduce smoke emissions;
    d) detailing any measures to reduce flaring,
    e) addressing any other issue relevant to the minimisation or mitigation of emissions from the production station flare; and
    f) detailing any complaints received and any measures undertaken to address complaints.

5. The consent holder shall keep and make available to the Chief Executive, Taranaki Regional Council, upon request, a record of all smoke emitting incidents, noting time, duration and cause. The consent holder shall also keep, and make available to the Chief Executive, upon request, a record of all complaints received as a result of the exercise of this consent.

Information and notification

6. The consent holder shall make available to the Chief Executive, Taranaki Regional Council upon request, an analysis of a typical gas and/or condensate stream from the Manutahi, Kauri and Tariki Formations, covering sulphur compound content and the content of compounds containing six or more carbon atoms in their molecular structure.

7. Prior to undertaking any alterations to the plant equipment, processes or operations, which may substantially alter the nature or quantity of flare emissions other than as described in the consent application, the consent holder shall first consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991.

8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, as soon as practicable, whenever the continuous flaring of hydrocarbons (other than the flaring of rich mono-ethylene glycol degasser vapour, condensate tank vapours, non-condensibles from tri-ethylene glycol/mono-ethylene glycol regeneration and purge gas) is expected to occur for more than five minutes in duration.

Preventing and minimising emissions

9. The discharges authorised by this consent shall not, whether alone or in conjunction with any other emissions from the site arising, give rise to any levels of odour or dust or smoke that are offensive or obnoxious or objectionable at or beyond the boundary of the site.

10. The consent holder shall not discharge any contaminant to air from the site at a rate or a quantity such that the contaminant, whether alone or in combination with other contaminants, is or is liable to be hazardous or toxic or noxious at or beyond the boundary of the site.

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 discharges to the atmosphere from the flare of contaminants, other than those addressed by the *Resource Management (National Environmental Standards for Air Quality) Regulations, 2004*, whether alone or in conjunction with any other emissions from the site, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent, measured at or beyond the boundary of the site, is not increased above background levels:

    a) by more than 1/30th of the relevant Workplace Exposure Standard-Time Weighted Average (exposure averaged over a duration as specified for the Workplace Exposure Standard-Time Weighted Average), or by more than 1/10th of the Workplace Exposure Standard-Short Term Exposure Limit over any short period of time (all terms as defined in Workplace Exposure Standards, 2002, Department of Labour); or

b) if no Short Term Exposure Limit is set, by more than the General Excursion Limit at any time (all terms as defined in Workplace Exposure Standards, 2002, Department of Labour or any subsequent reviews).

Advice Note:
In exercising this consent the consent holder must also comply with any discharge standard required by Regulations. At the time of issuing this consent the 'Resource Management (National Environmental Standards for Air Quality) Regulations, 2004' set limits on discharge of carbon monoxide, nitrogen dioxide, fine particles (PM_{10}) and sulphur dioxide.

Lapse

13. This consent shall lapse on 31 December 2022, 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.

Review

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 2023 and/or June 2029, for the purposes of:

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 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 discharge or ambient concentrations of any contaminant or contaminants.

Signed at Stratford on 16 November 2017

For and on behalf of
Taranaki Regional Council

A D McLay
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:	Todd Petroleum Mining Company Limited PO Box 802 New Plymouth 4340
Decision Date:	13 February 2002
Commencement Date:	13 February 2002

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a concrete ford on the bed of the Kapuni Stream for access purposes
Expiry Date:	1 June 2023
Site Location:	318 Palmer Road, Kapuni
Grid Reference (NZTM)	1701240E-5629760N
Catchment:	Kapuni

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

General conditions

a) That on receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) That unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

1. The initial construction and any further disturbance of parts of the riverbed covered by water and/or any works which may result in downstream discolouration of water shall be undertaken only between 1 November and 30 April, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

2. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to the commencement and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water.

3. The structure(s) authorised by this consent shall be constructed generally in accordance with the documentation submitted in support of the application and shall be maintained to ensure the conditions of this consent are met.

