Contact Energy Limited
Stratford Power Station (TCC1 & SP1)
and Ahuroa Gas Storage
Monitoring Programme
Biennial Report
2012-2014

Technical Report 2014-71

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Executive summary

Contact Energy Limited operates the Stratford Power Station located on State Highway 43 near Stratford in the Patea catchment, and the associated underground Ahuroa Gas Storage facility located 7.5 km away in the Waitara catchment. The Company holds resource consents that provide for the power station, gas storage and connecting pipeline. The consents allow it to abstract water from the Patea River and Kahouri Stream, to discharge to the Patea River and the Kahouri and other streams, and onto and into land, to provide for several structures across streams, and to discharge emissions into the air.

This report describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance, and the results and environmental effects of the Company's activities.

For the power station, the report covers the two-year period July 2012-June 2014, which included the fifteenth and sixteenth years of its operation. For the gas storage and pipeline, this is the first monitoring report, covering the three-year period July 2011- June 2014, during which the storage facility was extended (2011) and the pipeline (2013) was constructed.

For Stratford Power Station, the Company holds a total of 28 resource consents, which include a total of 240 conditions setting out the requirements that the Company must satisfy. These consents provide for three gas-fired plants, including a combined-cycle plant, a smaller, open-cycle peaking plant, and a yet-to-be-built plant similar to either of the existing plants.

The Council's annual monitoring programmes for the two years under review together included ten site inspections, 24 water samples collected for physico-chemical analysis, and six bio-monitoring surveys of receiving waters. Water abstraction, wastewater discharge, and air emission monitoring results were provided by the Company to the Council. There was ongoing consultation between the Council and Contact Energy Limited staff.

The monitoring showed that the power station continued to be well managed and any environmental impacts were negligible. There was one minor incident, when an effluent pipeline developed a small leak, which was addressed satisfactorily.

During the two years, the Company demonstrated a high level of environmental performance and compliance with the resource consents that provide for Stratford Power Station. The Company has achieved a high level of performance throughout the station's sixteen years of operation.

For Ahuroa Gas Storage, the Company holds a total of 10 resource consents, which include a total of 134 conditions setting out the requirements that the Company must satisfy. For the pipeline, a total of 17 resource consents are held, with a total of 170 conditions.

The Council's annual monitoring programmes for the three years under review together included 10 inspections and 4 stormwater samples collected for physico-chemical analysis at the gas storage site, and 5 inspections during construction and testing of the pipeline. Gas injection and air emission monitoring results were provided by the Company to the Council. There was ongoing consultation between the Council and Contact Energy Limited staff.

During the three years, the Company demonstrated a high level of environmental performance and compliance with the resource consents that provide for construction and operation of Ahuroa Gas Storage and the pipeline connecting it to Stratford Power Station.

For reference, in the 2012-2013 year, 35% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 59% demonstrated a good level of environmental performance and compliance with their consents. In the 2013-2014 year, 60% of consent holders achieved a high level of environmental performance and compliance with their consents, while another 29% demonstrated a good level of environmental performance and compliance.

This report includes recommendations for the 2014-2015 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 the combined annual reports for the periods July 2012-June 2013 and July 2013-June 2014 by the Taranaki Regional Council on the monitoring programme associated with resource consents held by Contact Energy Limited (Contact Energy) to provide for two gas-fired power plants at Stratford Power Station, situated on East Road (State Highway 43) near Stratford, in the Patea catchment.

This report is also the combined annual reports for the periods July 2011-June 2012, July 2012-June 2013 and July 2013-June 2014 by the Council on the monitoring programme associated with resource consents held by Contact Energy to provide for an associated underground gas storage reservoir, situated on Barleymans Road at Ahuroa, in the Waitara catchment, and the pipeline that connects the storage and power station.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Contact Energy Limited that relate to abstractions and discharges of water within the Patea and Waitara catchments, and the air discharge permits held by Contact Energy Limited to cover emissions to air from the power station and storage sites.

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 Taranaki Regional Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of Contact Energy use of water, land, and air, and is the fifteenth and sixteenth (combined} annual report by the Taranaki Regional Council for the Company.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the RMA and the Council's obligations and general approach to monitoring sites through annual programmes.

Section 2 sets out the resource consents held by Contact Energy Limited to allow operation of Stratford Power Station (SPS) in the Patea 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 power station site. It presents the results of monitoring in relation to SPS during the period under review, including scientific and technical data. It also discusses the results, their interpretation and their significance for the environment, and makes recommendations.

Section 3 sets out the resource consents held by Contact Energy Limited to provide for Ahuroa Gas Storage (AGS) facility in the Waitara catchment and the associated gas pipelines for supply of the facility and SPS, the nature of the monitoring

programme in place for the period under review, and a description of the activities and operations conducted at AGS site. It presents the results of monitoring in relation to AGS and the pipeline during the period under review, including scientific and technical data. It also discusses the results, their interpretation and their significance for the environment, and makes recommendations.

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

1.1.3 The Resource Management Act 1991 and monitoring

The *Resource Management Act 1991* (RMA) primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

(a) the neighbourhood or the wider community around a discharger, and may include cultural and socio-economic effects;
(b) physical effects on the locality, including landscape, amenity and visual effects;
(c) ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
(d) natural and physical resources having special significance (eg, recreational, cultural, or aesthetic);
(e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Taranaki Regional Council is recognising the comprehensive meaning of `effects' 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 performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continuously assess its own performance in resource management as well as that of resource users particularly consent holders. It further enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental performance

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

- A **high** level of environmental performance and compliance indicates that essentially there were no adverse environmental effects to be concerned about, and no, or inconsequential non-compliance with conditions.

- A **good** level of environmental performance and compliance indicates that adverse environmental effects of activities during the monitoring period were negligible or minor at most, or, the Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices, or, there were perhaps some items noted on inspection notices for attention but these items were not urgent nor critical, and follow-up inspections showed they have been dealt with, and inconsequential non-compliances with conditions were resolved positively, co-operatively, and quickly.
- **Improvement required (environmental)** or **improvement required (administrative compliance)** (as appropriate) indicates that the Council may have been obliged to record a verified unauthorised incident involving measureable environmental impacts, and/or, there were measureable environmental effects arising from activities and intervention by Council staff was required and there were matters that required urgent intervention, took some time to resolve, or remained unresolved at the end of the period under review, and/or there were ongoing issues around meeting resource consent conditions even in the absence of environmental effects. Abatement notices may have been issued.
- **Poor performance (environmental)** or **poor performance (administrative compliance)** indicates generally that the Council was obliged to record a verified unauthorised incident involving significant environmental impacts, or there were material failings to comply with resource consent conditions that required significant intervention by the Council even in the absence of environmental effects. Typically there were grounds for either a prosecution or an infringement notice.

2. Stratford Power Station

2.1 Process description

Taranaki Combined Cycle Plant

The Taranaki Combined Cycle Power Plant (Photo 1) was the first large-scale combined-cycle power plant to be built in New Zealand. The plant was completed in 1998. It uses a gas turbine and a steam turbine in tandem to generate electricity at an efficiency greater than could be achieved by either system alone. The hot exhaust gases from the gas turbine are directed into a heat recovery boiler where most of the heat is used to produce a high pressure steam that drives the steam turbine. The station was designed to produce up to 354 MW of electricity at an efficiency of about 56%, which has since been improved to 383 MW at 56.7%. The firing system in the gas turbine is especially designed to minimise the production of nitrogen oxides in the exhaust.

The cooling system for the steam system is based on an evaporative process. The cooling towers have been designed to minimise the formation of a steam plume, so that a plume is visible only under cool or humid conditions.

The gas supply for the plant comes mainly from the Kupe and Maui fields together with a smaller component from the underground Ahuroa Gas Storage facility. The station uses approximately 1.4 million cubic metres of gas per day in generation at full production.

Water is abstracted from the Patea River to supply the cooling towers and for steam generation. The water discharges are from plant utilities and domestic effluent, boiler blowdown and site stormwater. Septic tank effluent is discharged to land.

Stratford Peaker Plant

The Stratford Peaker Plant (Photo 1) is designed to provide fast start-up (peaking) capacity to support the increasing volumes of weather-dependent renewable electricity sources in New Zealand, such as wind generation. Commercial operation commenced in June 2011. The plant may be required to run for hours during low wind conditions, or for months during dry hydro years or times of major plant outages. The two separate 100 MW high-efficiency gas turbines employ a gas-fired open-cycle generation process, with an intercooler, and are capable of going from cold to full power in 10 minutes. To improve efficiency, air passing from the low pressure compressor is cooled prior to entering the high pressure compressor, giving an LHV efficiency of about 46% at full load.

The cooling system for the intercooler is similar in type to that of the Taranaki Combined Cycle Plant described above, being a hybrid dry/wet mechanical draft cooling tower.

Water to supply the cooling tower is drawn from the Patea River via the existing abstraction and storage system for the combined cycle plant. Wastewater is discharged to the Patea River. Site stormwater is transferred to the raw water holding pond at the combined cycle plant during operation. Domestic wastes are discharged to a land-based system, and also to the Patea River after treatment on the adjacent switchyard site.

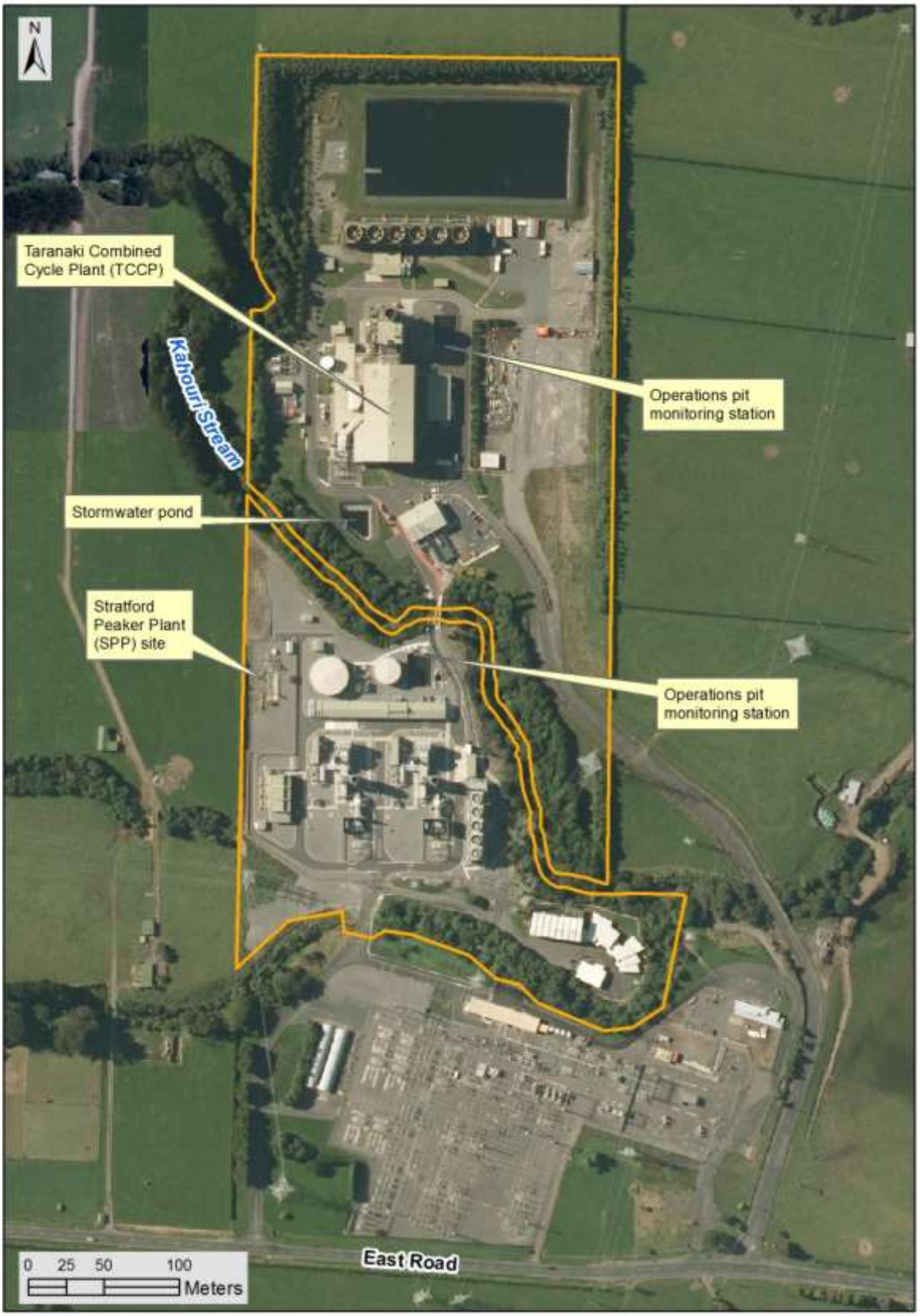

Photo 1 Aerial view of Stratford Power Station, March 2012

2.2 Resource consents

A summary of the consents held by Contact Energy Limited, formerly Stratford Power Limited, in relation to activities at its Stratford power station site is given in Table 1 below. A copy of each of the consents can be found in Appendix I.

Table 1 Summary of resource consents for Stratford Power Station

Consent number	Purpose	Volume	Next review date	Expiry date
3939-2	Discharge stormwater to Kahouri Stream/tributary	464 L/s	-	2016
4022-2	Discharge emissions to air from combustion		-	2022
4454-1	Discharge contaminants to air		2016	2029
4455-1	Take from Patea River below Toko confluence	19,440 m^3/day (225L/s)	2016	2028
4456-1	Intake structure on Patea River below Toko confluence		2016	2028
4458-1	Diffuser structure on Patea River		2016	2028
4459-1	Discharge stormwater to Kahouri/Piakau Streams	1,360 litres/second	2016	2028
4460-1	Stormwater discharge structures		2016	2028
4461-1	Utilities structures on Kahouri Stream		2016	2028
4462-1	Water transmission structures		2016	2028
4804-1	Bridge for electricity transmission over Kahouri Stream		2016	2028
5063-1	Discharge septic tank effluent to land	5 m^3/day	2016	2028
5633-1	Discharge sediment from water intake to Patea River		2016	2028
5846-1	Discharge contaminants to air		2016	2034
5847-1	Take from Patea River at Skinner Road	19,440 m^3/day (225L/s)	2016	2034
5848-1	Discharge used water to Patea River	6,740 m^3/day (78L/s)	2016	2034
5849-1	Gas pipeline structures on Kahouri Stream		2016	2034
5850-1	Intake structure on Patea River at Skinner Road		2016	2034
5851-1	Discharge sediment from water intake to Patea River		2016	2034
5852-1	Utilities structures on Kahouri Stream		2016	2034
7247-1	Discharge emissions to air from cooling tower		2016	2034
7248-1	Bridge for pedestrian access and utilities over Kahouri tributary		2016	2034
7249-1	Bridge for vehicle access over Kahouri Stream		2016	2034
7250-1	Bridge for pedestrian access and utilities over Kahouri Stream		2016	2034
7605-1	Stormwater discharge structure		2016	2028
7653-1	Stormwater discharge structure		2016	2028
7785-1	Discharge construction contaminants to Piakau/Kahouri Streams		2016	2028
7786-1	Discharge contaminants to air from construction		2016	2028

Consents **4454** to **4462** and **4804** were granted in 1994 and 1995 to provide for the operation of the existing Taranaki Combined Cycle (TCC1) Power Plant, and consents **5063** and **5633** were issued after that plant was commissioned to provide for minor changes in its operation.

Consents **5846** to **5852** were granted in 2001 to provide for the operation of a second, 500 MW combined-cycle power plant (TCC2), in combination with the existing plant (TCC1). The proposed second station has not been constructed. A variation to change the date of the lapse of the consents if the consents are not exercised, to 6 December 2017, was granted in February 2007. Consent **5848** is exercised, in relation to the existing plant.

Consents **7247** to **7250** were granted in March 2008 to provide for the operation of two 100 MW high efficiency open-cycle gas turbine generators, together known as Stratford Peaker Plant (SP1), in combination with the existing plant. Consents **7605** and **7653** were issued in 2010 while the plant was being constructed to provide for minor changes in its design.

Consents **3939** and **4022**, that provided for the disused original Stratford Gas Turbine Plant (SGT), and consents **4455**, **4458**, **4462**, **5847**, **5848 and 5850** were changed in March 2008 to provide for the Peaker Plant. (Construction of the Peaker Plant commenced in December 2008, following demolition of the old plant. It became fully operational in May 2011).

Consents **4459**, **4460**, **4461**, **4804**, **5063**, **5846**, **5849** and **5852** were changed in March 2012 to provide for the development and operation of a second peaker plant (SP2), with up to two 200 MW generators, as an alternative to a second combined cycle plant. Consents **7785** and **7786** were granted to provide for construction activities.

2.2.1 Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14.

Contact Energy Limited holds two consents for the abstraction and use of water in relation to SPS.

Water Permit **4455-1** allows the take and use of up to 19,440 cubic metres/day [225 litres/second averaged over 15 minutes] of water on a continuous basis from the Patea River for use of power stations. This permit was originally issued by the Taranaki Regional Council on 25 May 1994 under Section 87(d) of the RMA, with change to consent conditions on 7 December 2001 and 6 March 2008. It is due to expire on 1 June 2028.

Condition 1 requires the consent holder to install and operate a recording device for water abstraction rates and to provide the records to the Council.

Conditions 2, 3 and 4 address abstraction during low flow conditions.

Condition 5 sets out review provisions.

Water permit **5847-1** allows the Company to take and use up to 19,440 cubic metres/day [225 litres/second averaged over 15 minutes] of water from a water intake structure in the Patea River for cooling and power station purposes. This permit was issued by the Taranaki Regional Council on 27 November 2001 as a resource consent under Section 87 (d) of the RMA, with changes to consent conditions on 6 March 2008. The consent expires on 1 June 2034. To date, this consent has not been exercised.

This permit applies to a different abstraction site from that which is covered by Permit **4455.** Contact Energy Limited proposes that when the TCC2 or SP2 station is built, generally water would be drawn from the new site to service the demand of both stations. However, as flows in the Patea decrease, there would be both a reduction in the total draw-off allowed, and a gradual substitution of supply from the existing site over the new site.

Condition 1 requires a measuring device for recording rates of abstraction.

Conditions 2 and 3 set out the abstraction regime under various levels of flow in the Patea River.

Condition 4 sets out an agreed donation towards habitat enhancement within the Patea catchment.

Conditions 5 and 6 deal with lapse and review provisions.

2.2.2 Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations.

Used water, mainly cooling water

Stratford Power Limited previously held water discharge permit **4457-1** to cover the discharge of up to 2,770 m^3/day [32 litres/second] of used water, mainly blow down water from the cooling system, and up to 5 m^3/day [0.12 litres/second] of treated domestic effluent, into the Patea River. This permit was issued by the Taranaki Regional Council on 25 May 1994 under Section 87(e) of the RMA, and was due to expire on 1 June 2028.

This consent was surrendered on 21 October 2002.

Contact Energy holds water discharge permit **5848-1** to discharge up to 6,740 cubic metres/day [78 litres/second] of used water, mainly blowdown water from the cooling system of power stations, into the Patea River. This permit was issued by the Taranaki Regional Council on 27 November 2001 under Section 87(e) of the RMA, with changes to the consent granted on 6 March 2008. It is due to expire on 1 June 2034.

Conditions 1 and 2 detail requirements for an effluent disposal management plan, and address subsequent compliance with and revision of the plan.

Conditions 3, 4 and 5 deal with water treatment and cleaning chemicals.

Condition 6 requires a contingency plan in case of accidental discharge or spillage.

Condition 7 establishes a mixing zone beyond which a number of effects are prohibited, and condition 8 addresses fish passage within that zone.

Conditions 9, 10 and 11 relate to control and monitoring of temperature in the mixing zone.

Conditions 12 and 13 impose limits on concentrations of effluent components in the discharge and receiving water.

The last two conditions relate to lapse and review of the consent.

Stormwater

Contact Energy Limited holds two consents in relation to discharge of stormwater at SPS.

Water discharge permit **3939-2** covers the discharge of up to 454 litres/second of stormwater from the Stratford Power Station Peaking Plant into an unnamed tributary of the Kahouri Stream and into the Kahouri Stream in the Patea catchment. This permit was issued by the Taranaki Regional Council on 10 November 1997 under Section 87(e) of the RMA. It is due to expire on 1 June 2016.

Condition 1 establishes a mixing zone and controls effects of the discharge on the appearance, odour, water quality and biology of the river.

Condition 2 imposes limits on significant potential contaminants in the discharge.