4. The consent holder shall adopt the best practicable option to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.

5. The consent holder shall ensure that the area and volume of riverbed disturbance shall, so far as is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.

6. The structure which is the subject of this consent shall not obstruct fish passage.

7. The structure(s) authorised by this consent shall be removed and the area reinstated, if and when the structure(s) are no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to structure(s) removal and reinstatement.

8. 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 2005, June 2011, and June 2017, for the purpose of ensuring that the conditions adequately deal with the environmental effects 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.

Transferred at Stratford on 1 August 2017

For and on behalf of
Taranaki Regional Council

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A D McLay
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:	Todd Petroleum Mining Company Limited PO Box 802 New Plymouth 4340
Decision Date:	16 April 2013
Commencement Date:	16 April 2013

Conditions of Consent

Consent Granted:	To disturb the bed of the Kapuni Stream for the purpose of undertaking maintenance work on the fire water intake chamber
Expiry Date:	1 June 2029
Review Date(s):	June 2023
Site Location:	Kapuni Production Station, 318 Palmer Road, Kapuni
Grid Reference (NZTM)	1701162E-5629698N
Catchment:	Kapuni

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

General condition

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

Special conditions

1. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours 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.

2. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of sediments or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.

3. The consent holder shall ensure that the area and volume of stream bed disturbance is restricted to a practicable minimum.

4. No instream works shall take place between 1 May and 31 October inclusive.

5. The exercise of this consent shall not restrict the passage of fish.

6. 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.

7. 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 2017 and/or June 2023 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.

Transferred at Stratford on 1 August 2017

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Appendix II

Biomonitoring report

To	Job Manager, C MacKenzie
From	Environmental Scientist, B Thomas
Report No	BT083
Document No	2171429
Date	5 December 2018

Biomonitoring of the Kapuni Stream in relation to the Kapuni Production Station of Shell Todd Oil Services Ltd, March 2018

Introduction

This biological survey of two sites in the Kapuni Stream was conducted to monitor effects related to the discharge of stormwater from the Kapuni Production Station. The survey fulfilled the biological monitoring requirements for this industry in the 2017-2018 monitoring year. Results from surveys performed since the 2000-2001 monitoring year are discussed in reports referenced in this report.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from two established sites in the Kapuni Stream related to the Kapuni Production Station stormwater discharge (Table 1, Figure 1) on 20 March 2018. This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Table 1 Biomonitoring sites in the Kapuni Stream, related to the Kapuni Production Station

Site No.	Site Code	Map Reference	Location
2	KPN000285	Q20: 112914	Upstream of Kapuni Production Station
2b	KPN000289	Q20: 111914	50 metres downstream of Production Station discharge

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al. 2001).). Macroinvertebrate taxa found in each sample were recorded based on the abundance categories in Table 2.

Table 2 Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	>499

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most `tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. By averaging the scores obtained from a list of taxa taken from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained.