Condition 3 requires the consent to be exercised in accordance with documentation submitted.

Condition 4 is a review provision.

Water discharge permit **4459-1** covers the discharge of stormwater from a nine-hectare power station site into an unnamed tributary of the Piakau Stream and into the Kahouri Stream; both are tributaries of the Patea River. This permit was issued by the Taranaki Regional Council on 29 May 1994 under Section 87(e) of the RMA with changes to the consent granted on 6 September 2001 and 23 March 2012. It is due to expire on 1 June 2034.

Condition 1 relates to plans of the stormwater system when it is upgraded.

Condition 2, inserted in March 2012, restricts the stormwater catchment area.

Condition 3 imposes limits on significant potential contaminants in the discharge.

Condition 4 requires a contingency plan in case of accidental discharge or spillage.

Condition 5 establishes a mixing zone, and controls effects of the discharge on the appearance, odour, water quality, and biology of the river.

Condition 6 is a review provision.

Sediment at water intakes

Contact Energy holds two consents in relation to the cleaning of water intake structures.

Water discharge permit **5633-1**, to discharge fine sediment and organic matter from water intake structure screens to the Patea River, was issued by the Taranaki Regional Council on 24 May 2000 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Condition 1 requires that the discharge licensed by the consent takes place in accordance with the documentation provided with the application. The second condition sets out environmental performance requirements in terms of unacceptable effects upon the Patea River, while the third condition is a review condition.

Water discharge permit **5851-1**, to discharge fine sediment and organic matter from water intake structure screens to the Patea River, was issued by Taranaki Regional Council on 7 December 2001 under Section 87(e) of the RMA, with variations to conditions on 22 February 2007. To date this consent has not been exercised. The consent expires on 1 June 2034.

Condition 1 requires that the discharge licensed by the consent take place in accordance with the documentation provided with application.

Condition 2 sets out environmental performance requirements in terms of unacceptable effects upon the Patea River.

Conditions 3 and 4 deal with lapse and review of the consent.

Construction contaminants

Contact Energy holds water discharge permit **7785-1** to discharge stormwater, sediment, dewatering water and washdown water into an unnamed tributary of the Piakau Stream and the Kahouri Stream from earthworks associated with the construction activities of a power station. This permit was issued by the Taranaki Regional Council on 23 March 2012 under Section 87(e) of the RMA. The consent has not been exercised. It is due to expire on 1 June 2028.

Conditions 1 and 2 require the provision of and adherence to an erosion and sediment control plan. Condition 3 relates to notification of works.

Conditions 4 to 6 deal with sediment control measures and stabilisation of earthworks areas.

Condition 7 requires use of the best practicable option.

Condition 8 and 9 are lapse and review provisions.

2.2.3 Air discharge permits

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

Contact Energy Limited holds five discharge permits in relation to discharges to air at SPS.

2.2.3.1 Taranaki Combined Cycle 1 (TCC 1 - operating)

Air discharge permit **4454-1** covers the discharge of contaminants to air from a combined cycle power station and ancillary plant ['the station'] located adjacent to East Road approximately three kilometres east of the town of Stratford.

The application relating to discharge to air was called in by the Minister for the Environment under Section 140 of the RMA, and the permit was issued by the Minister on 23 March 1995 (operative on 15 August 1995) as a resource consent under Section 87(e) of the RMA. A variation was granted by Hearing Committee on 12 June 2003 to delete (original) conditions 4 to 10 relating to the mitigation of CO2 emissions. A change to condition 12 was granted on 9 February 2010 to increase the period when emission standards relating to start-up apply. The consent is due to expire on 14 August 2029.

Conditions 1, 2 and 3 are general, covering supply of information on exercise of consent, monitoring costs and administrative charges.

Conditions 4, 5 and 6 require the adoption of the best practicable option for controlling effects of discharges on the environment, and provide for the supply of relevant information on and for the review of measures representing the best practicable option.

Condition 7 requires consultation with Council before any significant changes on the site.

Condition 8 requires Contact Energy Limited to provide reports within two years of, and then again at 4 years after, commencement of commissioning, and then at six-year intervals. The report(s) are to review technological advances in the reduction or mitigation of emissions, provide an inventory of emission contaminants, detail measures taken to improve energy efficiency, address issues relating to minimisation or mitigation of emissions, and detail carbon dioxide emissions.

Conditions 9 to 13 impose limits on significant potential contaminants in discharges.

Condition 14 sets a minimum height for discharges from turbines.

Condition 15 prohibits any direct significant adverse ecological effect.

Conditions 16 and 17 place controls on visible effects and droplet drift in relation to the evaporative cooling system.

The last two conditions relate to review and lapse of the consent.

2.2.3.2 Taranaki Combined Cycle 2 or Stratford Peaker 2 (TCC2 or SP2 – yet to be constructed)

Contact Energy holds two consents to discharge emissions to air in relation to a proposed new station adjacent to the existing combined cycle plant (TCC1), one for the development and construction phase, and one for the commissioning and operational phase.

Construction

Air discharge permit **7786-1** covers the discharge of contaminants [dust] to air from earthworks associated with the construction activities of a power station. This permit was issued by the Taranaki Regional Council on 23 March 2012 under Section 87(e) of the RMA. The consent has not been exercised. It is due to expire on 1 June 2028.

Condition 1 limits the earthworks area.

Conditions 2 and 3 require the provision of and adherence to a dust control management plan. Condition 4 relates to notification of works.

Condition 5 requires the adoption of the best practicable option.

Condition 6 controls levels of dust in air from the site beyond the property boundary.

Conditions 7 to 9 address complaints.

Conditions 10 and 11 deal with lapse and expiry of consent.

Operation

Air discharge permit **5846-1** covers the discharge of contaminants to air from power station unit(s) and ancillary plant located adjacent to State Highway 43 (East Road) approximately three kilometres east of Stratford.

This consent relates to a power station to be constructed adjacent to the existing TCC1 plant. The Council granted the permit after a hearing on 14 November 2001. The permit was subsequently appealed by two parties to the Environment Court. The appeal was subsequently dismissed by the Environment Court. The consent was issued on 6 September 2002 to provide for a second combined-cycle station (TCC2). A variation that broadened the purpose and conditions of the consent and allowed minor amendments, to provide for an alternative open-cycle (SP2) power plant, was granted on 23 March 2012. The consent has not been exercised. The consent expires on 1 June 2034.

Condition 1, inserted in March 2012, stipulates the use of gas fuel only. Conditions 2, 3 and 4 require the adoption of the best practicable option for controlling effects of discharges on the environment, and provide for the supply of relevant information on and for the review of measures representing the best practicable option.

Condition 5 requires consultation with Council before any significant changes on the site.

Condition 6 requires Contact Energy to provide reports within two years of, then again at 4 years after, commencement of commissioning, and then at six-year intervals. The report(s) are to review technological advances in the reduction or mitigation of emissions, provide an inventory of emission contaminants, detail measures taken to improve energy efficiency, address issues relating to minimisation or mitigation of emissions, and detail carbon dioxide emissions.

Conditions 7 to 11 impose limits on significant potential contaminants in discharges.

Condition 12 sets a minimum height for discharges from turbines.

Condition 13 prohibits any direct significant adverse ecological effect.

Conditions 14 and 15 place controls on visible effects and droplet drift in relation to the evaporative cooling system.

The last three conditions relate to review and lapse of the consent.

2.2.3.3 Stratford Peaker Plant (SP1)

Air discharge permit **4022-2** covers the discharge of emissions into the air from fuel combustion and other related activities associated with the operation of the Stratford Power Station and ancillary plant. This permit was originally issued by the Taranaki Regional Council on 14 December 1994 under Section 87(e) of the RMA, with changes to consent conditions on 6 March 2008 and 9 February 2010. It is due to expire on 1 June 2022.

Condition 1 requires the adoption of the best practicable option for controlling effects of discharges on the environment.

Condition 2 requires consultation with Council before any significant changes on the site.

Condition 3 requires Contact Energy to provide reports within two years of granting of the consent, and at six-year intervals thereafter. The report(s) are to review technological advances in the reduction or mitigation of emissions, provide an inventory of emission contaminants, detail measures taken to improve energy efficiency, address issues relating to minimisation or mitigation of emissions, and detail carbon dioxide emissions.

Conditions 4 to 18 impose limits on significant potential contaminants in discharges.

Condition 9 sets a minimum height for discharges from turbines.

Condition 10 prohibits any direct significant adverse ecological effect.

Condition 11 relates to review of the consent.

Air discharge permit **7247-1** covers the discharge of emissions to air from the operation of the cooling tower associated with the Stratford Peaker Power Plant. This permit was issued by the Taranaki Regional Council on 6 March 2008 under Section 87(e) of the RMA. It is due to expire on 1 June 2034.

Conditions 1 and 4 require the adoption of the best practicable option for controlling effects of discharges on the environment, and that processes be operated to minimise discharges.

Condition 2 requires that the cooling tower described in the consent application be installed.

Condition 3 deals with notification of works.

Conditions 5 and 6 address visible plumes and droplet drift.

Condition 7 requires consultation of significant changes in the plant.

Condition 8 deals with cooling water treatment.

Condition 9 prohibits the causing of offensive odour beyond the site boundary.

Condition 10 prohibits adverse ecological effects.

Conditions 11 and 12 relate to lapse and review of consent.

2.2.4 Discharge of waste to land

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

Contact Energy Limited holds land discharge permit **5063-1** to discharge up to 5 cubic metre/day of domestic septic tank effluent through a soakage field onto and into land in the vicinity of the Kahouri Stream in the Patea Catchment. This permit was issued by the Taranaki Regional Council on 6 December 1996 as a resource consent under Section 87(e) of the RMA, with changes to conditions on 6 September 2001 and 23 March 2012. The consent expires on 1 June 2028.

Condition 1 requires the septic tank and soakage system to be installed as described in the documentation provided with the application.

Condition 2 prohibits any direct discharge to a waterbody, while Condition 3 is a review condition.

2.2.5 Land use consents

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

Contact Energy Limited holds 14 land use consents for structures on streams in relation to SPS.

Land use consent **4456-1,** to erect, place, use and maintain an intake structure in and on the bed of the Patea River, was issued by the Taranaki Regional Council on 25 May 1994 as a resource consent under Section 87(a) of the RMA, with a change to consent conditions on 20 January 2000. The consent expires on 1 June 2028.

Conditions 1 and 2 require the provisions of plans and details of the structure and that the consent holder constructs and maintains the structure according to the approved plan.

Condition 3 requires that the structure not obstruct fish passage.

Conditions 4 and 5 relate to notification and timing of maintenance works.

Condition 6 requires that the best practicable option be used to prevent adverse effects on water quality.

Condition 7 requires that the area of river bed disturbance be minimised.

Condition 8 relates to removal of the structure.

Condition 9 is a review condition.

Land use consent **4458-1,** to erect, place, use and maintain a diffuser structure in and above the bed of the Patea River for the purpose f discharging used water from power stations, was issued by the Taranaki Regional Council on 25 May 1994 as a resource consent under Section 87(a) of the RMA, with a change to consent conditions on 28 November 2001. The consent expires on 1 June 2028.

Consent **4458** has essentially the same nine conditions as those imposed on consent **4456** (above).

Land use permit **4460-1** to erect, place, use and maintain in and above the beds of an unnamed tributary of the Piakau Stream and of the Kahouri Stream, both tributaries of the Patea River, structures for the purpose of discharging stormwater from a power station site, was issued by Taranaki Regional Council on 25 May 1994 as a resource consent under section 87(a) of the RMA with a change on 23 March 2012. The consent expires on 1 June 2028.

Consent **4460** has essentially the same nine conditions as those imposed on consent **4456** (above).

Land use consent **4461-1** to erect, place, use and maintain in, over and under the bed of the Kahouri Stream (a tributary of the Patea River), within the site and adjacent land immediately to the southeast a bridge, pipelines, cables and associated utilities for a power station site, was issued by the Taranaki Regional Council on 25 May 1994 as a resource consent under section 87(a) of the RMA. The consent expires on 1 June 2028.

Consent **4461** has essentially the same nine conditions as those imposed on consent **4458** (above).

Land use consent **4462-1** to erect, place, use and maintain water pipelines and associated control cables above, through or below the beds of the Toko Stream and various small unnamed streams, for the purpose of water transmission from the Patea River to power stations, was issued by the Taranaki Regional Council on 25 May 1994 as a resource consent under section 87(a) of the Resource Management Act. The consent expires on 1 June 2028.

Consent **4462** has essentially the same nine conditions as those imposed on consent **4458** (above).

Land use consent **4804-1** to erect, place use and maintain over the bed of an unnamed tributary of the Kahouri Stream in the Patea catchment a bridge structure to convey high voltage electricity cables and associated communication cables for a power station site, was issued by the Taranaki Regional Council on 25 May 1994 as a resource consent under section 87(a) of the RMA with a change on 23 March 2012. The consent expires on 1 June 2028.

Consent **4804** has essentially the same nine conditions as those imposed on consent **4458** (above), with the omission of the condition on fish passage.

Land use consent **5849-1** to erect, place use and maintain gas pipelines and associated utilities, under the bed, and including disturbance for installation by trenching of the bed, of the Kahouri Stream in the Patea catchment, for combined cycle power station purposes, was issued by the Taranaki Regional Council on 27 November 2001 as a resource consent under section 87(a) of the RMA, with changes on 22 February 2007 and 23 March 2012. To date this consent has not been exercised. The consent expires on 1 June 2034.

Conditions 1 and 2 require the provision of plans and details of the structure and that the consent holder constructs and maintains the structure according to the approved plan.

Conditions 3, 4 and 5 control the construction of the structures, addressing effects on the watercourse, and notification and timing.

Condition 6 requires that the structure not obstruct the passage of fish.

Conditions 7 and 8 relate to lapse and review of the consent.

Land use consent **5850-1**, to erect, place use and maintain an intake structure and ancillary pipework and pumps in and on the bed, and including disturbance

associated with construction of the bed, of the Patea River, for the purpose of taking water for power stations, was issued by Taranaki Regional Council on 27 November 2001 as a resource consent under section 87(a) of the RMA, with a change to conditions on 6 March 2008. To date this consent has not been exercised. The consent expires on 1 June 2034.

Consent **5850** has essentially the same eight conditions as those imposed on consent **5849** (above), with the omission of a condition on fish passage, and the addition of a condition dealing with removal and reinstatement.

Land use consent **5852-1** to erect, place use and maintain a bridge, cables including high voltage electricity cables and associated utilities over the Kahouri Stream in the Patea catchment for combined cycle power station purposes, was issued by Taranaki Regional Council on 6 December 2001 as resource consent under section 87(a) of the RMA with change on 23 March 2012. To date this consent has not been exercised. The consent expires on 1 June 2034.

Consent **5852** has essentially the same eight conditions as those imposed on consent **5850** (above).

Land use consent **7248-1,** to erect, place, use and maintain a bridge over the Kahouri Stream for pedestrian access and carriage of water pipes, high voltage cables, control cables and associates utilities, was issued by Taranaki Regional Council on 6 March 2008 as resource consent under section 87(a) of the RMA. To date this consent has not been exercised. The consent expires on 1 June 2034.

Condition 1 requires exercise of consent in accordance with documentation supplied.

Condition 2 requires plans of the bridge.

Condition 3 relates to notification.

Conditions 4, 5 and 6 relate to control and mitigation of sediment, riverbed disturbance, removal of the structure and reinstatement.

Conditions 7 and 8 address lapse and review of consent.

Land use consent **7249-1,** to erect, place use and maintain a bridge over the Kahouri Stream for vehicle access purposes, was issued by Taranaki Regional Council on 6 March 2008 as a resource consent under section 87(a) of the RMA. To date this consent has not been exercised. The consent expires on 1 June 2034.

Consent **7249** has essentially the same eight conditions as those imposed on consent **7248** (above).

Land use consent **7250-1,** to erect, place use and maintain a bridge over an unnamed tributary of the Kahouri Stream for pedestrian access and carriage of water pipes, high voltage cables, control cables and associates utilities, was issued by Taranaki Regional Council on 6 March 2008 as a resource consent under section 87(a) of the RMA. The consent expires on 1 June 2034.

Consent **7250** has essentially the same eight conditions as those imposed on consent **7248** (above).

Land use consent **7605-1,** to construct, place and maintain a stormwater outlet structure in the Kahouri Stream was issued by Taranaki Regional Council on 23 February 2010 as a resource consent under section 87(a) of the RMA. The consent expires on 1 June 2028.

Consent **7605** has seven conditions which are essentially the same as those imposed on consent **7248** (above), with the omission of a condition on provision of plans.

Land use consent **7653-1**, to construct, place and maintain a stormwater outlet structure in the Kahouri Stream was issued by Taranaki Regional Council on 21 June 2010 as a resource consent under section 87(a) of the RMA. The consent expires on 1 June 2028.

Consent **7653** has eight conditions which are essentially the same as those imposed on consent **7605** with the addition of a condition dealing with timing of works.

2.3 Monitoring programme

2.3.1 Introduction

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

The Taranaki Regional 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 Stratford Power Station site consisted of six primary components.

2.3.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- discussion over monitoring requirements;
- preparation for any reviews;
- renewals
- or new consents;
- advice on the Council's environmental management strategies and content of regional plans, and;
- consultation on associated matters.

2.3.3 Site inspections

The Contact Energy site was visited four times during each year of 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 consent holder 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.

2.3.4 Chemical sampling

The Taranaki Regional Council undertook sampling both of the discharges from the site and of the water quality upstream and downstream of the discharge point and mixing zone.

The used water discharge was sampled on six occasions over the two years, and the sample analysed for temperature, pH, suspended solids, oil and grease, free and total chlorine, ammonia, dissolved reactive phosphorus, turbidity and conductivity.

Two sites on the Patea River were sampled on six occasions, and the samples analysed for temperature, pH, suspended solids, ammonia, dissolved reactive phosphorus, turbidity and conductivity.

2.3.5 Biomonitoring surveys

A biological survey was performed on two occasions each year in the Patea River to determine whether or not the discharge of used water, mainly cooling water, from the site has had a detrimental effect upon the communities of the streams. The Kahouri Stream was surveyed once each year to assess the effect of stormwater discharges.

2.3.6 Review of data and reports

The consent holder submitted water discharge and emission data on a monthly basis to the Council for review.

2.4 Results - Water

Figure 1 Physico-chemical and biological sampling sites, discharge sites and abstraction site

2.4.1 Inspections – Combined Cycle Plant and Peaker Plant

At the combined-cycle plant and peaker plant site, inspection is made of areas where wastewater is generated, treated and monitored, and where chemicals and fuel/oil are stored, transferred and dispensed. The stormwater system is also included. The laboratory and the control room are visited to view and discuss recent monitoring results.

At the Patea River, the abstraction works at Vickers Quarry and the discharge structure beside East Road are inspected.

Inspections specifically address the operation of the water abstraction system, the raw water treatment plants, the cooling water systems, and the wastewater treatment systems (pH neutralisation, oil separation, holding ponds and monitoring stations). The maintenance of areas that are bunded to contain spillage (e.g. around chemical and oil storage/use, transformers, electrical batteries), and the stormwater drainage system, are given particular attention.

Five site visits were carried out during 2012-2013, and five visits in 2013-2014. Routine inspections took place on 26 September and 19 December 2012, 20 February, 25 June, 25 September and 18 December 2013, and 10 April and 21 May 2014. Additional inspections were made on 30 January 2013, when effluent samples were collected, and on 2 September 2013, to monitor the running of a pig (a swabbing device) through the new Ahuroa pipeline.

In general, the site was found to be in tidy condition. Staff of Contact Energy were found to have a good knowledge of the environmental aspects of running the plant, and to have proper training in dealing with contingency events that have potential for causing adverse environmental effects.

In addition, three liaison meetings were held at the Council offices in Stratford between Council staff and new Contact Energy staff involved in consent compliance monitoring, on 4 February and 17 September 2013, and 13 February 2014.

2.4.2 Results of abstraction monitoring

Abstractions are regulated by consent **4455**. Contact Energy also holds consent **5847** relating to water abstraction for the proposed power station. Contact Energy operates a continuous monitoring system to measure the abstraction rate at two points, at the river intake and at the inlet to the raw water pond that provides for both power plants. The record is based on 5-minute average flows, rather than instantaneous values, to avoid short-term 'spikes' that are caused when the pumps are reversed into backwash mode or are restarted, giving rise to transient water surges in the pipelines which may represent breaches of the abstraction consent. Data are forwarded to the Council on a monthly basis for audit.

The consent limit is 225 litres/second (L/s) when river flows at Skinner Road are above 765 L/s, ramping down to 150 L/s when river flows at Skinner Road are at or below 690 L/s.

The abstraction pumps are governed so that they cannot exceed a rate of 225 L/s. During 2012-2013, the maximum intake flow recorded was 134 L/s, with an average flow rate of 55 L/s. The total volume abstracted was 1,734,426 m^3. This was a decrease of 10%, or 524 m^3/day, from the previous year's abstraction volume, which can be attributed to less operation of the TCC1 plant. During 2013-2014, the maximum intake flow recorded was 135 L/s, with an average flow rate of 29 L/s. The total volume abstracted was 931,567 m^3. This was a large decrease of 46%, or 2,200 m^3/day, from the previous year's abstraction volume, which can be attributed to a combination of further reduction in operation of the combined-cycle plant and the cessation of use of water for NOx control in the peaker plants.

The abstraction consent requires the plant to reduce its abstraction to less than 150 L/s when river flows drop below 690 L/s at Skinner Road. Abstraction rate did not exceed 150 L/s during the 2012-2014 review period. In 2012-2013, the Patea River flow dropped below 690 L/s on a total of 9 days, in March 2013. The lowest (instantaneous) flow occurred on 14 March, with a value of 592 L/s. In 2013-2014, the Patea River flow dropped below 690 L/s on a total of 34 days, between 6 March and 8 April. The lowest instantaneous flow occurred on 7 and 8 April, with a value of 586 L/s. In comparison, the lowest instantaneous flow recorded since 1978 is 406 L/s for 16 February 1982.

Patea River flows measured at Skinner Road are shown in Figure 2.

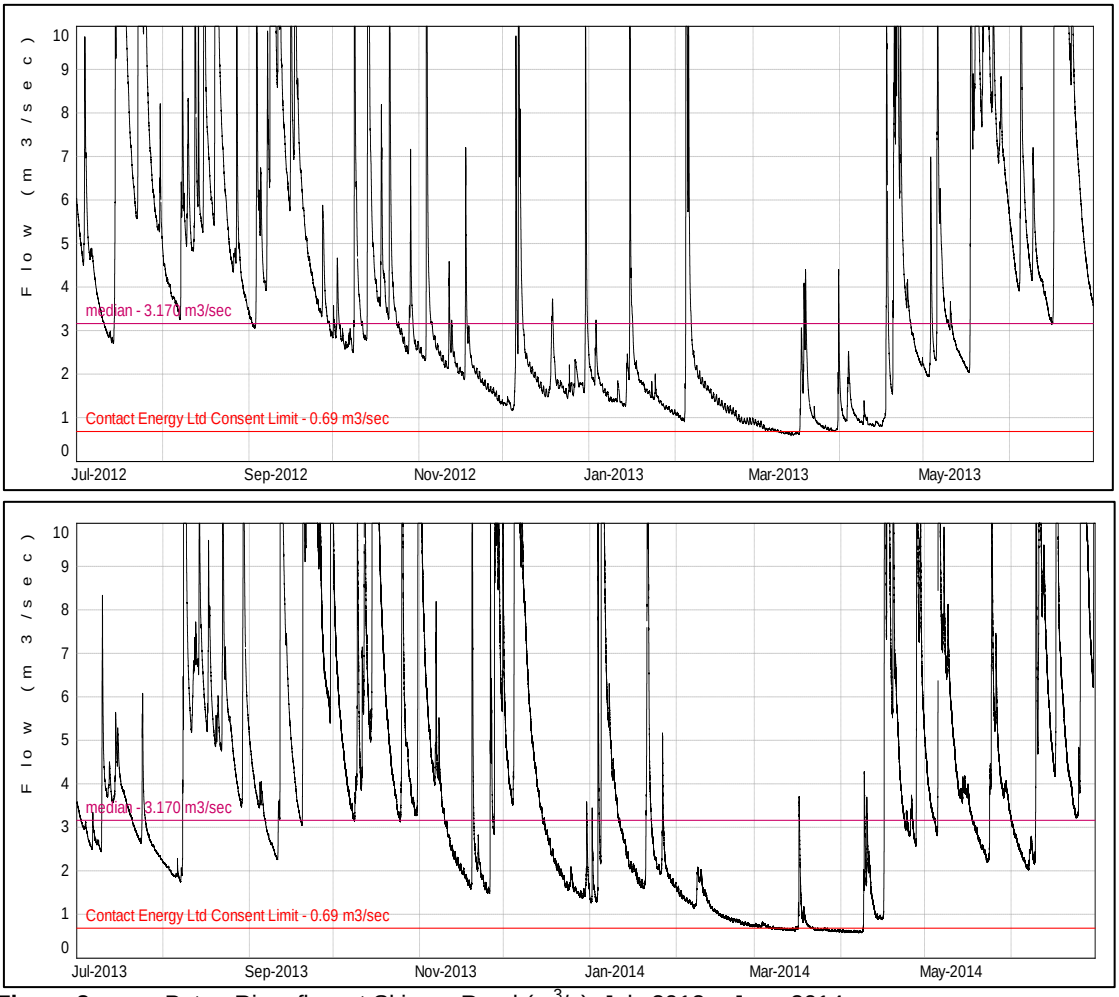

Figure 2 Patea River flow at Skinner Road (m^3/s), July 2012 – June 2014

The data in Table 2 below on abstraction rates are as presented by Contact Energy to the Council.

Table 2 Monthly abstraction data July 2012 to June 2014

Month	2012 - 2013		2013 - 2014	
	Ave L/s	Max L/s	Ave L/s	Max L/s
July	66	93	41	128
August	75	130	41	128
September	51	111	16	94
October	42	129	9	91
November	70	127	49	135
December	50	131	26	135
January	34	131	25	90
February	42	134	19	89
March	44	103	51	89
April	71	128	48	94
May	58	93	9	88
June	58	127	20	100

2.4.3 Results of discharge monitoring

Consent **5848** covers the discharge of used waters (mainly blowdown water from the cooling system of TCC1 and water treatment plant of SP1) to the Patea River. The Company continuously monitors pH, chlorine, temperature (effluent and receiving water), and flow of effluent from both plants. It also conducts twice-daily checking of the on-line monitoring devices, and daily sampling and analysis of 'grab' samples. The Council samples the discharge from both plants into the Patea River quarterly, splitting the samples with Contact Energy for inter-laboratory comparison. Sampling times are chosen by Council staff to cover the 'worst case' circumstances, relating to the daily dosing of cooling water with chlorine for biological control, and to flow of the receiving water. The Council analyses the samples to determine compliance with consent conditions on effluent composition (pH and chlorine) and nutrient minimisation (phosphorus), to assess the amount of ammonia discharged (in relation to the receiving water limit), and to monitor for any change in general effluent quality parameters (conductivity, turbidity and suspended solids).

Consent **4459** covers the discharge of stormwater to the Kahouri Stream from a holding pond that serves both plants. Before 2011, there were few discharges from the pond, as nearly all stormwater was transferred to the raw water pond. With enlargement of the catchment created by construction of the peaker plant, discharge frequency increased. Also, changes in the Company's generation strategy, whereby TCC1 is shut down for longer periods, has led to a need to refresh the raw water pond at times, through overflow back to the Patea River via the stormwater pond and Kahouri Stream. The stormwater is monitored by the Company for compliance with the limits on pH range, suspended solids and oil and grease.

2.4.3.1 Results of monitoring by Contact Energy

The data in Table 3 are from the monthly summaries forwarded to the Council by Contact Energy relating to its monitoring of the Patea River discharge by continuous analysers and by testing of grab samples.

Table 3 Monitoring of TCC1 plant effluent by Contact Energy Limited July 2012 to June 2013

Month	Flow L/s		pH		Total Cl_2 g/m^3		Temp °C	
	Max	Avg	Min	Max	Max	Avg	Max	Avg
Jul-12	38.0	16.6	6.1	8.2	0.05	0.00	23.2	20.3
Aug-12	39.1	18.8	6.7	7.7	0.06	0.01	22.3	20.5
Sep-12	43.7	12.5	6.6	8.7	0.04	0.01	22.8	19.1
Oct-12	44.7	15.1	6.1	8.9	0.05	0.01	23.9	17.8
Nov-12	41.0	15.8	6.1	9.0	0.05	0.01	26.9	22.1
Dec-12	53.8	22.9	6.6	9.0	0.06	0.01	26.7	22.3
Jan-13	49.9	20.2	6.7	8.9	0.63	0.01	38.2	22.1
Feb-13	46.2	17.0	6.8	8.2	0.05	0.01	27.4	23.8
Mar-13	45.9	19.4	6.6	8.2	0.04	0.01	25.8	22.1
Apr-13	39.5	20.8	6.8	8.1	0.05	0.01	26.9	23.4
May-13	36.2	13.2	6.0	8.9	0.13	0.01	23.4	20.1
Jun-13	44.6	14.4	7.0	8.2	0.04	0.01	39.6	19.0
Limit	**78**		**6.0**	**9.0**	**0.05**			

Table 4 Monitoring of TCC1 plant effluent by Contact Energy Limited July 2013 to June 2014

Month	Flow L/s		pH		Total Cl_2 g/m³		Temp °C	
	Max	Avg	Min	Max	Max	Avg	Max	Avg
Jul-13	34.9	12.3	6.9	8.1	0.08	0.01	21.7	17.1
Aug-13	42.7	12.0	6.6	7.5	0.05	0.01	21.2	18.8
Sep-13	42.3	11.2	6.5	8.0	0.17	0.01	21.5	16.2
Oct-13	49.0	15.7	6.7	8.0	0.40	0.01	17.2	15.8
Nov-13	49.4	13.0	6.1	8.9	0.07	0.01	25.4	20.9
Dec-13	48.5	24.6	6.8	8.9	0.09	0.00	23.4	20.4
Jan-14	51.6	23.9	7.1	8.9	0.06	0.01	22.1	20.3
Feb-14	48.4	17.8	7.5	9.0	0.05	0.00	24.0	22.0
Mar-14	46.8	17.7	6.9	8.9	0.06	0.01	27.1	22.6
Apr-14	41.2	15.7	6.9	8.3	0.04	0.01	25.6	20.6
May-14	45.4	10.5	6.5	8.2	0.07	0.00	16.0	13.7
Jun-14	40.7	13.8	6.7	8.0	0.08	0.01	21.1	12.8
Limit	**78**		**6.0**	**9.0**	**0.05**			

Table 5 Monitoring of SP1 effluent by Contact Energy Limited July 2012 to June 2013

Month	Flow L/s		pH		Total Cl_2 g/m³		Temp °C	
	Max	Avg	Min	Max	Max	Avg	Max	Avg
Jul-12	38.0	16.6	6.5	7.8	0.05	0.01	18.2	11.6
Aug-12	39.1	18.8	6.6	7.8	0.88	0.01	18.9	13.4
Sep-12	43.7	12.5	6.6	9.0	0.67	0.02	15.2	11.9
Oct-12	44.7	15.1	6.7	8.4	1.18	0.03	18.3	15.5
Nov-12	41.0	15.8	6.8	8.1	0.76	0.03	20.8	17.1
Dec-12	53.8	22.9	6.8	8.4	0.77	0.02	29.0	20.2
Jan-13	49.9	20.2	6.5	8.9	0.05	0.01	25.2	21.4
Feb-13	46.2	17.0	6.9	7.6	1.12	0.01	24.8	20.5
Mar-13	45.9	19.4	6.4	7.8	0.64	0.01	24.7	21.2
Apr-13	39.5	20.8	7.3	7.5	1.06	0.03	26.5	17.6
May-13	36.2	13.2	2.8	10.1	0.78	0.02	15.0	12.7
Jun-13	44.6	14.4	7.0	8.2	0.83	0.03	15.6	12.7
Limit	**78**		**6.0**	**9.0**	**0.05**			

Table 6 Monitoring of SP1 effluent by Contact Energy Limited July 2013 to June 2014

Month	Flow L/s		pH		Total Cl_2 g/m³		Temp °C	
	Max	Avg	Min	Max	Max	Avg	Max	Avg
Jul-13	38.0	16.6	6.6	8.3	0.86	0.13	17.0	12.7
Aug-13	42.7	12.0	6.7	7.6	0.05	0.02	16.7	13.2
Sep-13	42.3	11.2	6.5	7.9	0.10	0.02	15.8	14.0
Oct-13	49.0	15.7	6.7	8.1	0.04	0.01	18.9	16.2
Nov-13	49.4	13.0	6.8	8.4	0.07	0.01	21.5	18.2
Dec-13	48.5	24.6	6.5	8.5	0.05	0.01	24.3	21.3
Jan-14	51.6	23.9	6.5	8.5	0.05	0.01	25.5	21.3
Feb-14	48.4	17.8	6.5	7.6	0.06	0.01	24.6	22.4
Mar-14	46.8	17.7	6.6	7.9	0.32	0.01	24.6	20.4
Apr-14	41.2	15.7	6.6	7.7	0.11	0.01	22.4	18.9
May-14	45.4	10.5	6.5	7.5	0.05	0.02	19.4	15.7
Jun-14	40.7	13.8	6.9	7.8	0.11	0.00	13.3	12.2
Limit	**78**		**6.0**	**9.0**	**0.05**			

Flow

The discharge flow remained within the consent limit of 78 L/s throughout the 2012-2014 period.

In 2012-2013, the combined average discharge flow for the combined-cycle and peaker plants was 17.3 L/s, an increase of 1.7 L/s from the previous year, and the maximum recorded discharge flow was 53.8/s. The total volume of wastewater discharged for the year was about 504,559 m^3, an increase of about 11% over the previous year which related to treatment of water for use in SP1.

In 2013-2014, the combined average discharge flow for TCC1 and SP1 was 16.3 L/s, and the maximum recorded discharge flow was 63.3 L/s. The total volume of wastewater discharged for the year was 417,779 m^3, a decrease of about 17% from the previous year which related to a large reduction in operation of TCC1.

pH

The discharge pH remained within the consent range limit of 6.0 to 9.0 throughout the 2012-2014 period.

For TCC1, in 2012-2013, the minimum pH was 6.0, and the maximum 9.0. In 2013-2014, the minimum pH was 6.1, and the maximum 9.0.

For SP1, in 2012-2013, the minimum recorded pH was 2.8, and the maximum 10.1. These extreme values were recorded when there was no or minimal discharge, or a fault with the meter. In 2013-2014, the minimum pH was 6.5, and the maximum 8.5.

Each time the continuous pH monitor reading exceeds the consent range limit, the wastewater discharge valve at the relevant operations pit on the site automatically closes immediately (within one minute), ensuring discharge of off-specification wastewater to the river does not occur. The limits of when the discharge valve closes are set so that the valve activates outside the pH range 6.1 to 8.9. The pH excursions that were recorded were reported to relate to low sample flow, instrument maintenance or testing of the valve closure system, or to have occurred during the short period while the valve closes in response to a pH range excursion.

Chlorine

In 2012-2013, the average value for chlorine from continuous monitor reading at the combined-cycle plant was 0.01 mg/kg. The actual value exceeded the total residual chlorine limit of 0.05 mg/kg on several occasions, with a maximum of 0.63 mg/kg. These high values are ascribed to periods of low sample level in the analyser, instrument calibrations, or actual high values. Most often, high values occur due to low sample volume which happens when the circulation pump has stopped as a result of a low level in the effluent pit. The wastewater discharge valve was shut whenever the limit was exceeded; therefore compliance with consent conditions was achieved.

For the peaker plant, the average value for chlorine was 0.02 mg/kg, with a maximum of 1.18 mg/kg. The high values were ascribed to low sample volume in the analyser and blockages in the analyser.

In 2013-2014, the average value for chlorine at the combined-cycle plant was again 0.01 mg/kg, and the maximum value was 0.40 mg/kg. The wastewater discharge valve was shut whenever the limit was exceeded; therefore compliance with consent conditions was achieved.

For the peaker plant, the average value for chlorine was also 0.01 mg/kg, with a maximum of 0.32 mg/kg. In July 2013, the average recorded value was 0.13 mg/kg as the result of eight occasions when recorded chlorine value exceeded the limit for more than 10 seconds while the wastewater discharge valve was closing. Manual sampling was undertaken to check values before the discharge was restarted.

Temperature

The river temperature during the monitoring period remained below 25˚C, allowing for continuous discharge. River temperature differentials remained within consent limits throughout the monitoring period. The maximum temperature differential recorded was 0.88°C in 2012-2013, and 1.35°C in 2013-2014.

Stormwater

Contact Energy reported that discharges of stormwater to Kahouri Stream due to high rainfall occurred on 18 occasions in 2012-2013 and 25 occasions in 2013-2014. Discharges from refreshing of the raw water pond occurred on a total of six occasions in November/December 2012. Full compliance with the limits on pH range (6-9), suspended solids (100 g/m^3) and oil and grease (15 g/m^3) was reported.

2.4.3.2 Results of Council monitoring

The results of Council monitoring of effluent from the combined-cycle and peaker plants in 2012-2014 are presented in Table 7 Results of effluent monitoring by Taranaki Regional Council, compared to Contact Energy Limited results for temperature, pH and chlorine. Also presented are the corresponding results from continuous effluent monitoring by Contact Energy, and of grab samples taken by Contact Energy for inter-laboratory comparison.

Compliance monitoring

Consent **5848** places limits on the pH range and the total residual chlorine concentration in the effluent. On the basis of laboratory test results, compliance with consent conditions on pH and total residual chlorine in the effluent was achieved.

Comparison exercises

Comparisons are carried out between the Council and the Contact Energy laboratories on pH and free residual and total chlorine. The continuous temperature meter was checked with a field meter. Overall there was a good agreement on monitoring results.

Table 7 Results of effluent monitoring by Taranaki Regional Council, compared to Contact Energy Limited results for temperature, pH and chlorine

	Time	Flow	Temp C		pH		Free Cl_2 g/m³	Total Cl_2 g/m³		Condy @ 20°C	Turbidity	SS	Oil	Amm	DRP
	NZST	L/s	TRC	CE meter	TRC	CE meter	TRC	TRC	CE meter	mS/m	NTU	g/m³	g/m³	g/m³	g/m³
TCC1															
26-Sep-12	0930	7.3	18.5	18.4	7.2	7.41	<0.01	<0.01	0.006	87.6	2.1	3	<0.5	0.029	0.031
*30-Jan-13	1315	17.9	24.4	25.3	8.6	8.45	<0.01	<0.01	0.003	14.2	1.7	4	<0.5	0.007	0.013
20-Feb-13	0755	9.6	24.7	25.0	7.1	7.13	<0.01	0.02	0.017	101	2.0	5	<0.5	0.102	0.052
*18-Dec-13	0855	15.3	20.4	19.5	8.0	8.16	<0.01	0.01	0.004	11.9	1.2	2	<0.5	0.022	0.015
19-Feb-14	1045	22.2	21.3	21.6	7.6	7.48	<0.01	<0.01	0.023	45.4	1.5	<2	<0.5	0.162	0.044
*21-May-14	1130	6.5	13.3	13.4	7.5	7.59	<0.01	<0.01	0.000	12.9	0.83	<2	<0.5	0.017	0.021
SP1															
26-Sep-12	0915	17.0	13.4	14.7	7.1	7.14	<0.01	<0.01	0.011	18.0	1.2	9	<0.5	0.010	0.006
30-Jan-13	1305	17.2	25.1	24.8	7.5	7.40	<0.01	<0.01	0.002	32.7	1.6	18	<0.5	0.056	0.81
20-Feb-13	0825	18.2	20.0	20.0	7.5	7.43	<0.01	<0.01	0.035	26.8	1.0	10	<0.5	0.054	0.051
18-Dec-13	0820	25.0	21.3	19.3	6.7	6.88	<0.01	<0.01	0.011	40.2	2.1	16	<0.5	0.044	0.60
19-Feb-14	1030	16.4	21.9	23.7	7.2	7.15	<0.01	<0.01	0.024	38.7	1.6	10	1.2	0.078	0.98
21-May-14	1110	16.2	14.5	16.6	6.7	6.76	0.01	0.02	0.010	38.4	2.9	10	<0.5	0.015	1.05
Limit		**78**			**6.0 - 9.0**			**0.05**							

* Discharging and recirculating while plant not operating, for inter-laboratory comparison exercise

CE meter = Contact Energy on-line meter
Free Cl_2 = free chlorine
Total Cl_2 = total chlorine
Cond = conductivity at 20C
DRP = dissolved reactive phosphorus
Amm = ammonia
Oil = oil and grease
SS = suspended solids
Temp = temperature
Turb = turbidity

2.4.4 Results of receiving environment monitoring

2.4.4.1 Biomonitoring

Biomonitoring was conducted in the Patea River on 1 October 2012, 28 February and 11 November 2013, and 18 February 2014, and in the Kahouri Stream on 12 June 2013 and 25 February 2014. The full reports are given in Appendix IV. These surveys relate to the exercise of two consents.