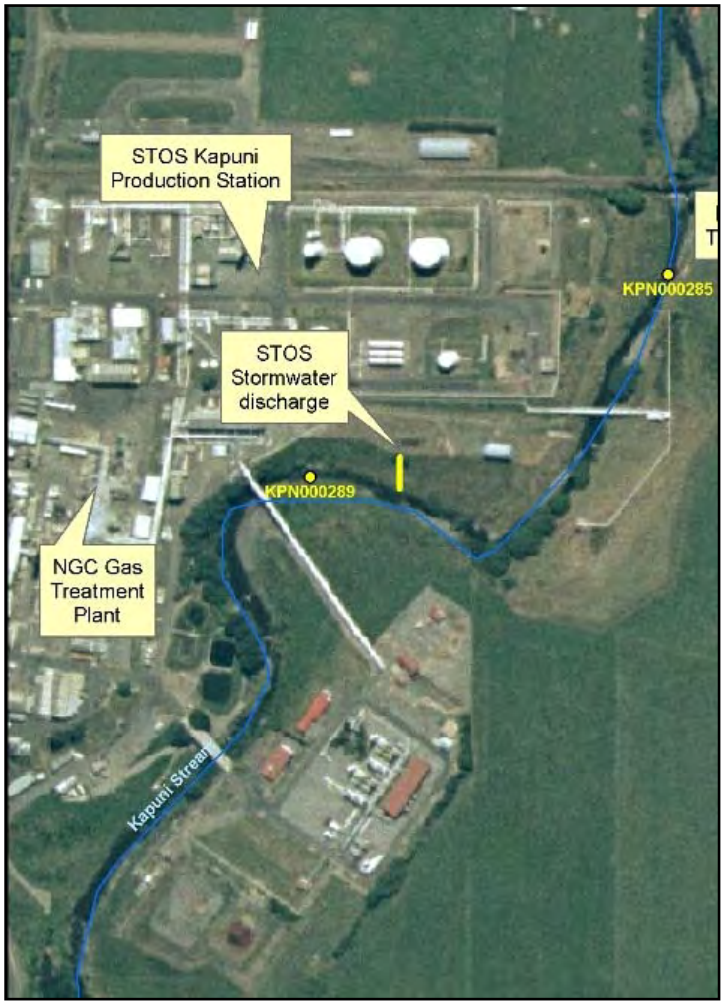

Figure 1 Biomonitoring sites in the Kapuni Stream related to the Kapuni Production Station

The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. Communities that are more 'sensitive' inhabit less polluted waterways.

A semi-quantitative MCI value ($SQMCI_S$) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the $SQMCI_S$ is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower.

Results

At the time of this midday survey, there was a clear, uncoloured, swift and moderate flow in the Kapuni Stream and the water temperature ranged from 15.5 °C at site 2 to 15.7 °C at site 2b. The bed of the stream predominantly comprised cobble and gravel with some boulder also recorded. Only thin films of periphyton

were present at both sites. Partial shading was noted at site 2b and no shading was observed at site 2. This survey was performed during late summer following a moderate flow period, 10 days after a fresh in excess of three times and 12 days after a fresh in excess of seven times median flows.

Macroinvertebrate communities

Previous biological surveys in the Kapuni Stream have generally recorded macroinvertebrate communities that would be expected in clean, mid reaches of Taranaki ring plain streams. The communities have had moderate to relatively good numbers of taxa and relatively high MCI values. The results of previous surveys are summarised in Table 3 together with current results and are illustrated in Figure 2 and Figure 3. The results for site 2b also include results from the long-term monitoring programme performed by Cawthron Institute/Stark Environmental for other consented discharges. The full macroinvertebrate results of this survey are presented in Table 3.

Table 3 Numbers of taxa and MCI values recorded in previous surveys in the Kapuni Stream in relation to the Kapuni Production Station since May 1987, together with current results.

Site no.	Site	Number of previous surveys	Numbers of taxa			MCI values		
			Median	Range	Current Survey	Median	Range	Current Survey
2	KPN000285	27	23	18-33	15	107	94-132	133
2b	KPN000289	120	18	9-35	19	116	90-145	128

Site 2 Upstream of Kapuni Production Station

A moderately low richness of fifteen taxa was recorded at site 2, upstream of the Kapuni Production Station; eight taxa less than the median found by 27 previous surveys (Table 3), and the lowest taxa richness recorded at this site to date (Figure 2). Four 'highly sensitive' taxa were present, with the community characterised by one of these 'highly sensitive' taxa (mayfly (*Deleatidium*)).

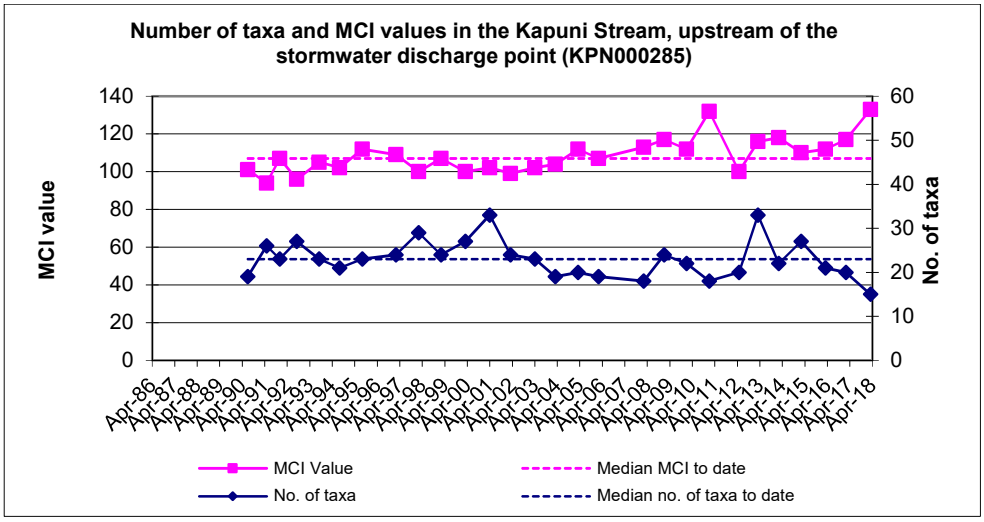

Figure 2 Number of taxa and MCI values in the Kapuni Stream upstream of STOS discharge

Table 4 Macroinvertebrate fauna of the Kapuni River re STOS Kapuni Production Station sampled on 20 March 2018

Taxa List	Site Number	MCI score	Site 2	Site 2b
	Site Code		KPN000285	KPN000289
	Sample Number		FWB18167	FWB18168
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	C	R
	Coloburiscus	7	C	A
	Deleatidium	8	XA	XA
	Nesameletus	9	C	C
	Zephlebia group	7	-	R
COLEOPTERA (BEETLES)	Elmidae	6	C	A
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	R	C
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	C	A
	Costachorema	7	R	R
	Hydrobiosis	5	C	C
	Plectrocnemia	8	-	R
	Psilochorema	6	R	-
	Beraeoptera	8	C	C
	Olinga	9	R	R
	Pycnocentria	7	R	R
	Pycnocentrodes	5	C	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	C	C
	Eriopterini	5	-	R
	Limonia	6	-	R
	Orthocladiinae	2	-	R
		No of taxa	15	19
		MCI	133	128
		SQMCIs	7.8	7.7
		EPT (taxa)	12	13
		%EPT (taxa)	80	68
'Tolerant' taxa	'Moderately sensitive' taxa		'Highly sensitive' taxa	

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

The high proportion of 'sensitive' taxa (93% of taxa numbers) comprising the community was reflected in the MCI score of 133 units. This was the highest MCI score recorded at this site to date and significantly (Stark, 1998) higher than that recorded in the previous survey. It was also 26 units higher than the median of all past survey scores (Figure 2 and Table 3). This is similar to the trend observed in 2011, when this site recorded an MCI score well above the median score. In addition, the score was significantly (Stark, 1998) higher than the predicted score for this site (99 units), 18.1 km downstream of the National Park boundary (Stark and Fowles, 2009). Overall, this is a higher than expected MCI score. An excellent (Stark & Maxted, 2007) $SQMCI_S$ score (7.8 units) reflected the relative dominance of 'highly sensitive' taxa in the community at this site.

Site 2b 50 m downstream of Kapuni Production Station discharge

A slightly higher richness (19 taxa) was recorded at site 2b, a further 300m downstream and 50 m below the production station stormwater discharge. This richness was one taxon above the median found by the long term record of 120 previous surveys at this site and one taxon less than that recorded by the previous (Council) survey at this site (Table 3 and Figure 3). There was one 'highly sensitive' taxon, and 12 'moderately sensitive' taxa present, indicative of good preceding physicochemical water quality. The community was characterised by one 'highly sensitive' taxon (extremely abundant *Deleatidium*), two 'moderately sensitive' taxa (elmid beetles, and mayfly (*Coloburiscus*)) and one 'tolerant' taxon (abundant net-spinning caddisfly (*Hydropsyche-Aoteapsyche*)).