Consent **5848-1** allows the discharge of cooling water into the Patea River approximately 1km upstream of its confluence with the Kahouri Stream. The discharge may be elevated in temperature and may contain nutrients and other contaminants. Consent **4459-1** allows the discharge of stormwater into the Kahouri Stream, approximately 3km upstream of its confluence with the Patea River. Condition 7 (v) and (vi) of consent **5848-1** and condition 4 (e) and (f) on consent **4459-1** specify that, beyond the mixing zone, the discharge shall not cause any significant adverse effects on aquatic life, habitats, or ecology nor any undesirable biological growths.

The Council's standard 'kick-sampling' technique was used at five established sites to collect streambed macroinvertebrates from the Patea River. Three of the sites are in the immediate vicinity of the discharge point, the other two further downstream below the abstraction point. Samples were processed to provide number of taxa (richness), MCI and $SQMCI_s$ scores, and EPT taxa 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 abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may be the more appropriate index if non-organic impacts are occurring.

Significant differences in either MCI or the $SQMCI_s$ between sites indicate the degree of adverse effects (if any) of the discharge being monitored.

The conclusions of the six surveys in the two catchments are presented below.

2.4.4.1.1 Patea River

1 October 2012

This spring macroinvertebrate survey undertaken following a lengthy period of power station discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge. Rather, changes were more subtle involving presence/absence of several (mainly 'sensitive') taxa rarities.

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained high proportions of 'sensitive' taxa at both sites (more typical of spring flow conditions) whereas the communities further downstream (below the

Kahouri Stream confluence) were typically dominated by a small increase in numbers of 'tolerant' taxa at some sites. The range in taxonomic richnesses (number of taxa) tended to be lower at the time of this spring survey compared to those of the previous summer 2012 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the river reach were of 'good' health and slightly better than the condition predicted for similar Taranaki ringplain rivers, following a period of higher flow conditions in winter and early spring.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar conditions to those monitored in the vicinity of the cooling water discharge but with a very small increase in the percentage of 'tolerant' taxa. Minimal significant changes in abundances within particular 'tolerant' and 'sensitive' taxa were recorded within this reach, and downstream decreases in the $SQMCI_s$ values through this reach were typical of past results. MCI scores were above historical median values at all sites and slightly higher than typical of communities at these distances from the National Park, but coincident with moderate periphyton substrate cover following a wet and higher flow period in late winter-early spring.

28 February 2013
This summer macroinvertebrate survey undertaken following periods of power station discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained moderately high proportions of 'sensitive' taxa at both sites (more typical of summer flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were typically dominated by a small increase in numbers of 'tolerant' taxa at some sites. The range in taxonomic richnesses (number of taxa) tended to be higher at the time of this summer survey compared to those of the previous spring 2012 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the river reach were of 'fair' health and in the condition predicted for similar sites in other Taranaki ringplain rivers, following a period of lower flow conditions over a dry late summer.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar community compositions to those monitored in the vicinity of the cooling water discharge but with very small increases in the percentages of 'tolerant' taxa. Minimal significant changes in individual taxon abundances were recorded within this reach, and minor downstream decreases in the $SQMCI_s$ values through this reach were smaller than typical of past results. MCI scores were near historical median values at all sites and typical of communities at

these distances from the National Park, coincident with relatively extensive periphyton substrate cover following a very dry, low flow period in late summer.

11 November 2013
This spring macroinvertebrate survey undertaken following periods of power station discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained moderately high proportions of 'sensitive' taxa at both sites (typical of spring flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were dominated by higher numbers of both 'moderately sensitive' and 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) tended to be lower at the time of this spring survey compared to those of the previous summer 2012-2013 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the river reach were of 'fair' to 'good' generic health and in the condition predicted for similar sites in other Taranaki ringplain rivers, following a period of moderate flow conditions following a wet early spring.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar community compositions to those monitored in the vicinity of the cooling water discharges. Minimal significant changes in individual taxon abundances were recorded within this reach, and minor downstream decreases in most of the $SQMCI_s$ values through this reach were smaller than typical of past results. MCI scores were equal with or slightly higher than historical median values at all sites and typical of communities at these distances from the National Park, coincident with limited periphyton substrate cover following a wet period in early spring.

18 February 2014
This late summer macroinvertebrate survey undertaken following periods of power station peaker plant discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained moderately high proportions of 'sensitive' taxa at both sites (typical of summer lower flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were dominated by higher numbers of both 'moderately sensitive' and 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) tended to be higher at the time of this summer survey and MCI scores insignificantly different compared to those of the previous spring 2013 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the entire river reach were of 'fair' to 'good' generic health and generally in the condition predicted for similar sites in other Taranaki ringplain rivers, following a period of low flow conditions following a dry mid-summer.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar community compositions to those monitored in the vicinity of the cooling water discharges with few significant changes in individual taxon abundances recorded. Downstream increases in the $SQMCI_s$ values through the reach below the Skinner Road site were atypical of past results. With the exception of the Skinner Road site (3), MCI scores were slightly higher than historical median values at all sites and typical of communities at these distances from the National Park, despite the survey coinciding with more extensive periphyton substrate cover following a dry period in mid-summer.

2.4.4.1.2 Kahouri Stream

12 June 2013
This late autumn macroinvertebrate survey indicated that the discharge of stormwater from the Contact Energy site had not had any significant detrimental effect on the macroinvertebrate communities of the stream, in comparison with historical results and also predicted MCI scores.

The macroinvertebrate communities of the stream contained a moderately high proportion of 'sensitive' taxa, with some 'highly sensitive' taxa also recorded, one in extreme abundance at both sites. At both sites taxonomic richness (number of taxa) and MCI scores did not differ significantly from the medians of previous surveys. There was some improvement in the $SQMCI_S$ score at both sites, as both recorded scores significantly higher than their respective median score. This was principally due to the 'highly sensitive' mayfly *Deleatidium* being extremely abundant, which is most likely attributable to the short period of time since a flood (seven days).

The results at site 1 did reflect a minor lingering impact of the disturbance works associated with the installation of a pipeline used to convey hydrocarbons, which preceded this survey.

MCI and $SQMCI_S$ scores indicated that the stream communities were of good 'health' and typical of communities in ring plain streams that are sourced outside of the National Park. Overall, the results do not indicate any discernible impact from the Contact Energy Site.

25 February 2014
This late summer macroinvertebrate survey indicated that the discharge of stormwater from the Contact Energy site had not had any significant detrimental effects on the macroinvertebrate communities of the stream, in comparison between sites, with historical results, and also with predicted MCI scores (for similar sites in ringplain, National Park-sourced streams).

The macroinvertebrate communities of the stream contained a moderately high proportion of 'sensitive' taxa, with some 'highly sensitive' taxa also recorded, one in

extreme abundance at both sites. At both sites taxonomic richness (number of taxa) and MCI scores did not differ significantly from the medians of previous surveys although at site 2 the MCI score was the highest recorded to date. There was also an improvement in the $SQMCI_S$ score at both sites, as both recorded scores were significantly higher than respective median scores, principally due to the extreme abundance of the 'highly sensitive' mayfly (*Deleatidium)*.

MCI and $SQMCI_S$ scores indicated that the stream communities were of 'good' generic biological health and typical of communities at sites in ring plain streams that are sourced within the National Park. Overall, the results did not indicate any discernible impact from the Contact Energy site discharges of stormwater.

2.4.4.2 Physico-chemical monitoring by Council

Council Officers collected water quality samples from the Patea River on six occasions during 2012-2014 at sites above the discharge point for the cooling and process wastewaters and at the boundary of the mixing zone 75 metres downstream. The results are presented in Table 8. Flow in the river at the recording station downstream at Skinner Road is included for assessment of relative effects of the power station effluent. The Kahouri Stream, a major tributary, joins the river between the discharge point and the recorder station.

No sampling occurred on three occasions that site inspections were undertaken, on 19 December 2012, 25 June and 25 September 2013, because receiving water flows were too high for adequate compliance monitoring. Additional samples were taken on 30 January 2013, when receiving water flows were relatively low. The monitoring on 20 February 2013 coincided with the annual low-flow survey of the discharge from Stratford municipal oxidation ponds.

Table 8 Patea River monitoring

Parameter	Units	Site	26-Sep-12	30-Jan-13	20-Feb-13	18-Dec-13	19-Feb-14	21-May-14
Discharge			**TCC+SP**	**TCC+SP**	**TCC+SP**	**TCC+SP**	**TCC+SP**	**TCC+SP**
Time	NZST	U	0950	1225	0920	0940	0940	1150
		D	1010	1245	0940	1000	1000	1205
Flow	L/s	Skinner Rd	3,474	1,262	1,145	2,503	905	2,580
		Discharge	7.3 + 17.0	17.9 + 17.2	9.6 + 18.2	15.3 + 25.0	22.2 + 16.4	6.5 + 16.2
Temperature	˚C	U	11.0	20.7	16.3	14.7	17.8	10.9
		D	11.1	21.1	16.6	15.1	18.0	11.1
Conductivity at 20˚C	mS/m	U	9.5	10.1	9.9	9.7	10.1	9.7
		D	10.1	10.9	12.2	10.2	11.6	10.1
pH	pH	U	7.8	8.8	8.3	7.6	8.1	7.8
		D	7.8	8.7	8.2	7.7	8.1	7.8
Ammonia	g/m^3 N	U	0.145	0.020	0.006	0.081	0.037	0.148
		D	0.132	0.019	0.010	0.074	0.026	0.134
Unionised ammonia	g/m^3 NH_3	U	0.002	0.005	0.000	0.001	0.002	0.002
		D	0.002	0.004	0.001	0.001	0.001	0.002
Dissolved reactive phosphorus	g/m^3 P	U	0.024	0.090	0.067	0.059	0.095	0.078
		D	0.023	0.111	0.066	0.068	0.125	0.095
Suspended solids	g/m^3	U	<2	2	3	<2	3	2
		D	<2	3	5	<2	4	2
Turbidity	NTU	U	0.96	1.5	1.3	1.0	2.8	1.3
		D	1.2	1.5	1.7	1.0	2.3	1.3

U = upstream of discharge point (Site Code PAT000356)
D = downstream of discharge point (Site Code PAT000357)

The discharge of power plant effluent had negligible effect on the river in terms of physical appearance, nutrient concentration, pH and temperature, except on 21 May 2014, when there was some foaming within the mixing zone – the cause was found to be the discharge from SP1 operations pit, the flow of which was reduced for a period.

Turbidity and suspended solids levels remained relatively constant.

The concentration of nutrients, in terms of ammonia and dissolved reactive phosphorus (DRP), was governed largely by the discharge from Stratford oxidation ponds upstream. There was a measureable increase in DRP on four of the six monitoring occasions, each when the peaker plant effluent contained a significant amount of DRP – there was no statistical increase in (flow-adjusted) level of DRP recorded for the Patea River at Skinner Road, 2.0 km downstream at the regional state of the environment monitoring site that is monitored monthly. Ammonia concentration differed little between the two monitoring sites and was below levels allowed by consent conditions.

The temperature increase measured in the river was between 0.1 and 0.4˚C, at times of normal effluent discharge rate.

2.4.4.3 Temperature monitoring by Contact Energy

The river temperature remained below 25˚C throughout the monitoring period, allowing for continuous discharge.

In 2012-2013, the maximum river temperature recorded for the downstream monitoring site was 21.58˚C at 1725 NZDT on 31 January 2013. The maximum temperature recorded for the upstream monitoring site was 21.45°C at 1748 NZDT on 3 February 2013.

The average temperature increase caused by the plant discharge was 0.10˚C. The highest temperature differential was 0.88˚C, recorded on 23 January 2013 at 1149 NZDT. The average plant discharge rate was 17.33 l/s. The average flow rate of the Patea River at Skinner Road was 4,548 l/s.

In 2013-2014, the maximum river temperature recorded for the downstream monitoring site was 21.28˚C at 1658 NZDT on 20 February 2014. The maximum temperature recorded for the upstream monitoring site was 21.19°C at 1619 NZDT on 21 February 2014.

The average temperature increase caused by the plant discharge was 0.14˚C. The highest temperature differential was 0.43˚C, recorded on 4 March 2014 at 0754 NZDT. The average plant discharge rate was 16.32 l/s. The average flow rate of the Patea River at Skinner Road was 4,694 l/s.

2.5 Results - Air

2.5.1 Inspections

Inspections in relation to emissions to air comprise assessment of the visual effect of discharges from the power station site, particularly the cooling towers, and a visit to the control room to view and discuss air monitoring results. The equipment in the TCC1 air monitoring shed is also included.

Inspections took place on 26 September and 19 December 2012, 20 February, 25 June, 25 September and 18 December 2013, and 10 April and 21 May 2014.

Compliance with condition 16 of consent **4454** and condition 5 on consent **7247**, in respect of non-production of a visible plume from the evaporative cooling systems except under certain meteorological conditions was achieved at the time of each inspection.

Staff of Contact Energy Limited were found to have a good knowledge of the environmental aspects of running the plant, and to have proper training in dealing with contingency events that have potential for causing adverse environmental effects.

2.5.2 Results of discharge monitoring

The station has provided to Council a monthly summary of its emissions monitoring data. The report covers the average, minimum and maximum concentrations of nitrogen oxides (NO_x), oxygen (O_2), carbon monoxide (CO) and carbon dioxide (CO_2). The results are summarised in Table 9.

Total emissions of CO_2 for the 2012-2013 year were 920,288 tonnes, comprising 681,781 tonnes from TCC1 and 238,507 tonnes (estimated) from SP1. For TCC1, this represented a decrease of 104,452 tonnes or 13% from the previous year. For SP1, this represented an increase of 44,282 tonnes or 23% from the previous year.

In 2013-2014, total emissions of CO_2 from Stratford Power Station were 432,791 tonnes, comprising 287,849 tonnes from TCC1 and 144,942 tonnes (estimated) from SP1. This represented a reduction of 487,497 tonnes, or 53.0%, compared to 2012-2013, reflecting the reduction in operational time in 2013-2014.

The relative contribution from TCC1 decreased, from 74% to 67%, with a corresponding increase for SP1, from 26 to 33%.

The limit imposed by consent **4454-1** on NO_x mass discharge rate (430 kg/h) from TCC1 was complied with throughout 2012-2014. Stack testing of the SP1 units under full load during commissioning in March 2011 had demonstrated compliance with NO_x emission concentration and mass discharge limits on consent **4022-2**. (See section 2.5.3).

Table 9 Air monitoring results for TCC1 plant

Parameter	Unit	Average													Maximum													Annual total											
		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14
NOx	ppm	8.7	9.3	7.7	7.5	9.3	7.5	7.4	6.1	7.4	6.4	12.0	10.9	2.9	80	80	80	80	80	80	80	80	81	80	80	80	80													
	kg/h	32	33	24	20	35	26	26	23	23	20				155	171	146	277	317	346	359	298	277	332	137	126	105													
	tonnes																											283	287	214	178	304	232	230	214*	204*	177	344	309	80
Carbon dioxide	t/h	111	103	81	71	122	91	91	91	71	62	89	78	33	145	147	154		161	306	189	167	171	212	184	199	151													
	Mtonnes																											0.969	0.911	0.718	0.627	1.106	0.801	0.801	0.792	0.621	0.551	0.786	0.682	0.288
Carbon monoxide	ppm	12	22	50	88	4	20	32	56	51	87	50	55	43	412	403	403	403	401	412	402	401	401	412	412	408	412													
Consent limits for NOx	ppm kg/h														**50** **430**																								

2.5.3 Emissions testing of Stratford Peaker Plant

Consent 4022-2 places limits on the concentration and mass emission rate of nitrogen oxides (NO_x) discharged to air from the two gas turbines at SP1. Limits are also imposed on maximum ground level concentration of carbon monoxide, nitrogen oxides and other contaminants derived from emissions to atmosphere from the site at or beyond the site boundary under ambient conditions, that is, accounting for emissions from all plants at the site.

The Council did not require Contact Energy to install continuous metering to monitor compliance with the NO_x emission limits for SP1, as was done for TCC1, because of the NO_x control technology employed and the relatively regular cycle of emissions for peaker plants of that design. Instead, Council required Contact Energy to demonstrate by stack testing during commissioning of SP1 that the discharge of contaminants would comply with the emission limits under worst case operating conditions, and that, on the basis of air dispersion modelling using the hard data from testing of SP1 and TCC1, compliance with ground level concentration limits would be achieved.

Stack testing of emissions from the two SP1 machines was undertaken on 25 and 26 March 2011. Officers of the Council attended the testing. The results are presented in Table 10. Both machines were run at full load of 108MW. The duration of combustion gas sampling was 110 minutes for each machine. Volumetric flow rate, dry at STP, was 207 – 211 Nm^3/s at 15%O_2.

Table 10 Results from emission testing of Stratford Peaker Plant, March 2011

Constituent		Concentration			Mass rate, g/s		
		Unit 21	Unit 22	Limit	Unit 21	Unit 22	Limit
Oxides of Nitrogen(NO_x) as NO_2	ppm	30	31	125	9.4	9.8	175
Oxides of Nitrogen(NO_x) as NO_2	ppm @ 15% O_2	22	23				
Oxides of Nitrogen(NO_x) as NO_2	mg/Nm^3	61	63				
Carbon monoxide	ppm	17	18		3.2	3.4	NA
Carbon monoxide	ppm @ 15% O_2	13	13				
Carbon monoxide	mg/Nm^3	21	22				
Carbon Dioxide	% v/v dry	5.2	5.3				
Oxygen	% v/v dry	13.0	12.9				
Moisture content	% v/v	12.3	11.4				

The results demonstrate compliance with the NO_x consent limits at full load, emission concentration being about 25% of the limit, and mass emission rate about 5% of the limit.

The data from emission testing of SP1, used together with existing test data for the TCC1, confirmed air dispersion modelling results that limits on NO_x and carbon monoxide at ground level at and beyond the site boundary would be achieved.

Other emission testing, carried out during combustion tuning at commissioning, demonstrated that compliance with the consent limits on NO_x was achieved during "dry" operation, that is, without the water control system, throughout the range of generation conditions, albeit at higher values than under "wet" operation.

In August 2012, Contact Energy reported the first of a series of problems with the NO_x water control system in both peaker plants, which resulted in the cessation of all use of water for NO_x control in June 2013.

Additional emission testing, for NO_x and other combustion products, to improve tuning of the plants for optimal power output versus efficiency under both dry and wet operation, was being planned at the end of the reporting period.

2.5.4 Reviews and audits

All three air discharge consents that cover emissions from fuel combustion at Stratford Power Station include a condition that requires Contact Energy to provide the Council with reports:

- reviewing technological advances in reducing or mitigating plant emissions
- providing a site emissions inventory
- describing the energy efficiency of the plant
- covering other matters relating to mitigation or emission reduction, and
- detailing carbon dioxide emissions from the site.

A summary of the most recent report(s) is provided in the annual monitoring report by Council.

In relation to TCC1, under condition 8 of consent **4454-1**, Contact Energy was required to provide the Council with such a report within two years and four years of commissioning the plant and then at six-yearly intervals. The plant was commissioned on 1 February 1998. The first report was received by Council in the 1999-2000 monitoring year and the second in the 2001-2002 year. The third report was received in the 2009-2010 year. The fourth report, due on 1 February 2014, was delayed, so that it could be presented together with the report for SP1 that was due 10 months later.

In relation to SP1, under condition 3 of consent **4022-2**, Contact Energy was required to provide the Council with such a report for the (old) Stratford Gas Turbine Plant within two years from the granting of the (replacement) consent in December 1994 and every six years thereafter. The last such report was considered to be the Assessment of Effects report that was produced in February 2008 in support of the application to change the purpose of consent **4022-2** to provide for operation of SP1. The next report is due by 14 December 2014.

In relation to the as yet unbuilt third plant of either open or closed-cycle design, under condition 6 of consent **5846-1,** Contact Energy was required to provide the Council with such a report within two years and four years of commissioning the plant and then at six-yearly intervals. The cooling tower plume was to be addressed specifically.

The most recent report on TCC1, that was received in August 2009, is attached as Appendix VI. The main points of the report are summarised below.

Technological advances

The plant already incorporates many of the features of the latest technology, such as EV burners and sequential combustion. The most notable advances in the mitigation of carbon dioxide emissions relate to alternative electricity generation, however most of these are not economically competitive with current technology at the Stratford plant.