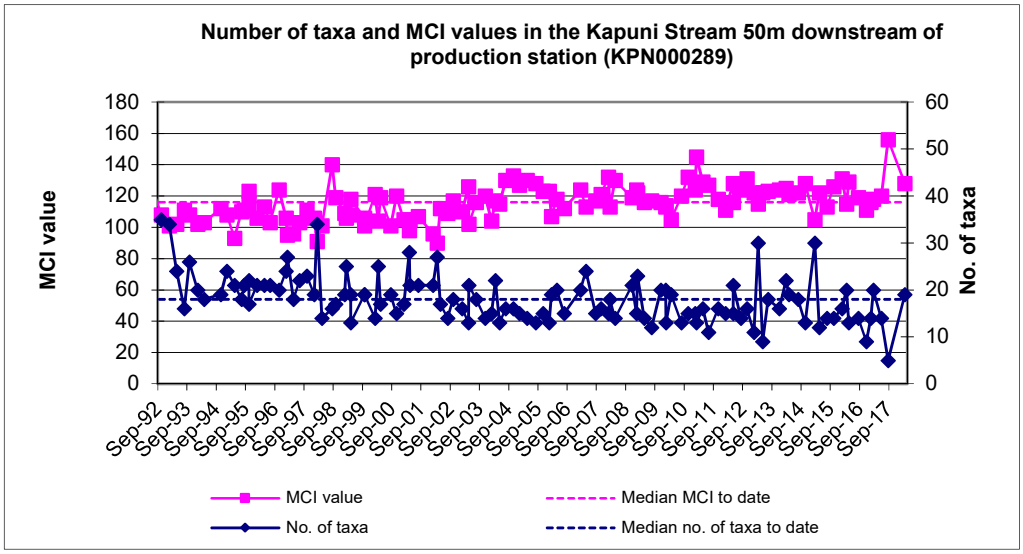

Figure 3 Number of taxa and MCI values in the Kapuni Stream 50m d/s of the Kapuni production station discharge.

There were no significant changes in individual taxa abundance recorded between sites. Generally, the dominant taxa at the two sites were very similar, which was reflected in the $SQMCI_S$ scores (7.8 and 7.7 $SQMCI_S$ units respectively) (Table 3 and Table 3). Similarly, the MCI score (128) was only five units lower than recorded at site 2 (Stark, 1998), which was not a statistically significant difference. However, this MCI score was significantly (Stark, 1998) higher than the median for this site (by 12 MCI units) (Figure 3). The similarity in index scores with that recorded upstream reflects the similar habitat present at both sites, with the lack of periphyton being an important factor. When gravel and cobble substrate supports little periphyton, the habitat is more suited to 'sensitive' taxa such as stoneflies, and was less suited to snails or midge larvae.

Summary and Conclusions

The Council's standard 'kick-net' sampling technique was used at two sites to collect streambed macroinvertebrates from the Kapuni Stream to assess whether stormwater discharges from the STOS Kapuni Production Station have had any adverse effects on the macroinvertebrate communities of this stream. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This March 2018 biological survey of the Kapuni Stream performed under moderate summer flow conditions indicated that stormwater discharges from the Kapuni Production Station had not had any recent significant impacts on the macroinvertebrate communities of the stream. The macroinvertebrate communities had moderately low community richnesses and community composition did not vary significantly between the two sites. A seven times median fresh occurred 12 days prior to the current survey and may provide a possible explanation to the moderately low taxa richnesses recorded at both sites. The MCI scores at both site 2 and 2b were significantly higher than historic medians and site 2 recorded the highest MCI to date. The lack of significant changes in MCI scores between the two sites reflects the similar habitat present at both sites, with the lack of periphyton being an important factor. When gravel and cobble substrate supports little periphyton, the habitat is more suited to 'sensitive' taxa such as stoneflies, and was less suited to snails or midge larvae and was indicative of the absence of any recent impacts of any stormwater discharges from the Kapuni Production Station.

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Appendix III

Air monitoring report

To	Job Manager, Callum MacKenzie
From	Environmental Scientist - Air Quality, Brian (Vladislav) Cheyne
File	2116073
Date	September 03, 2018

Ambient Gas (PM10, NOx, CO and LEL) Monitoring at Kapuni Production Stations during 2017-2018 monitoring year

Introduction

In January 2018 and June 2018 as part of the compliance monitoring programme for the Kapuni production station, a survey of ambient air quality sampling was carried out by the Taranaki Regional Council (the Council) in the vicinity of the plant. The main objectives were to measure:

- The concentrations of PM10 using a portable data logging TSI 'DustTrak';
- To measure the concentrations of the nitrogen oxides (NOx) using a passive sampling method, that gives a result for average exposure;
- And to measure carbon monoxide (CO) using a portable multi gas meter that provides instantaneous data throughout the monitoring period.

The findings of this study are presented in this memorandum, together with the locations of the monitoring sites which are provided in Figure 1.

Carbon monoxide (CO) and Lower explosive limit (LEL)

During the monitoring year, a multi-gas meter was deployed on one occasion in the vicinity of the plant. The deployment lasted approximately 28 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continuous measurements of gas concentrations for the gases of interest (carbon monoxide and combustible gases).

Because of the nature of the activities on the site, it was considered that the primary information of interest in respect of gases potentially emitted from the site was the average downwind concentration, rather than any instantaneous peak value. That is, the long-term exposure levels, rather than short-term maxima, are of most interest. The gas meter was therefore set up to create a data set based on recording the average concentration measured during each minute as raw data.

Figure 1 Air monitoring sites at Kapuni production station (2017-2018)

The details of the sample run are summarised in Table 1 and the data from the sample run are presented graphically in Figure 2**.**

The consent 4054-5 covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for carbon monoxide (which are based on health protection) are 30 mg/m^3 averaged over a 1 hour exposure and 10mg/m^3 averaged over an 8 hour exposure period. The maximum concentration of carbon monoxide found during the monitoring run was 2.2 mg/m^3 with average concentration for the entire dataset was only 0.46 mg/m^3 which comply with the Ministry for the Environment's air quality guidelines. This is in line with the pattern found in previous years.

Table 1 Results of carbon monoxide and LEL monitoring at Kapuni production station

Period (from-to)		13/06/2018 10:24 to 14/06/2018 14:36
Max	CO(ppm)	1.90
	LEL(%)	0.20
Mean	CO(ppm)	0.40
	LEL(%)	0.00
Min	CO(ppm)	0.00
	LEL(%)	0.00

Note: (1) the instrument records in units of ppm. At 25°C, 1 atm.

1ppm CO = 1.145 mg/m^3

(2) See text for explanation of LEL. Because the LEL of methane is equivalent to a mixture of approximately 5% methane in air, then the actual concentration of methane in air can be obtained by dividing the percentage LEL by 20.

LEL gives the percentage of the lower explosive limit, expressed as methane that is detected in the air sampled. The sensor on the instrument reacts to gases and vapours such as acetone, benzene, butane, methane, propane, carbon monoxide, ethanol, and higher alkanes and alkenes, with varying degrees of sensitivity. The Council's Regional Air Quality Plan has a typical requirement that no discharge shall result in dangerous levels of airborne contaminants, including any risk of explosion. At no time did the level of explosive gases downwind of the Kapuni production station reach any more than a trivial level.