Energy efficiency improvements

Refurbishment of the main turbine and a compressor blade in early 2008 resulted in an output increase of 24MW and an efficiency improvement of 0.76%.

2.6 Investigations, interventions, and incidents

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

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

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 2012-2014 period, it was necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with Contact Energy's conditions in resource consents or provisions in Regional Plans in relation to the Company's activities on one occasion.

On 15 January 2013, Contact Energy notified the Council that a leak had developed in the pipeline carrying plant effluent to Patea River (for discharge under consent **5848-1**) at the bridge over Kahouri Stream the previous afternoon. A small flow, mainly water treatment plant and cooling waters, had entered Kahouri Stream. The leak had been stopped immediately upon discovery, and all discharge from the station ceased until the pipe was repaired. Investigation found that the leak had developed at the location of a previous minor leak, with no explanation. A permanent Ford clamp was placed across the affected section. No adverse effect was

observed in Kahouri Stream, which flooded with rain the next day. No further action was taken.

Another incident, that did not involve unauthorised activity, was notified by Contact Energy on 11 April 2014. A crane, which had been parked on land owned by Transpower New Zealand Ltd opposite the station site across an unnamed tributary of Kahouri Stream, awaiting entry to the site, had run down the bank of the tributary. Given the potential for contamination with diesel, oil and hydraulic fluids, Council deployed an oil boom across the tributary while the crane was lifted out. No contamination occurred.

2.7 Discussion

2.7.1 Discussion of plant performance

Contact Energy provided regular documentation on plant performance. All documentation was reviewed by the Council and found to be satisfactory, meeting consent requirements.

Continuous emission monitoring by Contact Energy has demonstrated compliance with the air discharge permits. The monitoring showed a high level of performance in terms of low concentrations of various contaminants in the plant emissions.

Continuous monitoring by Contact Energy of water abstraction from the Patea River showed compliance with consent conditions throughout the year. The volume abstracted, which had increased in June 2011 upon commissioning of SP1, reduced markedly (by 46%) between 2012-2013 and 2013-2014 as the result of less operation of TCC1, from 264 to 138 days, and the cessation of use of water for NOx control in SP1. The proportion of the volume abstracted that was discharged back to the Patea River increased, from 29 to 45%, as the result of less evaporative cooling from operation of TCC1.

Monitoring of plant effluent, comprising mainly TCC1 cooling water and SP1 water treatment wastewater, was carried out largely by the Contact Energy, with checks undertaken by the Council. There was high compliance with conditions on the discharge permit.

Contact Energy Limited produced an annual report to the Council on the fifteenth and sixteenth years of operation of the power station (Appendix V). The reports are satisfactory.

The effluent management plan was revised in December 2009 to cover the SP1 effluent. The plan was satisfactory. A new site emergency response plan, which covers fire, criminal actions, chemical/oil spill, earthquake, volcanic eruption and gas leak/explosion, among other things, was released in November 2013.

2.7.2 Environmental effects of exercise of water consents

The environmental effects in the Patea River system of discharges from the combined cycle power station were monitored through chemical analysis and biological survey of the Patea River above and below the plant effluent discharge point on East Road,

and by biological survey of the Kahouri Stream above and below the stormwater discharge point beside the plant. Permanent temperature monitors are established in the Patea River immediately upstream of the effluent diffuser and at the mixing zone boundary 75 metres downstream.

Chemical testing conducted on samples taken from the Patea River above and below the discharge point under relatively low flow conditions indicated that the discharge had little effect on receiving water quality. There was negligible change in pH, suspended solids, or turbidity. A slight increase in dissolved phosphorus concentration was noted on most occasions that the peaker plant was discharging. It is noted that the concentration of nutrients upstream is somewhat elevated as the result of the discharge from Stratford municipal oxidation ponds.

Temperature increase is usually the most important environmental effect associated with thermal power stations. The maximum temperature increase recorded by Contact Energy in 2012-2013 was 0.88°C, at a flow of 1,499 litres/second at Skinner Road. In 2013-2014, the maximum recorded temperature increase was 1.53°C, at a corresponding flow of 782 litres/second.

Biological surveys carried out in the Patea River in October 2012, February and November 2013, and February 2014, and in the Kahouri Stream in June 2013 and February 2014, showed no impacts of any recent discharges from SPS upon the biological communities of in the vicinity of the discharges. There was a minor effect on the (upstream) control site in Kahouri Stream in June 2013 from pipeline installation works, as a result of change in stream bed and loss of shading. No effect was apparent in the February 2014 survey.

2.7.3 Environmental effects of exercise of air discharge permit

2.7.3.1 Neighbourhood effects

Monitoring in previous years around the station of dust, plume, and nitrogen oxide levels has confirmed there are no local issues arising from aerial emissions. The monitoring programme in the period under review reflected this, with the main emphasis being on ongoing inspections to confirm the status quo, and on auditing the Company's own emissions monitoring data.

All emissions complied with the resource consent conditions.

2.7.3.2 Global effects

Total emissions of carbon dioxide for the year were 920,288 tonnes in 2012-2013 and 432,791 tonnes in 2013-2014, a decrease of 53%. This reflected a large reduction in power generation in 2013-2014. As described earlier, under alterations to consent **4454**, Contact Energy is no longer required to provide a yearly carbon dioxide emissions report.

2.8 Evaluation of performance

A tabular summary of the Company's compliance record for consents that were exercised during the year under review is set out in Table 11 to Table 22 below.

Table 11 Summary of performance for Consent **3939-2** - to discharge stormwater into the Kahouri Stream from Stratford Peaker Plant

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Effects not to be present below mixing zone	Site inspections	Yes
2. Limits on contaminant levels in discharge	Samples collected by Contact Energy	Yes
3. Discharge to be undertaken in accordance with application	Site inspections	Yes
4. Optional review of consent	Next review date available June 2016.	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

Table 12 Summary of performance for Consent **4022-2** to discharge emissions to air from SP1

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option (BPO)	Site inspections - checking that standard operating procedures to achieve compliance with conditions are followed	Yes
2. Consulting over significant proposed changes	Liaison during visits..	Yes
3. Provision of reports on specific monitoring/investigations	Last 6-yearly report considered part of AEE for consent change for peaker plant. Next report due 14 December 2014	N/A
4. Limit on ambient carbon monoxide	Not monitored beyond boundary, as source monitoring at commissioning and modelling gave low results	N/A
5. Limit on ambient nitrogen oxides	Not monitored beyond boundary, as source monitoring at commissioning and modelling gave low results	N/A
6. Limit on other emissions at boundary	Not monitored beyond boundary, as source monitoring at commissioning and modelling gave low results	N/A
7. Limits on nitrogen oxides outside start-up or shut-down periods	Stack testing during commissioning of plants on 25 and 26 March 2011	Yes
8. Limit on nitrogen oxides mass discharge rate	Stack testing during commissioning of plants on 25 and 26 March 2011	Yes
9. Stack height	Inspection by Council	Yes
10. Ecological effects	Inspection by Council and observation of vegetation	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Optional review of consent	Option not available, as no report required under condition 3	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**Good**

Table 13 Summary of performance for Consent **4454-1** to discharge emissions to air from TCC1

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option (BPO)	Site inspections - checking that standard operating procedures to achieve compliance with conditions are followed	Yes
2. Outline BPO measures at time of commissioning	Report provided in 1998, as required	N/A
3. Option to review BPO measures	No review sought by Council	N/A
4. Consulting over significant proposed changes	Liaison during visits. No significant changes undertaken during year	N/A
5. Provision of reports on specific monitoring/investigations	Third report received August 2009. Provision of next report, due 1 February 2014, delayed so as to combine with report under consent **4022-2**, due December 2014.	N/A
6. Limit on ambient carbon monoxide	Not monitored beyond boundary, as continuous CO emission monitoring by Contact Energy gave low results	N/A
7. Limit on ambient nitrogen oxides	Not monitored, as emissions monitored continuously by Contact Energy, and previous ambient monitoring by Council, gave low results	N/A
8. Limit on other emissions at boundary	Not monitored, as emissions monitoring by Contact Energy and dispersion modelling demonstrated no need	N/A
9. Limits on nitrogen oxides outside start-up or shut-down periods	Continuous monitoring by Contact Energy and monthly report to Council.	Yes
10. Limit on nitrogen oxides mass discharge rate	Continuous monitoring by Contact Energy and monthly report to Council	Yes
11. Stack height	Inspection by Council	Yes
12. Ecological effects	Inspection by Council and observation of vegetation	Yes
13. Visibility of cooling system plume	Inspection and observation by Council and Contact Energy	Yes
14. Cooling system drift	Inspection and observation by Council	Yes
15. Optional review of consent	Next review date available June 2016.	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
16. Lapse of consent	Consent was exercised	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 14 Summary of performance for Consent **4455-1** - to take water from the Patea River

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Measurement of abstraction rate	Continuous flow metering by Contact Energy and monthly report	Yes
2. Limit on maximum abstraction rate	Continuous flow metering by Contact Energy and monthly report to Council	Yes
3. Limit on abstraction rate during low river flows	Continuous flow metering by Contact Energy and monthly report to Council	Yes
4. Limit on abstraction rate during very low river flows	Continuous flow metering by Contact Energy and monthly report to Council	Yes
5. Optional review of consent	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 15 Summary of performance for Consent **4456-1** – intake structure

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Notification of works	No maintenance undertaken	N/A
2. Construction and maintenance in accordance with documentation		N/A
3. Adopt BPO to prevent or minimise adverse effects		N/A
4. Riverbed disturbance and reinstatement		N/A
5. Removal of structure when no longer required		N/A
6. Timing of works		N/A
7. Optional review provision	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 16 Summary of performance for Consent **4458-1** – discharge structure

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Provision of design plans	Plans received by Council and approved in 1996	Yes
2. Construction and maintenance in accordance with documentation		N/A
3. Passage of fish not to be obstructed	No monitoring during review period. Trout monitoring survey in January 2004 did not show any effect	N/A
4. Notification prior to and after maintenance	No maintenance during period under review	N/A
5. Timing of works	No maintenance during period under review	N/A
6. Adopt best practicable option to prevent or minimise adverse effects	Liaison with Contact Energy and inspection of diffuser	Yes
7. Riverbed disturbance and reinstatement		N/A
8. Removal of structure when no longer required		N/A
9. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 17 Summary of performance for Consent **4459-1** - to discharge stormwater

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Provision of plans prior to completion of construction	Plans received by Council	Yes
2. Concentration limits upon potential contaminants in discharge	Monitored by Contact Energy.	Yes
3. Provision of contingency plan	Plan received by Council and approved 1996. Most recent update produced November 2013. No revision required	Yes
4. Controls on effect of discharge in receiving water	Inspection and biological monitoring by Council	Yes
5. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 18 Summary of performance for Consent **4460-1** – stormwater structure

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Provision of plans	Plans received by Council and approved	Yes
2. Construction and maintenance in accordance with documentation	Site inspection by Council	Yes
3. Passage of fish not to be obstructed	No monitoring during review period, as design of structure satisfactory	N/A
4. Notification prior to and after maintenance	Notification received	Yes
5. Timing of works	Inspections	Yes
6. Adopt best practicable option to prevent or minimise adverse effects	Inspections	Yes
7. Riverbed disturbance and reinstatement	Inspections	Yes
8. Removal of structure when no longer required		N/A
9. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 19 Summary of performance for Consent **4461-1** – utility structures

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Provision of plans	Plans received by Council and approved	Yes
2. Construction and maintenance in accordance with documentation	Site inspection by Council	Yes
3. Passage of fish not to be obstructed	No monitoring during review period, as design of structure satisfactory	N/A
4. Notification prior to and after maintenance		N/A
5. Timing of works		N/A
6. Adopt best practicable option to prevent or minimise adverse effects		N/A
7. Riverbed disturbance and reinstatement		N/A
8. Removal of structure when no longer required		N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
9. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 20 Summary of performance for Consent **4462-1** - structures for water transmission

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Provision of design plans	Plans received by Council and approved in 1996	N/A
2. Construction and maintenance in accordance with documentation	Site inspection by Council	Yes
3. Passage of fish not to be obstructed	No monitoring during review period, as design of structure satisfactory	N/A
4. Notification prior to and after maintenance		N/A
5. Timing of works		N/A
6. Adopt best practicable option to prevent or minimise adverse effects		N/A
7. Riverbed disturbance and reinstatement		N/A
8. Removal of structure when no longer required		N/A
9. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 21 Summary of performance for Consent **4804-1** - electricity transmission structures

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Provision of design plans	Plans received by Council and approved in 1996	Yes
2. Construction and maintenance in accordance with documentation	Site inspection by Council	Yes
3. Notification prior to and after maintenance	No monitoring during review period, as design of structure satisfactory	N/A
4. Timing of works		N/A
5. Adopt best practicable option to prevent or minimise adverse effects		N/A
6. Riverbed disturbance and reinstatement		N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
7. Removal of structure when no longer required		N/A
8. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 22 Summary of performance for Consent **5063-1** - to discharge septic tank effluent to land

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Installation according to plan submitted	Installation inspected by Council	Yes
2. Prohibition on surface run-off	Inspection by Council	Yes
3. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 23 Summary of performance for Consent **5633-1** - to discharge sediment from water intake

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge according to documentation submitted	Inspection by Council	Yes
2. Controls on effect of discharge in receiving water	Inspection and biological monitoring by Council	Yes
3. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 24 Summary of performance for Consent **5848-1** - to discharge used water

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge in accordance with effluent disposal management plan	Inspection by Council, and provision of annual report by Contact Energy	Yes
2. Provision and revision of effluent disposal management plan	Plan received by Council and approved 1996. Most recent update received February 2010 approved by Council. Updated Plan currently being prepared by Consent Holder.	Yes
3. Provision of details on proposed new water treatment chemicals	Liaison with Contact Energy. Written notifications.	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
4. Provision of details on proposed new cleaning chemicals	Liaison with Contact Energy. Written notifications.	Yes
5. Optional review of consent on notification of new chemicals	No review required	N/A
6. Provision and maintenance of contingency plan	Plan received by Council and approved. Most recent update produced November 2013.	Yes
7. Controls on effect of discharge in receiving water	Inspection and biological monitoring by Council	Yes
8. Passage of fish not to be obstructed	No monitoring during review period. Trout monitoring survey in January 2004 did not show any effect	Yes
9. Limit on river temperature increase	Continuous monitoring and monthly reporting by Contact Energy, and measurement checks by Council	Yes
10. Limit on maximum river temperature	Continuous monitoring and monthly reporting by Contact Energy, and measurement checks by Council	Yes
11. Consent holder to continuously monitor temperature and provide records	Monthly reporting by Contact Energy	Yes
12. Concentration limits upon potential contaminants in discharge	Continuous monitoring and monthly reporting by Contact Energy, and measurement checks by Council	Yes
13. Limit on ammonia in river	Monitoring by Council	Yes
14. Lapse of consent	Consent was exercised	N/A
15. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 25 Summary of performance for Consent **7247-1** – to discharge emissions to air from the operation of the cooling tower associated with the Stratford Peaker Plant

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option (BPO)	Site inspections - checking that standard operating procedures to achieve compliance with conditions are followed	Yes
2. Cooling tower design as described in application	Inspection by Council	Yes
3. Prior notification of exercise of consent	Notification received 10 November 2010	N/A
4. Minimisation of emissions	Inspection by Council	Yes
5. Visibility of cooling system plume	Inspection and observation by Council and Contact Energy	Yes
6. Cooling system drift	Inspection and observation by Council	Yes
7. Description of water treatment regime to be provided	Description provided 10 November 2010	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
8. Consulting over significant proposed changes	Liaison during visits. No significant changes undertaken during year	Yes
9. Offensive odour prohibited	Inspection by Council	Yes
10. Ecological effects	Inspection by Council and observation of vegetation	Yes
11. Lapse of consent	Consent was exercised	N/A
12. Optional review of consent	Next review date available June 2016.	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 26 Summary of performance for Consent **7248-1** - to erect a bridge for vehicle access over the Kahouri Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Site inspections	Yes
2. Provision of bridge plans prior to construction	Not received.	No
3. Notification prior to exercise of consent	Notification received 15 February 2010	N/A
4. Minimisation of sediment in stream	Site inspections	Yes
5. Area and volume of disturbance to be minimised	Site inspections	Yes
6. Structure removed and area reinstated if no longer required		N/A
7. Lapse of consent		N/A
8. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**Good**

N/A = not applicable

Table 27 Summary of performance for Consent **7250-1** - to erect a bridge for utilities over the Kahouri Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Site inspections	Yes
2. Provision of bridge plans prior to construction	Not received.	No

Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Notification prior to exercise of consent	Notification received 15 February 2010	N/A
4. Minimisation of sediment in stream	Site inspections	Yes
5. Area and volume of disturbance to be minimised	Site inspections	Yes
6. Structure removed and area reinstated if no longer required		N/A
7. Lapse of consent		N/A
8. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 28 Summary of performance for Consent **7605-1** – stormwater structure TCC1

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Site inspections	Yes
2. Notification prior to exercise of consent	Notification received 16 March 2010	N/A
3. Area and volume of disturbance to be minimised	Site inspections	Yes
4. Minimisation of sediment in stream	Site inspections	Yes
5. Structure removed and area reinstated if no longer required		N/A
6. Lapse of consent		N/A
7. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Table 29 Summary of performance for Consent **7653-1** – stormwater structure SP1

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Exercise of consent in accordance with application	Site inspections by Council	Yes
2. Timing of works	Site inspections	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Notification prior to exercise of consent	Notification received 9 July 2010	N/A
4. Area and volume of disturbance to be minimised	Site inspections	Yes
5. Minimisation of sediment in stream	Site inspections	Yes
6. Structure removed and area reinstated if no longer required	Site inspections	N/A
7. Lapse of consent		N/A
8. Optional review provision re environmental effects	Next review date available June 2016	N/A
Overall assessment of consent compliance and environment performance in respect of this consent		**High**

N/A = not applicable

Overall, during the period under review, the Company overall demonstrated a high level of environmental performance and compliance with the resource consents.

2.9 Recommendations from the 2010-2012 Biennual Report

In the 2010-2012 Biennial Report, it was recommended:

1. THAT monitoring of water abstraction and discharges in relation to the Stratford Power Station of Contact Energy Limited in the 2012-2013 year continue at the same level as in 2011-2012.

2. THAT monitoring of air emissions from the Stratford Power Station of Contact Energy Limited in the 2012-2013 year continue at the same level as in 2011-2012.

These recommendations were implemented.

2.10 Alterations to monitoring programmes for 2014-2015

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council had taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within the Taranaki emitting to the atmosphere/discharging to the environment.

In the case of Contact Energy, the programme for 2012-2013 and 2013-2014 was unchanged from that for 2010-2011. It is proposed that for 2014-2015, the monitoring programme for the Stratford Power Station essentially continues at the same level as in 2013-2014.

A recommendation to this effect is attached to this report.

2.11 Recommendations

1. THAT monitoring of water abstraction and discharges in relation to the Stratford Power Station of Contact Energy Limited in the 2014-2015 year continue at the same level as in 2013-2014.

2. THAT monitoring of air emissions from the Stratford Power Station of Contact Energy Limited in the 2014-2015 year continue at the same level as in 2013-2014.

3. Ahuroa Gas Storage

3.1 Process description

3.1.1 Site overview

Contact Energy Ltd (Contact) holds resource consents to store natural gas in a depleted hydrocarbon reservoir in the Tariki formation, using injection and extraction facilities located at the Ahuroa-B wellsite east of Midhirst (shown Photo 2 and Figure 3). Ahuroa-B wellsite was established by Petroleum Corporation of New Zealand Ltd (Petrocorp) in 1986, following which four production wells were drilled by Petrocorp, Fletcher Challenge Energy New Zealand Ltd and Swift Energy New Zealand Ltd. From 2008, Contact (under operatorship of Origin Energy Ltd) began to develop the Ahuroa underground gas storage (AGS) project.

Storage involves the injection of gas into a depleted sub-surface reservoir. Natural gas is typically injected during periods when the demand for gas supply is relatively low (e.g. in the summer months). As the demand for gas supply increases, the injected gas is withdrawn from the storage reservoir.