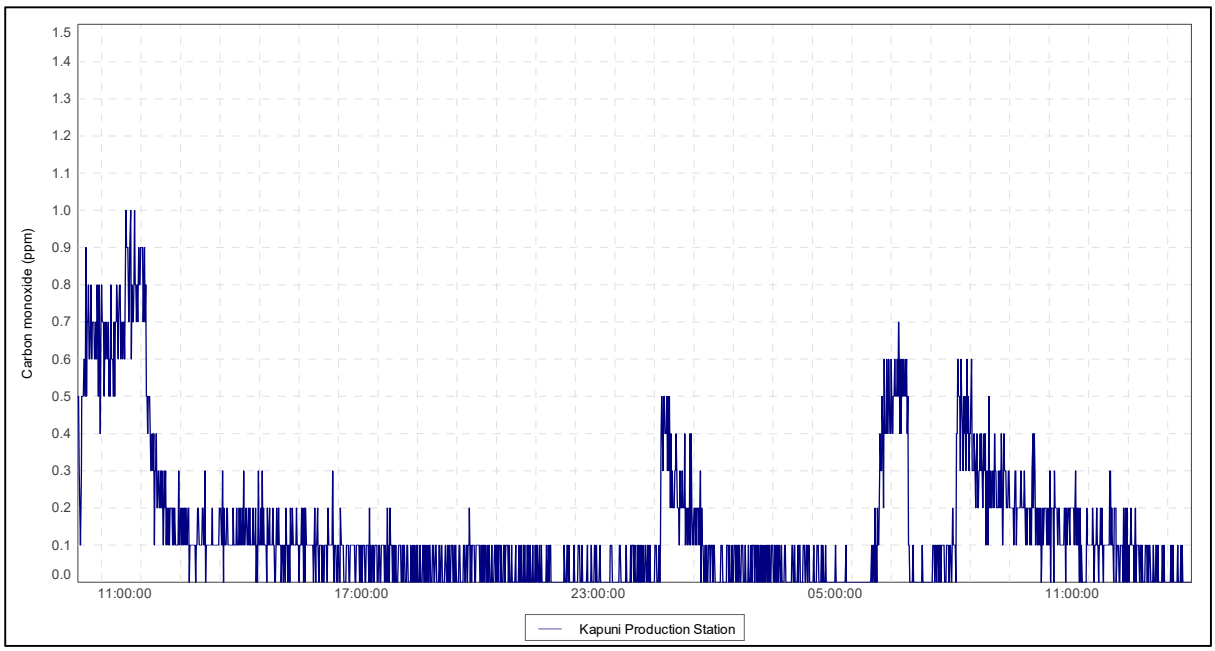

Figure 2 Graph of ambient CO levels in the vicinity of the Kapuni Production Station (2017-18)

PM10

In September 2004 the Ministry for the Environment made public National Environmental Standards (NESs) relating to certain air pollutants. The NES for PM10 is 50 µg/m^3 (24-hour average).

Particulates can be derived from many sources, including motor vehicles (particularly diesel), solid and oil-burning processes for industry and power generation, incineration and waste burning, photochemical processes, and natural sources such as pollen, abrasion, and sea spray.

PM10 particles are linked to adverse health effects that arise primarily from the ability of particles of this size to penetrate the defences of the human body and enter deep into the lungs significantly reducing the exchange of gases across the lung walls. Health effects from inhaling PM10 include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases.

During the reporting period, a "DustTrak" PM10 monitor was deployed on one occasion in the vicinity of the Kapuni production station. The deployment lasted approximately 28 hours, with the instrument placed in a down-wind position at the start of the deployment. Monitoring consisted of continual measurements of PM10 concentrations. The location of the "DustTrak" monitor during the sampling run is shown in Figure 1.

The details of the sample run are presented in Figure 3 and Table 2.

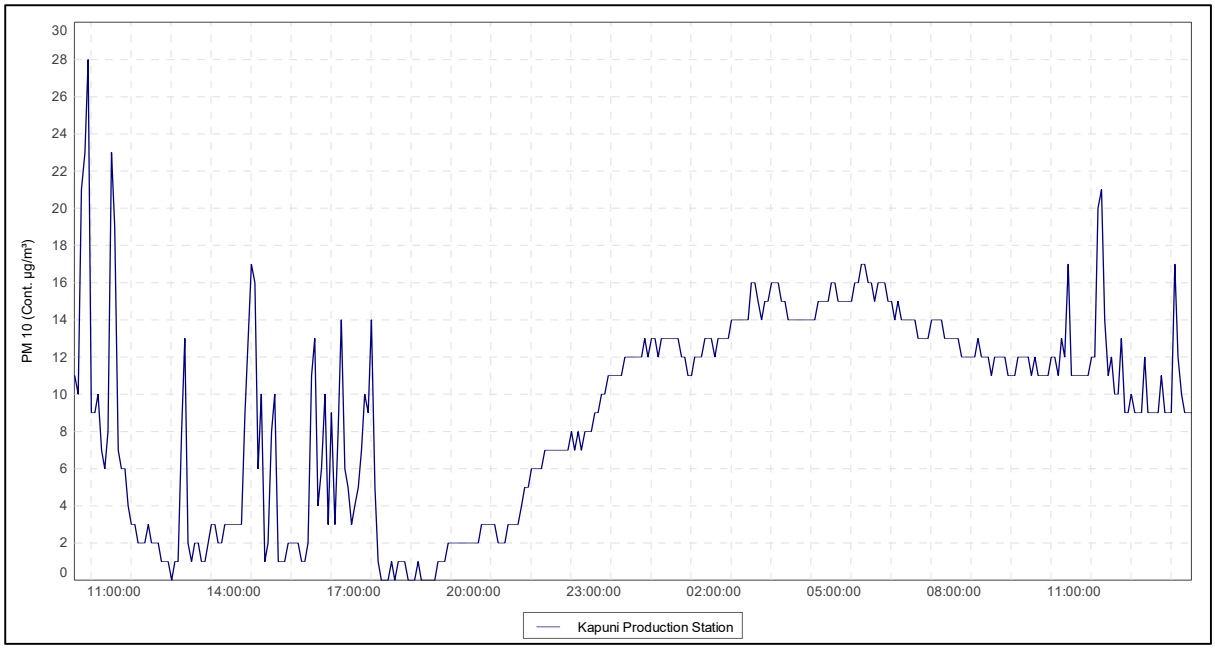

Figure 2 PM10 concentrations (µg/m³) at the Kapuni production station (2017-18)

Table 1 Daily mean of PM10 results during monitoring at Kapuni production station (2017-18)

	(28 hours) (13-14/06/2018)	
24 hr. set	Day 1 (Start to 24 hrs)	Day 2 (24 hrs to end)
Daily average	9.1 µg/m³	N/A
NES	50µg/m³	

During the 28-hour run, from 13th of June to 14th of June 2018, the average recorded PM_{10} concentration for the 24 hour period was 9.1µg/m³. These daily mean equate to 18.2% of the 50 µg/m³ value that is set by the National Environmental Standard.

Background levels of PM_{10} in the region have been found to be typically around 11 µg/m³.

Nitrogen oxides (NOx)

From 2014 onwards, the Council has implemented a coordinated region-wide compliance monitoring programme to measure NOx. The programme involves deploying all measuring devices at 30 NOx monitoring sites (including two sites in the vicinity of the Kapuni production station) on the same day, with retrieval three weeks later. This approach assists the Council in further evaluating the effects of local and regional emission sources and ambient air quality in the region.

The complete report covering region-wide NOx monitoring is attached to this memorandum (TRC #2089257).

The consent 4054-5 covering air discharges from the Kapuni Production Station does not have specific limits related to particular gases. The Ministry for the Environment's air quality guidelines for nitrogen dioxide are 100 µg/m³ for a 24 hour average or 200 µg/m³ for a one hour average exposure.

NOx passive adsorption discs were place at two locations in the vicinity of the Kapuni production station on one occasion during the year under review. The discs were left in place for a period of 21 days.

The calculated 1-hour and 24-hour theoretical maximum NOx concentrations found at the Kapuni production station during the year under review equates to 13.4 µg/m³ and 7.1 µg/m³ respectively. The results show that the ambient ground level concentration of NO_x is well below the limits set out by the Ministry for the Environment's air quality guidelines.