Photo 2 Ahuroa-B site layout, facing north-west, 13 May 2014

3.1.2 Geological setting

At Ahuroa, gas is injected, using cased wells at a depth of approximately 2,300 m, into the reservoir sandstone, known as the Tariki Sandstone Member. This member consists of interbedded sandstone, siltstone and mudstone deposited as submarine fans during the Oligocene (~30mya) as part of the Otaraoa Formation. Periods of tectonic activity during the Oligocene and Early Miocene (~20mya) subsequently modified the structural geology of the region, particularly in relation to tectonic stresses acting upon the Taranaki Fault and Tarata Thrust Fault. The Tarata Thrust Fault is adjacent to the

Ahuroa complex/system and aids in the effective trapping and storage of gas, in addition to the amalgamated sandstone deposits in the Tariki Sandstone Member which provide good reservoir quality and are overlain by alternating intervals of thin and thick siltstones predominantly the Otaraoa formation, which form a continuous top-seal.

The potential environmental risk associated with this gas storage activity relates to the possible unintentional release of natural gas into the receiving environment, particularly into groundwater aquifers. Appropriate reservoir selection and continual pressure monitoring are integral safeguards implemented to mitigate against this risk.

The nearest potable water aquifer to the reservoir is in the Matemateaonga Formation, the base of which is located approximately 950 metres below ground level, some 1,300 m above the storage reservoir. There are also at least three known hydrocarbon reservoirs in the overlying formations, meaning that, in the highly unlikely event of any gas losses, any potential upward migration of gas would likely be intercepted by these reservoirs on the way to surface.

3.1.3 Gas injection/extraction

At the Ahuroa-B site, the gas storage project has been developed in two stages. The initial storage utilised the existing Ahuroa 2A production well (identified in Figure 1) to inject gas. The secondary stage involved the drilling of an additional three injection wells (Ahuroa 3, 4 and 5A, Figure 1), and the installation of additional compressors and surface processing equipment.

The site is configured so that the gas can run either through New Zealand Energy Corporation Ltd's (NZEC's) Waihapa production station (WPS) and then to Ahuroa through the original 8-inch gas line, or through the new 18-inch gas line from the New Zealand gas transmission system via Contact's Stratford power station. The system can be configured to either inject or extract through one or more injection wells at any time using the same surface equipment, but cannot extract through one well and inject through another simultaneously.

During injection, gas comes in through either the Waihapa or Contact Energy line and into the compressor. The compressor raises the pressure of the gas so it can overcome both friction losses in the pipe and well and the reservoir pressure so that injection into the reservoir is possible.

Extraction is a similar process to general gas production. During extraction, relatively small quantities of produced water and gas consdensate are brought to surface with the gas. These are separated out in the facilities on site. The produced water is piped to a 60 m^3 storage tank on site, before being transported by road tanker to Waihapa production station to be deep-well injected. The condensate is separated and piped directly to Waihapa. No condensate is stored on site.

Continual pressure monitoring is conducted using Rosemount pressure sensors at surface and down-hole locations on the Ahuroa 3, 4 and 5A wells.

Figure 3 Ahuroa B wellsite and gas storage facilities showing main components and discharge sampling site IND000146

3.1.4 Pressure monitoring

Pressure data are essential in understanding reservoir behaviour and response to injection and extraction, and in ensuring reservoir and pipeline integrity. Temperature and pressure data are monitored by operators at the Waihapa production station control room. High and low alarms are set on all the recorded pressure data to ensure any potential irregularities are quickly detected by site operators.

Both the pipeline and the reservoir pressure alarms are significantly lower than the design pressure (of the pipeline) or the known safe pressure (for the reservoir).

Hydraulic control valves are installed which can be used to shut the wells in either remotely, through manual valves, or automatically or if required should there be a pressure anomaly during injection or extraction. In an extreme emergency, if none of the control valves is working, there is a valve set a few hundred metres sub-surface which will automatically close if the well is exposed to atmospheric pressures.

3.1.5 Pipeline to Stratford Power Station

An 18-inch pipeline, 8.5km in length, was installed between AGS and SPS in 2013 for the bidirectional conveyance of gas associated with the AGS project. A fibre optic cable was installed in the same trench. The pipeline route crosses 14 waterways, comprising the Kahouri and Piakau Streams and unnamed tributaries of the Kahouri (2) and Piakau (4) Streams in the Patea catchment, and unnamed tributaries of the Makara (5) and Ahuroa (1) Streams in the Waitara catchment. The pipeline route is shown in Figure 4.

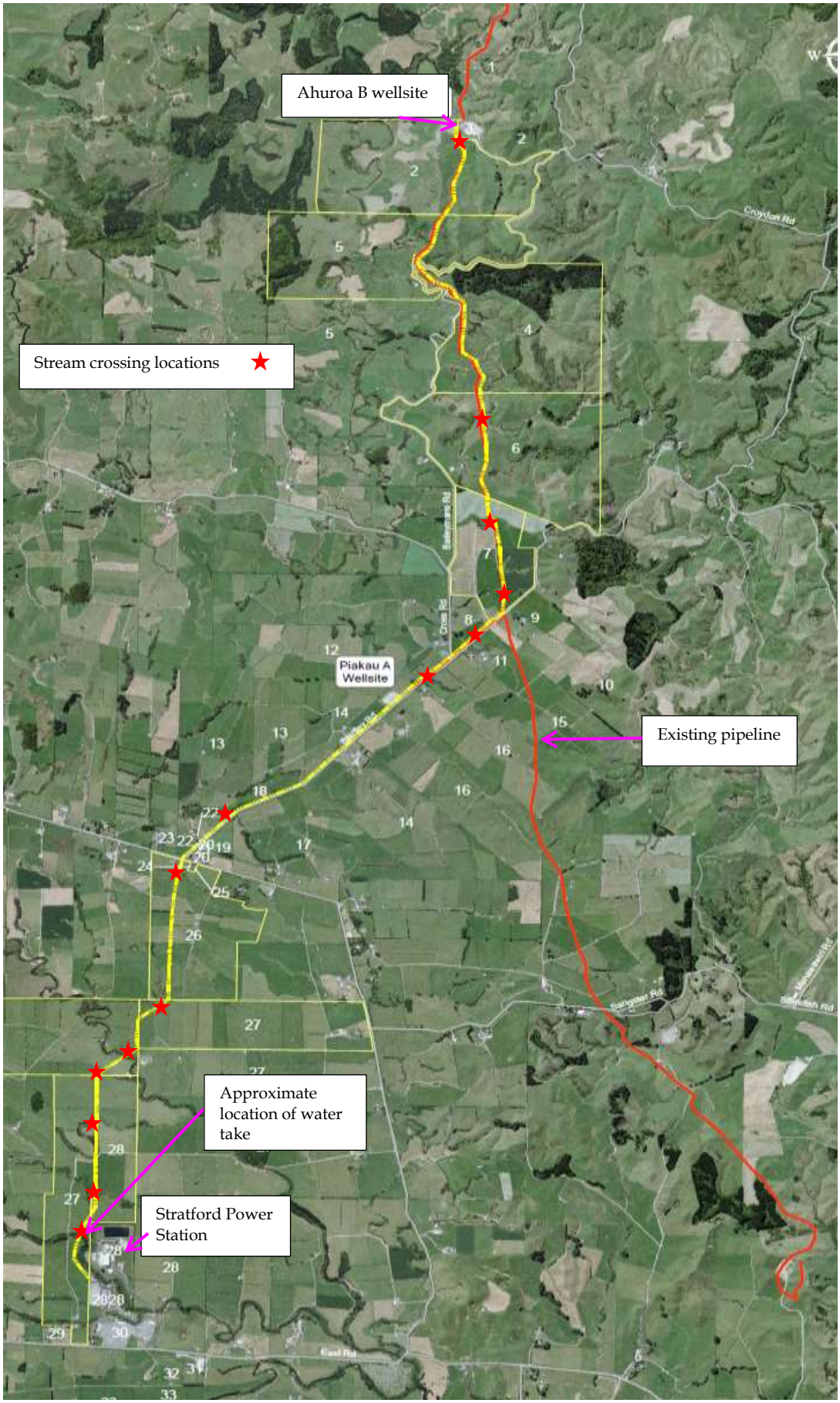

Figure 4 Pipeline route from Ahuroa Gas Storage to Stratford Power Station

3.2 Resource consents

A summary of the consents held by Contact Energy Limited in relation to Ahuroa Gas Storage facility and the gas pipeline connecting it to Stratford Power Station is given in Table 30 and Table 31. A copy of each of the consents for the storage and pipeline can be found in Appendix II and Appendix III, respectively.

Table 30 Summary of resource consents for Ahuroa Production Station

Consent number	Purpose	Issue date	Next review date	Expiry date
3681-2	Discharge stormwater, site water and uncontaminated production water to land and Makuri Stream tributary	22.04.2003	2015	2033
5173-2	Discharge solid drilling waste from hydrocarbon exploration operations at Ahuroa-B wellsite by mix-bury-covers	16.07.2003	2015	2021
7432-2	Discharge natural gas into land for purpose of gas storage	02.12.2008	2015	2027
7621-1	Discharge stormwater and sediment from Ahuroa-B site development earthworks to two Makara Stream tributaries	06.04.2010	2015	2027
7622-1	Culvert in Makara Stream tributary	06.04.2010	2015	2027
7745-1	Discharge emissions to air from flaring of hydrocarbons associated with well clean-up and well testing associated with exploration activities at Ahuroa-B wellsite	12.01.2011	2016	2028
7746-1	Discharge emission to air during flaring from well workovers and in emergency situations associated with production activites at Ahuroa-B wellsite, together with miscellaneous emissions.	12.01.2011	2016	2028
7748-1	Discharge stormwater and sediment to land from earthworks during extension of Ahuroa-B wellsite	18.01.2011	2015	2027
7749-1	Install pipe in bed of Makara Stream tributary	18.01.2011	2015	2027
7750-1	Access culvert in Makara Stream tributary	18.01.2011	2015	2027

Table 31 Summary of resource consents for the gas pipeline from AGS to SPS

Consent number	Purpose	Issue date	Next review date	Expiry date
9307-1	Discharge stormwater and sediment from pipeline construction between Ahuroa-B wellsite and SPS to land where may enter surface water	30.08.2012		2017
9308-1	Take from Kahouri Stream for pipeline testing	30.08.2012		2017
9309-1 to 9322-1	Install and use pipeline for conveying gaseous hydrocarbons under various streams between Ahuroa-B wellsite and SPS	30.08.2012	2016	2028
9576-1	Culvert to realign Makara Stream tributary	06.06.2013	2015	2027

Consents **3681** and **5173** were granted in 2003 to replace consents that provided for hydrocarbon exploration and production operations at Ahuroa-B wellsite. Consent **7432** was granted in December 2008 to provide for conversion of the depleted Ahuroa reservoir to a gas storage facility, and consents **7621** and **7622** enabled development of the site. Consents **7745** and **7746** were issued as a partial transfer to Contact Energy of consents that had allowed discharges to air at a number of sites. Consents **7748** to **7750** were granted in January 2011 to provide for expansion of the site.

Consents **9307** to **9322** were granted in March 2012 to provide for the construction and operation of a gas pipeline between AGS and SPS. Consent **9576** was granted in June 2013 to allow access for pipeline testing and maintenance.

Of these 27 consents, as listed in Table 30 and Table 31, three of the 10 held in relation to AGS were actively exercised in the 2011-2014 review period, and all 14 in relation to the pipeline. Those consents are described below.

3.2.1 Water take permit

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14.

Water Permit **9308-1** allows the take and use of water from Kahouri Stream for hydrostatic testing of pipelines. This permit was issued by the Taranaki Regional Council on 30 August 2012 under Section 87(d) of the RMA. It is due to expire on 1 June 2017.

Condition 1 limits the volume of water taken.

Condition 2 requires that a record of the take be maintained.

Condition 3 requires adoption of the best practicable option to minimise adverse effect on the environment.

Condition 4 addresses the protection of fish.

Condition 5 is a lapse provision.

3.2.2 Water discharge permits

Section 15(1)(a) of the *Resource Management Act 1991* (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.

Ahuroa Production Station

Water discharge permit **3681-2** covers the discharge of treated stormwater, uncontaminated treated site water, and uncontaminated treated production water from hydrocarbon exploration and production operations at the Ahuroa-B wellsite onto and into land and into an unnamed tributary of the Makara Stream in the Waitara catchment. This permit was issued to Swift Energy Ltd by the Taranaki Regional Council on 22 April 2003 under Section 87(e) of the RMA. It was transferred from Swift Energy to Origin Energy on 11 April 2008 and then partially transferred to Contact Energy Ltd on 23 November 2010 under Section 137(2). It is due to expire on 1 June 2033.

Condition 1 requires use of the best practicable option.

Condition 2 restricts the stormwater catchment area.

Condition 3 relates to notification of works.

Condition 4 relates to contingency planning.

Conditions 5 to 7 deal with stormwater treatment system design.

Condition 8 imposes limits on significant potential contaminants in the discharge.

Conditions 9 and 10 establish a mixing zone and set out allowable and unacceptable effects upon the receiving water.

Condition 11 addresses reinstatement of the site.

Condition 12 is a review provision.

Pipeline

Water discharge permit **9307-1** covers the discharge of stormwater and sediment from earthworks associated with the construction and installation of a pipeline between the Ahuroa-B wellsite and Stratford Power Station onto and into land in circumstances where it may enter surface water. This permit was issued to Contact Energy Limited by the Taranaki Regional Council on 30 August 2012 under Section 87(e) of the RMA. It is due to expire on 1 June 2017.

Condition 1 requires that the discharge licensed by the consent take place in accordance with the documentation provided with application.

Condition 2 relates to notification of works.

Conditions 3 and 4 address sediment control measures.

Condition 5 requires stabilisation of disturbed areas upon completion of earthworks.

Condition 6 requires that the best practicable option be used to minimise adverse effects.

Condition 7 is a lapse provision.

3.2.3 Air discharge pemits

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.

Contact Energy Ltd holds air discharge permit **7746-1** to cover the discharge of emissions to air during flaring from well workovers and in emergency situations associated with production activities at the Ahuroa-B well site, together with miscellaneous emissions. This activity was formerly provided for by air discharge permit **7518-1,** that was issued to Origin Energy Ltd by the Taranaki Regional Council to cover emissions at 11 well sites, including Ahuroa-B, on 6 October 2009 under Section 87(e) of the RMA. On 23 November 2010, the part of the consent that relates to Ahuroa-B well site was transferred to Contact Energy under section 137(2) of the Act.

Discharge permit **7746-1** was issued to cover the separated activity**.** It is due to expire on 1 June 2028.

Conditions 1 and 2 deal with notification of flaring.

Condition 3 requires consultation on changes in equipment or process.

Condition 4 relates to monitoring of wind conditions.

Conditions 5 to 7 address the separation of liquid and solids before gas flaring.

Condition 8 requires adoption of the best practicable option to minimise effects from emissions.

Condition 9 defines which substances can be combusted.

Conditions 10 and 12 control smoke and odour. Condition 11 requires vapour recovery systems on hydrocarbon storage vessels.

Conditions 13 to 15 set limits on ambient ground level concentrations of contaminants arising from flaring.

Conditions 16 to 19 relate to analysis of gas composition, recording of visible smoke emissions, flare event logs, and provision of an annual report.

Condition 20 is a review provision.

3.2.4 Discharges to land

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

Contact Energy Ltd holds discharge permit **7432-1** to cover the discharge of contaminants (natural gas) to land (sub-surface using deep well injection) for the purposes of storage. This permit was issued by the Taranaki Regional Council on 2 December 2008 under Section 87(e) of the RMA. It was varied on 7 April 2011 to allow a reservoir pressure increase from 3,000 psia to 3,400 psia. It is due to expire on 1 June 2027.

Condition 1 requires adoption of the best practicable option to minimise effects on the environment.

Condition 2 requires discharged gas to meet a certain specification.

Condition 3 limits the maximum gas reservoir pressure, and condition 4 addresses monitoring of injection and reservoir pressures.

Conditions 5 and 6 are lapse and review provisions.

3.2.5 Land use consents

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

Contact Energy Limited holds 15 land use consents for structures on streams in relation to the pipeline from AGS to SPS.

Land use consents **9309-1** to **9322-1,** to install and use a pipeline for conveying gaseous hydrocarbons under the bed of the Kahouri and Piakau Stream, and 12 unnamed tributaries of the Makara, Ahuroa, Kahouri and Piakau Streams were issued by the Taranaki Regional Council on the same certificate on 30 August 2012 as resource consents under Section 87(a) of the RMA. The consents expire on 1 June 2028.

Condition 1 defines the locations of the installation and use of the pipeline.

Condition 2 requires the provision of a programme and schedule of works, details of the contractor, and notification.

Condition 3 requires that the best practicable option be used to prevent discharge of sediment and adverse effect on surface water.

Condition 4 sets a minimum depth for burial below the stream bed, and condition 5 restricts work to between 1 November and 31 May. Condition 6 requires that the area of stream bed disturbance be minimised and addresses reinstatement.

Condition 7 deals with sediment discharge and suspension, and mitigation of effects.

Condition 8 addresses the discovery of archeological remains.

Conditions 9 and 10 are lapse and review provisions.

Land use consent **9576-1,** to install and use a culvert in an unnamed tributary of the Makara Stream, including associated realignment, streambed disturbance and reclamation was issued by the Taranaki Regional Council on 6 June 2013 as a resource consent under Section 87(a) of the RMA. The consent expires on 1 June 2027.

Condition 1 requires that the discharge licensed by the consent take place in accordance with the documentation provided with application.

Conditions 2 and 3 limit the length and depth of the culvert.

Condition 4 requires prior notification of works.

Conditions 5 to 11 specify the physical design of the works.

Conditions 12 and 13 are about minimisation of streambed disturbance and sedimentation.

Conditions 14 and 15 deal with stabilisation of earthwork areas and maintenance of the structure.

Condition 16 addresses the discovery of archaeological remains.

Conditions 17 and 18 are lapse and review conditions.

3.3 Monitoring programme

3.3.1 Introduction

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

The Taranaki Regional 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 Ahuroa-B site and pipeline consisted of four primary components.

3.3.2 Programme liaison and management

There is generally a significant investment of time and resources by the Taranaki Regional Council in ongoing liaison with resource consent holders over consent conditions and their interpretation and application:

- Ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements
- preparation for any reviews
- renewals
- new consents
- advice on the Council's environmental management strategies and content of regional plans and
- consultation on associated matters.

3.3.3 Site inspections

The Ahuroa-B site was visited ten times during the 2011-2014 review period. Inspections focussed on flaring activities and potential water discharge points including surface drainage networks and skimmer ponds. General site housekeeping was also assessed, and the neighbourhood was surveyed for environmental effects.

The pipeline from AGS to SPS was inspected on four occasions during the period of its construction in 2013, largely to assess silt control works and monitor any effects on water quality at stream crossings. The pigging of the completed pipeline was observed.

3.3.4 Chemical sampling

The Taranaki Regional Council undertook sampling of skimmer pit discharges leaving the site on four occasions during the review period. Samples were analysed for hydrocarbons, chloride, pH, conductivity, suspended solids and turbidity.

3.3.5 Data review

The consent holder is required to provide reservoir pressure and gas injection data routinely for Council Review. Special conditions 3 and 4 of Consent 7432-1 stipulate the maximum allowable reservoir pressure, and require the Company to record injection pressures and relate this to maximum reservoir pressure.

3.4 Results - Water

3.4.1 Inspections

16 September 2011
Site maintenance was being undertaken at the time of inspection. No flaring was occurring, and no odours were noted off site during the perimeter survey. The drains and skimmer pit were clear and not discharging stormwater at the time of inspection. The site was neat and tidy and no issues were recorded.

1 November 2011
An inspection was conducted with Origin Energy environmental staff. The site was generally tidy. No stormwater was discharging from the site and the skimmer pit appeared clear of any obvious contaminants. No flaring was being undertaken at the time of inspection.

2 May 2012
An inspection of the site was conducted with Origin environmental staff. No recent drilling activity had taken place and the primary site use was as an underground gas storage facility for gas reinjection. No stormwater discharges were occurring off site, as such; no stormwater discharge samples were collected. The site was tidy overall. No flaring was occurring at the time of inspection.

13 June 2012
An inspection was undertaken in regard to stormwater and air discharges. No flaring or stormwater discharge was occurring at the time of inspection. Skimmer pits were clear of all contaminants and the ring-drains and bunds were secure.

16 August 2012
The site was inspected following an extended period of rainfall over the preceding few weeks. All ring-drains and bunds were secure. Skimmer pits were clear and discharging. Samples were taken of the stormwater discharge. No flaring was being undertaken at the time of inspection and the site was generally neat and tidy.

18 September 2012
The site was inspected following a prolonged period of heavy rainfall. The skimmer pits were discharging what was visually very clear stormwater and routine samples were taken. All stormwater was being directed through skimmer pits for treatment and no effects to the receiving water were noted. No flaring was occurring.

29 May 2013
A site inspection was undertaken around the site perimeter following recent heavy rain. Ring drains were secure and the contents of the skimmer pits appeared clean. Discharge samples were taken for routine analysis. No flaring was occurring and there were no noticeable effects of site activities.

5 November 2013
A site inspection was undertaken in regard to stormwater and air discharges. The site was found to be neat and tidy, with ring drains and bunds secure. No flaring was being undertaken at the time of inspection. The skimmer pits were clean, with frogs present. There was no evidence of any effect from stormwater discharges in the receiving water. Scaffolding contactors were on site.

28 April 2014
A site inspection was taken during a period of intense squally rainfall, following a site induction and drug testing. Stormwater samples were taken. Well work-over crews were on site. There was no issue with silt. No flaring was occurring.

16 June 2014
An additional inspection was undertaken with Contact Energy staff to familiarise new Council staff with the storage and processing facilities, particularly the reservoir pressure monitoring system. Stormwater and flaring systems, and contaminated water separation and containment processes, were inspected. Consents compliance was demonstrated.

3.4.2 Results of discharge monitoring

Four skimmer pit discharge samples were taken during the monitoring period from sampling site IND001046, identified in Figure 3, and shown in Photo 3 below.

Photo 3 Ahuroa-B site looking towards skimmer pond (left) and final pond discharge point (right)

Discharge results are presented in Table 32.

Table 32 2011-2014 skimmer pond discharge results

Date	Chloride (g/m^3)	Conductivity (mS/m@20C)	Hydrocarbons (g/m^3)	pH	Suspended solids (g/m^3)	Turbidity (NTU)
16-May-2011	12.1	13.9	<0.5	7.2	5	
16 Aug 2012	3.4	5.0	<0.5	7.1	4	-
19 Sep 2012	15	11.8	<0.5	7.2	-	1.1
29 May 2013	12.1	10.6	<0.5	6.7	<2	1.3
29 Apr 2014	5.3	6.8	<0.5	7.0	2	1.4
Consent limit	**50**		**15**	**6.5-8.5**	**100**	

All results were well within consent limits, and discharge component concentrations would have been reduced further through dilution once the discharge eventually reached receiving waters. No hydrocarbons were detected, and the other water quality parameters were within typical surface water ranges.

3.5 Results - Air

3.5.1 Review of flaring data

During the 2011-2014 review period, short periods of flaring occurred at the Ahuroa-B wellsite. Flaring records were supplied to Council in annual reports in May each year as required under condition 18 on consent **7746-1** by Origin Energy on behalf of Contact Energy. The reports were for the period 1 April to 30 March.

The 2011-2012 year was the first in which reporting of flaring for Ahuroa B wellsite was separated from Waihapa Production Station.

Figure 5 combines the flaring data from three annual reports submitted by Origin Energy, and data provided by Contact Energy subsequent to the change over in operation on October 20 2013. It covers the period 1 April 2011 to 30 June 2014.

There were higher than normal volumes at times of power failures and/or compressor mechanical failures, notably in June and August 2011, and June, July and September 2013. The high August 2013 value was due to a complete pipeline depressure to tie in the new pipeline to Stratford Power Station.

The high values in December 2013 and January 2014 were due to a calibration error on the flare gas flow meters. The most recent data, following recalibration, show that approximately 10 m^3/hour of gas is flared.

The Council and neighbours were notified when flaring at high rate was expected, otherwise not. No complaints were received.

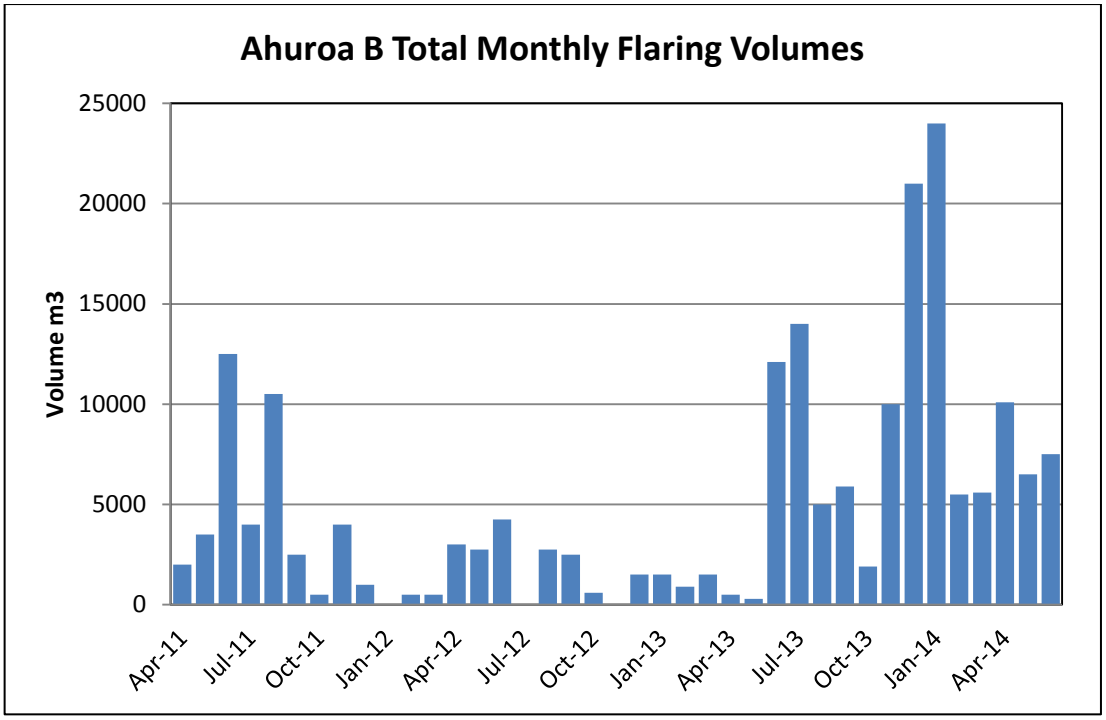

Figure 5 Ahuroa flaring volumes by month for 2011-2014

3.6 Results - Land

3.6.1 Reservoir pressure and injection pressure data review

Consent 7432-1 stipulates a maximum reservoir pressure of 3400 psia. There is also a requirement for the consent holder to record injection pressures and relate these data to the maximum reservoir pressures.

The data supplied to the Council are hourly reservoir pressure values from down-hole pressure gauges in the Ahuroa 4 and 5a wells, and injection pressure data from surface gauges on the Ahuroa 2a, 3, 4 and 5a wells.

Figure 6 and Figure 7 show down-hole and injection pressure readings for Ahuroa 4 and 5a respectively, and are compared with the consented maximum reservoir pressure of 3400 psia. Figure 8 shows the injection pressure readings for Ahuroa 2a and 3 wells.

There was a gap in the data of about three months, relating to changeover between Origin Energy and Contact Energy (20 October 2013), before the data became available to the new plant information system (PIE).

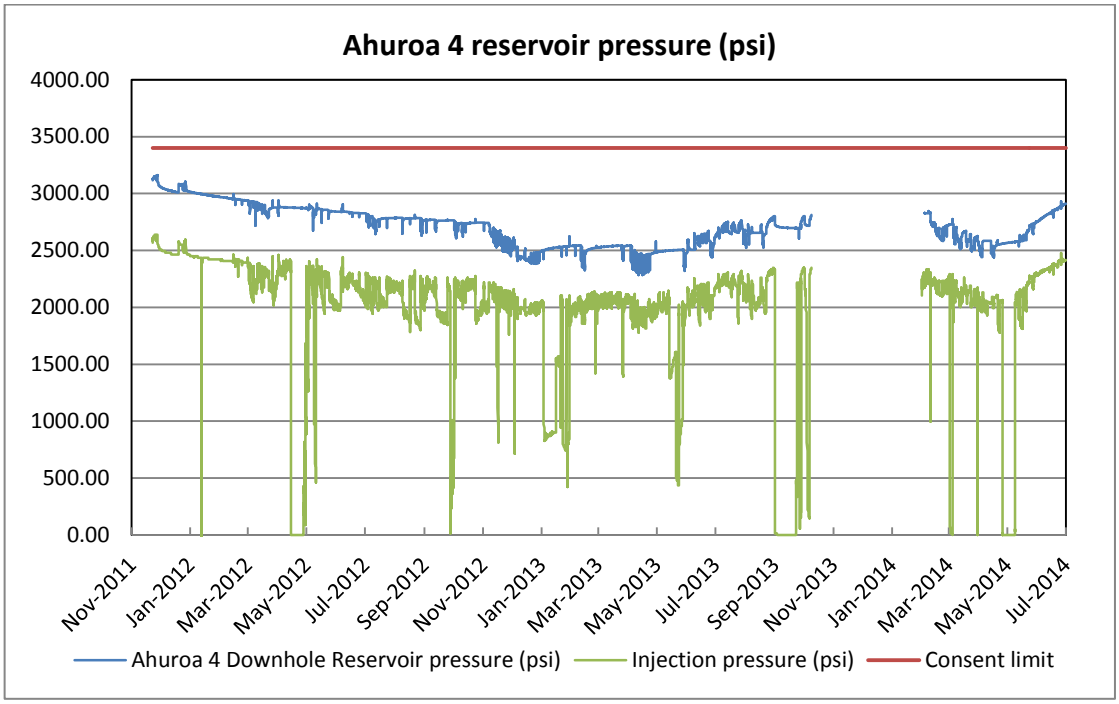

Figure 6 Ahuroa 4 downhole reservoir and injection pressures, 2011-2014

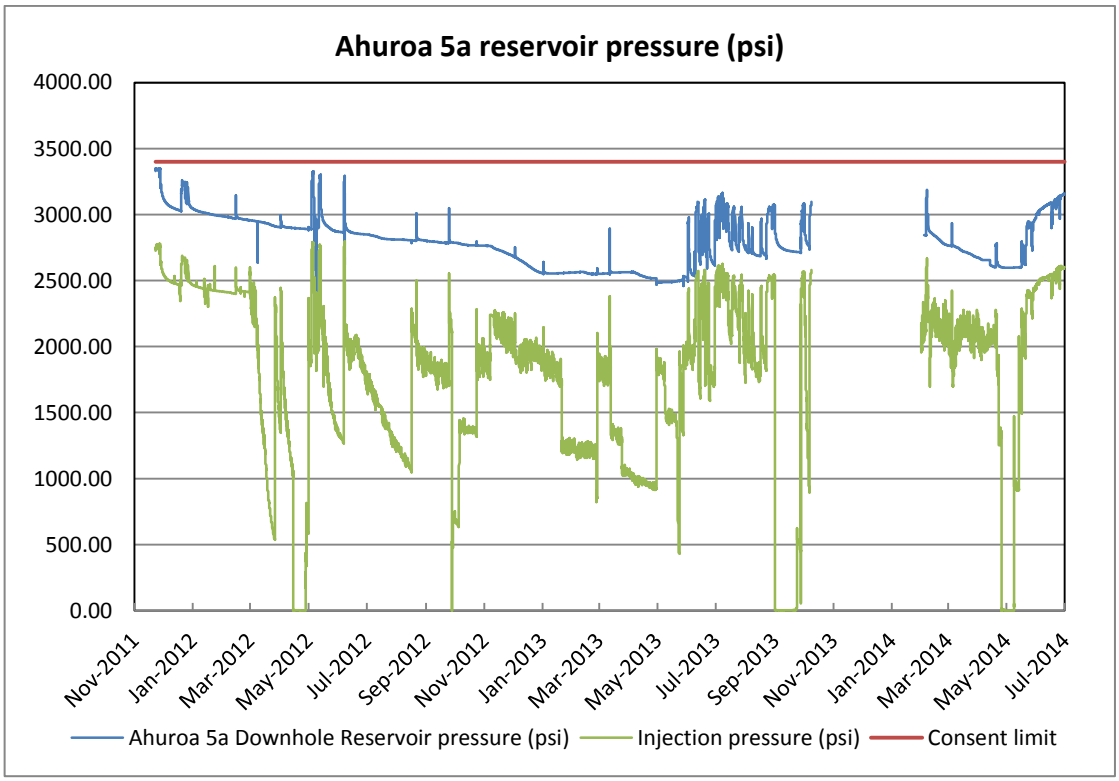

Figure 7 Ahuroa 5a downhole reservoir and injection pressures, 2011-2014

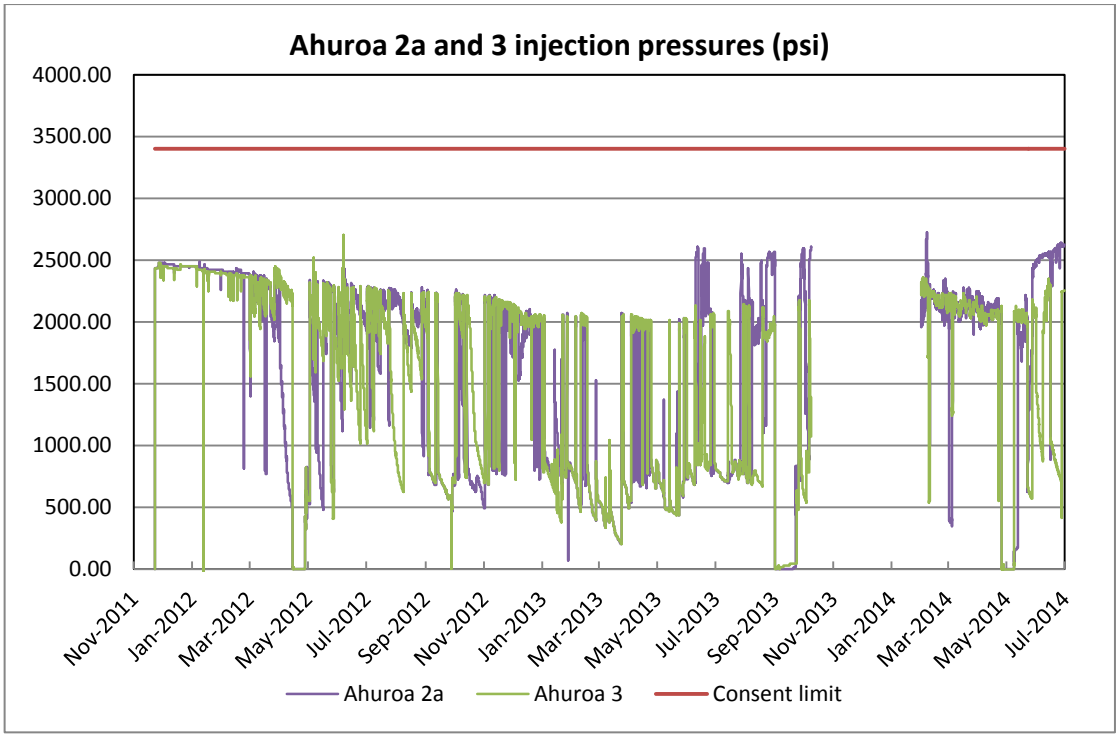

Figure 8 Ahuroa 2a and 3 injection pressures, 2011-2014

Reservoir pressure and injection pressure monitoring data, as measured on surface and down hole for wells Ahuroa 4 and 5a and on surface for wells Ahuroa 2a and 3, show compliance with special condition 3 of consent **7432-1**. At no time during the monitoring period did the measured reservoir pressure exceed the reservoir pressure limit of 3400 psi. The received data are compliant with the consented limit.

3.7 Results - Pipeline

Construction of the pipeline between AGS and SPS commenced on 14 January 2013, after due notification of Council, and hydro-testing of the pipeline was completed on 3 October 2013. Inspection by Council focused on the major stream crossings, under the Kahouri and Piakau Streams, with four inspections between 14 and 26 March.

No significant adverse effect on waterways was found. There was some discoloration noted in Kahouri Stream on 15 March 2013 in the immediate vicinity of the earthworks. Various silt retention measures, including hay bales, silt cloth, fluming, bunds and rip-rap, were used along the pipeline, and revegetation with grass and by riparian planting took place when soil moisture levels became suitable. The contractor, Energy Works, was commended.

3.8 Investigations, interventions, and incidents

The monitoring programme for the period under review was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the period under review, matters may arise which require additional activity by the Council eg provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain

good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

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

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 2011-2014 period, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with Contact's conditions in resource consents or provisions in Regional Plans in relation to Ahuroa Gas Storage facility and the connecting pipeline to Stratford Power Station..

3.9 Discussion

3.9.1 Discussion of performance

The Company performed well in respect to its consent conditions during the monitoring period. No incidents were recorded, data supply was punctual, and the data showed compliance with the resource consent conditions. Contact and Origin Energy staff were cooperative at all times and no issues were identified during the monitoring period.

During pipeline construction, silt control measures and vegetation reinstatement were undertaken in accordance with best practice.

3.9.2 Environmental effects of exercise of consents

No adverse environmental effects have been identified in the monitoring conducted during the 2011-2014 monitoring period in respect to any of the resource consents held by the Company for activities at the Ahuroa Gas Storage facility.

Inspections and discharge monitoring have indicated that Ahuroa-B site surface drainage and stormwater treatment systems are well designed and working effectively, and that site management is generally good.

There are no indications that the injection/withdrawal processes have had any adverse environmental effects.

Pipeline construction between Ahuroa Gas Storage and Stratford Power Station, over a distance of 8.5 km, resulted in no significant adverse effect on the 14 waterways that were crossed.

3.10 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 33 to Table 39.

Table 33 Summary of performance for Consent **3681-2** To discharge treated stormwater, uncontaminated treated production water from hydrocarbon exploration and production operations at the Ahuroa-B wellsite onto and into land and into an unnamed tributary of the Makara Stream in the Waitara catchment.

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. The consent holder shall adopt best practicable option at all times.	Inspections	Yes
2. Catchment area limited	Inspections and records	Yes
3. Notification provided prior to commencement of site works or drilling	Site works/drilling not undertaken in reporting period	N/A
4. Consent holder to provide site contingency plans for the site.	Plan received by Council and approved in 2003. Most recent update July 2011 approved by Council	Yes
5. All stormwater and uncontaminated production water to be directed through a stormwater treatment system prior to discharge	Inspections, review of site plans	Yes
6. Stormwater system management and maintenance to be conducted in accordance with consent application documentation	Inspection and liaison	Yes
7. Hazardous substance storage areas to be bunded and directed to sumps	Inspections	Yes
8. Limits on constituents in the discharge	Sampling	Yes
9. Discharge shall not result in the following effects downstream of the mixing zone in receiving waters: a. Increase in temp b. Increase in BOD	Not sampled during monitoring period	N/A
10. Discharge shall not give rise to the following effects downstream of mixing zone: a. Oil or grease films/scum b. Change in colour or clarity c. Objectionable odour d. The rendering of water unsuitable for consumption e. Any adverse effects on aquatic life	Inspections	Yes
11. Consent holder to notify prior to site reinstatement	Site still in use	N/A

12. Optional review provision re environmental effects	Not scheduled for consideration during year under review. Next consideration June 2015	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 34 Summary of performance for Consent **7746-1** To discharge emissions to air during flaring from well workovers and in emergency situations associated with production activities at the Ahuroa-B wellsite

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to notify of flaring events longer than 5 minutes in duration	Notifications received	Yes
2. Consent holder to notify nearby residents of flaring events longer than 5 minutes in duration	Notifications and records	N/A
3. No alteration of plant equipment or processes leading to changes in the quality of emissions	Company records and inspections	Yes
4. Consent holder to monitor wind conditions prior to flaring	Company records	Yes
5. Liquids and solids to be separated prior to flaring	Company records and inspections	Yes
6. Consent holder to notify if unable to comply with SC5, and to immediately work to re-establish separation process	No instances of non compliance with SC5	N/A
7. No liquids/solids to be combusted through the flare system unless during emergency	No instances of non compliance with SC5 or 6	N/A
8. Consent holder to adopt BPO to minimise effects from emissions	Company records, inspections	Yes
9. Only treated substances from well stream to me combusted in flare pit	Company records, inspections	Yes
10. No objectionable odours or smoke beyond site boundary	Inspections	Yes
11. All hydrocarbon storage vessels shall be fitted with vapour recovery systems	Company records	Yes
12. Opacity of emissions to not exceed level 1 on Ringlemann scale for more than 4 minutes	Not assessed	N/A
13. The consent holder shall control carbon monoxide emissions to not exceed 10 mg/m³ under ambient conditions	Not assessed	N/A
14. Consent holder to control nitrogen	Not assessed	N/A

Condition requirement	Means of monitoring during period under review	Compliance achieved?
oxide emissions to not exceed 100 ug/m3 under ambient conditions		
15. Consent holder to ensure other contaminants from flaring do not exceed workplace exposure standards (DOL, 2002)	Not assessed	N/A
16. Consent holder to make an analysis of the gas/condensate stream available on request	Not requested during monitoring period	N/A
17. Visible smoke instances to be recorded and supplied to Council upon request	Not requested	N/A
18. Consent holder to record flaring events in a log and supply records to Council in an annual report	Inspections and review of annual report	Yes
19. The consent holder to supply an annual report during May	Reports received 16 May 2012, 27 May 2013 and 21 May 2014	Yes
20. Optional review provision re environmental effects	Not scheduled for consideration during year under review. Next consideration June 2016	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 35 Summary of performance for Consent **7432-1** To discharge contaminants (natural gas) into land for the purpose of gas storage

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt best practicable option at all times	Inspections, consent holder liaison and data review	Yes
2. Gas discharged must meet into the ground must meet defined specifications	Not assessed	N/A
3. The pressure in the reservoir must not exceed 3400 psia	Data review	Yes
4. Consent holder to record injection pressure and reservoir pressure and supply to Council upon request	Data review, data supplied annually	Yes
5. Lapse condition	Consent exercised	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 36 Summary of performance for Consents **9309-1** to **9322-1** To install and use a pipeline for conveying gaseous hydrocarbons under the bed of various streams

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt best practicable option at all times	Inspections, consent holder liaison and data review	Yes
2. Gas discharged into the ground must meet defined specifications	Not assessed	N/A
3. The pressure in the reservoir must not exceed 3400 psia	Data review	Yes
4. Consent holder to record injection pressure and reservoir pressure and supply to Council upon request	Data review, data supplied annually	Yes
5. Lapse condition	Consent exercised	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High

N/A = not applicable

Table 37 Summary of performance for Consent **9307-1** To discharge stormwater and sediment from pipeline earthworks

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge according to documentation submitted	Inspection by Council	Yes
2. Notification prior to works	Notification received, 7 January 2013	Yes
3. Sediment control measures to be installed to specific design	Inspection by Council	Yes
4. Retention of erosion and sediment control measures until site stabilised	Inspection by Council	Yes
5. Site stabilisation as soon as practicable	Inspection by Council	Yes
6. Adopt best practicable option	Inspection by Council	Yes
7. Lapse of consent	Consent was exercised	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**

N/A = not applicable

Table 38 Summary of performance for Consent **9308-1** To take and use water from the Kahouri Stream for hydrostatic testing of pipelines

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limit on total abstraction volume	Measurement and recording by consent holder	?
2. Record of take	Supply of data to Council upon request	Record not requested
3. Adopt best practicable option	Inspection by Council	?
4. Screening of intake to protect fish	Inspection by Council	?
5. Lapse of consentt	Consent was exercised	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**

N/A = not applicable

Table 39 Summary of performance for Consent **9576-1** To install and use a culvert in an unnamed tributary of Makara Stream

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Construction according to documentation submitted	Inspection by Council	Yes
2. Limit on maximum length of culvert	Inspection by Council	Yes
3. Limit on maximum depth of culvert	Inspection by Council	Yes
4. Notification of works	Notification received, 1 July 2013	No, 2 days late
5. Maximum gradient of culvert	Inspection by Council	Yes
6. Installation of headwalls and rip-rap	Inspection by Council	Yes
7. Rip-rap grading of certain size	Inspection by Council	Yes
8. Rip-rap placement as specified	Inspection by Council	Yes
9. Post-reconstruction of banks and bed	Inspection by Council	Yes
10. Maximum bank slope above culvert	Inspection by Council	Yes
11. Invert depth as specified	Inspection by Council	Yes
12. Minimisation of bed disturbance	Inspection by Council	Yes
13. Minimisation of sedimentation	Inspection by Council	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
14. Earthwork area stabilisation upon completion of activity	Inspection by Council	Yes
15. Maintenance of structure and channel	Inspection by Council	Yes
16. Actions upon discovery of archaeological remains	Liaison with Council and other parties	N/A
17. Lapse of consent	Consent was exercised	N/A
18. Optional review of consent	Next review available June 2015	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**Good**

N/A = not applicable

During the period under review, the Company demonstrated a high level of environmental performance and compliance with the resource consents as defined in Section 1.1.4. There was no incident recorded against the Company in relation to Ahuroa Gas Storage facility or the associated pipeline to Stratford Power Station. Inspections and sampling indicated no adverse environmental effects were occurring in the receiving waters from stormwater discharges from Ahuroa site. Reservoir pressure was maintained within the maximum limit at all times and all data and record supply conditions were complied with during the review period. The pipeline was constructed using best practice to minimise stream channel disturbance and sedimentation.

3.11 Alterations to monitoring programmes for 2014-2015

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently 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 emitting to the atmosphere/discharging to the environment.

It is proposed that for 2014-2015 the monitoring programme remains unchanged from that implemented in the 2011-2014. A recommendation to this effect is attached to this report.

3.12 Exercise of optional review of consents

Nine of the 27 resource consents held for operation of AGS (8) and pipeline from AGS to SPS (1) provide for an optional review in June 2015.

Resource consents **3681-2** (discharge stormwater), **5173-2** (discharge to land), **7432-2** (discharge natural gas into land), **7621-1** (discharge development stormwater), **7622-1**

(culvert), **7748-1** (discharge extension stormwater), **7749-1** (install pipe), **7750-1** (culvert) and **9576-1** (culvert) each provide for an optional review of consent in June 2015.

Condition 12 on consent **3681-2**, condition 28 on consent **5173-2**, condition 6 on consent **7432-2**, condition 6 on consent **7621-1**, condition 12 on consent **7622-1**, condition 7 on consent **7748-1**, condition 10 on consent **7749-1**, condition 14 on consent **7750-1**, and condition 18 on consent **9576-1** allow the Council to review the consents, for the purpose of ensuring that the respective conditions are adequate to deal with any adverse effect of the respective activities on the environment.

Based on the results of monitoring in the period under review, it is considered that there are no grounds that require a review of any of the consents to be pursued.

Recommendations to this effect are presented in Section 3.13 of this report.

3.13 Recommendations

1. THAT monitoring of consented activities at Ahuroa gas storage (AGS) facilities and for the connecting pipeline to Stratford Power Station (SPS) in the 2014-2015 year continue at the same level as in 2013-2014.

2. THAT the option for a review of resource consent **3681-2** (discharge stormwater) in June 2015, as set out in condition 12 on consent **3681-2** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

3. THAT the option for a review of resource consent **5173-2** (discharge to land) in June 2015, as set out in condition 28 on consent **5173-2** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

4. THAT the option for a review of resource consent **7432-2** (discharge natural gas into land) in June 2015, as set out in condition 6 on consent **7432-2** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

5. THAT the option for a review of resource consent **7621-1** (discharge development stormwater) in June 2015, as set out in condition 6 on consent **7621-1** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

6. THAT the option for a review of resource consent **7622-1** (culvert) in June 2015, as set out in condition 12 on consent **7622-1** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

7. THAT the option for a review of resource consent **7748-1** (discharge extension stormwater) in June 2015, as set out in condition 7 on consent **7748-1** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

8. THAT the option for a review of resource consent **7749-1** (install pipe) in June 2015, as set out in condition 10 on consent **7749-1** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

9. THAT the option for a review of resource consent **7750-1** (culvert) in June 2015, as set out in condition 14 on consent **7750-1** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

10. THAT the option for a review of resource consent **9576-1** (culvert) in June 2015, as set out in condition 18 on consent **9576-1** not be exercised, on the ground that current conditions are adequate to deal with any potential adverse effects.

Glossary of common terms and abbreviations

The following abbreviations and terms are used within the report:

AGS	Ahuroa underground gas storage facility
Biomonitoring	Assessing the health of the environment using aquatic organisms
BPO	Best practicable option
Condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20˚C and expressed in mS/m
DRP	Dissolved reactive phosphorus
fresh	Elevated flow in a stream, such as after heavy rainfall
HHV	Higher heating value, the gross heat of combustion, expressed as kilojoules (of gas) per kilowatt-hour (of electricity)
g/m^3	Grammes per cubic metre, and equivalent to milligrammes per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same foes 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
LHV	Lower heating value, the net heat of combustion, expressed as kilojoules (of gas) per kilowatt-hour (of electricity)
l/s	Litres per second
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats
mS/m	MilliSiemens per metre
mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point
NH_3	Un-ionised ammonia, normally expressed in terms of the mass of nitrogen (N)
NTU	Nephelometric Turbudity 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 pH of 5

Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment
resource consent	Refer Section 98 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 subsequent amendments
SGT	Stratford gas turbine plant, commissioned in 1976 and decommissioned in
SP1	Stratford peaker 1 plant, commissioned May 2011
SP2	Stratford peaker 2 plant, not constructed
SS	Suspended solids
TCC1	Taranaki combined cycle 1 power plant, commissioned in 1998
TCC2	Taranaki combined cycle 2 power plant, not constructed
Temp	Temperature, measure in ˚C (degrees Celsius)
Turb	turbidity, expressed in NTU
UI	Unauthorised Incident
UIR	Unauthorised Incident Register – contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan

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

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Appendix I

Resource consents
for Stratford Power Station

Consent 3939-2

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
★ Change To Conditions Date:	6 March 2008 [Granted: 10 December 1997]

Conditions of Consent

★ Consent Granted:	To discharge up to 464 litres/second of stormwater from the Stratford Power Station Peaking Plant site into an unnamed tributary of the Kahouri Stream and into the Kahouri Stream in the Patea catchment at or about 2623900E-6207100N
Expiry Date:	1 June 2016
Review Date(s):	June 2010
Site Location:	Stratford Power Station site, State Highway 43 [East Road], Stratford
Legal Description:	Lot 1 DP 19365 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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

Conditions 1 - 2 [unchanged]

1. That after allowing for a mixing zone of 50 metres, the discharge shall not give rise to any of the following effects in the receiving waters of the Kahouri Stream:

i) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
ii) any conspicuous change in the colour or visual clarity;
iii) any emission of objectionable odour;
iv) the rendering of fresh water unsuitable for consumption by farm animals; and
v) any significant adverse effects on aquatic life.

2. That the components of the discharge shall not exceed the following concentrations:

pH (range)	6-9
Oil and grease (infrared spectroscope technique)	15 gm^{-3}
Suspended solids	100 gm^{-3}

Condition 3 - changed

3. That the discharge of stormwater as licensed by this consent shall be undertaken in accordance with the documentation submitted in support of applications 202 & 4899.

Condition 4 – unchanged

4. That 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 2010, for the purpose of ensuring that the conditions adequately deal with the environmental effects arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at that time.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4022-2

TARANAKI REGIONAL COUNCIL

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Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Change To Conditions Date:	9 February 2010 [Granted: 14 December 1994]

Conditions of Consent

Consent Granted:	To discharge emissions into the air from fuel combustion and other related activities associated with the operation of the Stratford Power Station and ancillary plant at or about (NZTM) 1713825E-5645366N
Expiry Date:	1 June 2022
Review Date(s):	As per special condition 11
Site Location:	Stratford Peaker Power Station, State Highway 43 [East Road], Stratford
Legal Description:	Lot 1 DP 19365 & Lot 1 DP 17776 Blk II Ngaere SD

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

General conditions

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

b) 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) 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. That the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the environment from the site.

2. That prior to undertaking any alterations to the plant, processes or operations, as specified in the application which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive and shall obtain any necessary approvals under the Resource Management Act.

3. That the consent holder shall provide to the Council within two years from the granting of this consent and every six years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, how these might be applicable and/or implemented at the power station, and the costs and benefits of these advances; and

b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive, Taranaki Regional Council, may from time to time specify following consultation with the consent holder; and

c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the power station; and

d) addressing any other issue relevant to the minimisation or mitigation of emissions from the site that the Chief Executive, Taranaki Regional Council, considers should be included; and

e) detailing carbon dioxide emissions from the site.

4. That the consent holder shall control all emissions of carbon monoxide to the atmosphere from the site, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 mg m^{-3} [eight-hour average exposure], or 30 mg m^{-3} [one-hour average exposure] at or beyond the boundary of the site.

5. That the consent holder shall control all emissions of nitrogen oxides to the atmosphere from the site, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 20 ug m^{-3} [twenty-four-hour average exposure], or 60 ug m^{-3} [four-hour average exposure] at or beyond the boundary of the site.

6. That the consent holder shall control all emissions to the atmosphere from the site of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, 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 Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any time, [all terms as defined in Workplace Exposure Standards and Biological Exposure indices for New Zealand, 1992, Department of Labour], or

   b) if no Short Term Exposure Limit is set, by more than three times the Time Weighted Average at any time, [all terms as defined in Workplace Exposure Standards and Biological Exposure Indices for New Zealand, 1992, Department of Labour].

7. That except in any period of 30 minutes following the initiation of start-up of a turbine or in any period of 30 minutes prior to the cessation of the generation of electricity from a turbine, in the event that the discharge of nitrogen oxides exceeds:

   a) a mass emission rate for the site of 175 g s^{-1}, or
   b) *[cancelled]*
   c) a concentration in any gas turbine stack equivalent to 100 mg m^{-3} at 450 degrees Celsius, or to 125 ppm [volumetric basis].

   then the operator shall immediately initiate all reasonable steps to reduce the emissions to below these levels as soon as practicable.

8. That the sum of all discharges of nitrogen oxides from the site of the power station is not to exceed 830 kg in any period of one hour.

9. That the minimum height of discharge of the products of combustion from the turbines shall be 15 metres above ground level.

10. That the discharges authorised by this consent shall not give rise to any direct significant adverse ecological effect on any ecosystems in the Taranaki region, including but not limited to habitats, plants, animals, microflora and microfauna.

11. That subject to the provisions of this condition, the Taranaki Regional Council may within six months of receiving a report prepared by the consent holder pursuant to condition 3 of this consent, serve notice that it intends to review the conditions of this resource consent in accordance with Section 128(1)(a) of the Act for the purposes of:

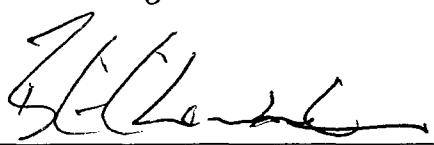
    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review or

    b) requiring the holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; or

    c) taking into account any Act of Parliament, regulation, national policy statement, regional policy statement or regional rule which relates to limiting, recording, or mitigating carbon dioxide and which is relevant to emissions from the Stratford gas turbine power station.

Signed at Stratford on 9 February 2010

For and on behalf of
Taranaki Regional Council



Chief Executive

Consent 4454-1

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder: Contact Energy Limited
P O Box 10742
WELLINGTON 6143

Change To Conditions Date: 9 February 2010 [Granted: 15 August 1995]

Conditions of Consent

Consent Granted: To discharge contaminants to air, subject to the following specified conditions, from a combined cycle power station and ancillary plant ['the station'] located adjacent to East Road approximately three kilometres East of the town of Stratford at or about (NZTM) 1713732E-5645766N

Expiry Date: 14 August 2029

Site Location: East Road, Stratford

Legal Description: Lot 2 of Subdiv of Lot 2 Lt 18343 Blk II Ngaere SD

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

General conditions

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

b) 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) 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

(note condition numbering intentionally begins at 4)

4) That the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the environment from the site.

5) That a general outline of the methods, specifications, operating guidelines or other measures which represent the best practicable option at the time of commissioning will be supplied by the consent holder and thereafter attached to this consent as Schedule A.

6) That the measures representing the best practicable option may be reviewed in accordance with the procedure provided for in condition 18.

7) That prior to undertaking any alterations to the plant, processes or operations specified in the application, which alterations may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive and shall obtain any necessary approvals under the Resource Management Act.

8) That the consent holder shall provide to the Council within two years from the commencement of commissioning of the Station and again at four years from commencement of commissioning of the Station and every six years thereafter, a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, especially, but not exclusively in respect of the cooling tower plume and of carbon dioxide, how these might be applicable and/or implemented at the power station, and the costs and benefits of these advances; and

b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive may from time to time specify following consultation with the consent holder; and

c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the Station; and

d) addressing any other issue relevant to the minimisation or mitigation of emissions from the site that the Chief Executive considers should be included; and

e) detailing carbon dioxide emissions from the site.

9) That the consent holder shall control all emissions of carbon monoxide to the atmosphere from the site, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 mg/m^3 [eight-hour average exposure], or 30 mg/m^3 [one-hour average exposure] at or beyond the boundary of the site.

10) That the consent holder shall control all emissions of nitrogen oxides to the atmosphere from the site, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 30 µ/m^3 [twenty-four hour average exposure], or 95 µg/m^3 [four-hour average exposure] at or beyond the boundary of the site.

11) That the consent holder shall control all emissions to the atmosphere from the site of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, 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 Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any time, [all terms as defined in Workplace Exposure Standards and Biological Exposure Indices for New Zealand, 1992, Department of Labour], or

b) if no Short Term Exposure Limit is set, by more than three times the Time Weighted Average at any time, [all terms as defined in Workplace Exposure Standards and Biological Exposure Indices for New Zealand, 1992, Department of Labour].

12) That except in any period of 240 minutes following the initiation of start-up of a turbine or in any period of 30 minutes prior to the cessation of the generation of electricity from a turbine, in the event that the discharge of nitrogen oxides exceeds:-

a) a mass emission rate for the site of 70 g/s, or

b) a mass emission rate per gas turbine stack of [70 divided by n] g/s [where n = number of gas turbine stacks], or

c) a concentration in any gas turbine stack equivalent to 75 mg/m^3 at 84° Celsius, or to 50 ppm [volumetric basis] then the operator shall immediately initiate all reasonable steps to reduce the emissions to below these levels as soon as practicable.

13) That the sum of all discharges of nitrogen oxides from the site of the power station is not to exceed 430 kg in any period of one hour.

14) That the minimum height of discharge of the products of combustion from the turbines shall be 35 metres above ground level.

15) That the discharges authorised by this consent shall not give rise to any direct significant adverse ecological effect on any ecosystems in the Taranaki region, including but not limited to habitats, plants, animals, microflora, and microfauna.

16) That the evaporative cooling system to be used shall not produce a visible plume at any ambient condition further from saturation than 6° Celsius and 85% relative humidity.

17) That the evaporative cooling system shall be operated in order that the loss of cooling water as droplet drift to atmosphere does not exceed in aggregate 0.02% of the cooling water circulation rate at the time.

18) That subject to the provisions of this condition, the Council may within six months of receiving a report prepared by the consent holder pursuant to condition 8 of this consent, serve notice that it intends to review the conditions of this resource consent in accordance with Section 128(1)(a) of the Resource Management Act for the purpose 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 and which it is appropriate to deal with at the time of the review; or

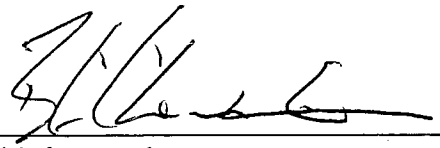
b) requiring the holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge; or

c) taking into account any Act of Parliament, regulation, national policy statement, regional policy statement or regional rule which relates to limiting, recording, or mitigating carbon dioxide and which is relevant to emissions from the Station.

19) That this consent shall lapse on the expiry of six years after the date of commencement of this consent, 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(b) of the Resource Management Act 1991.

Signed at Stratford on 9 February 2010

For and on behalf of
Taranaki Regional Council



Chief Executive

Consent 4455-1

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Please quote our file number on all correspondence

Water Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	6 March 2008 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted:	To take up to 19,440 cubic metres/day [225 litres/second averaged over 15 minutes] of water on a continuous basis from the Patea River for use on Power Stations at East Road, Stratford at or about 2631900E-6204900N
Expiry Date:	1 June 2028
Review Date(s):	June 2010, June 2016, June 2022
Site Location:	Toko Road, Stratford
Legal Description:	Patea Riverbed adjoining Pt Lot 2 DP 739 & Lot 1 DP 20723 Blk IV Ngaere SD
Catchment:	Patea

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

General conditions

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

b) 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) 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 resource consent holder shall install and operate a measuring device capable of recording instantaneous and daily rates of abstraction and shall make such records available to the Chief Executive, Taranaki Regional Council, upon request.

2. When the flow in the Patea River at the Taranaki Regional Council Skinner Road recorder [Q20:260-064] is more than 765 litres per second, up to 225 litres per second may be abstracted.

3. When the flow in the Patea River at the Taranaki Regional Council Skinner Road recorder [Q20:260-064] is between 765 litres per second and 690 litres per second abstraction may be up to a rate of the flow at the Skinner Road recorder less 540 litres per second.

4. When the flow in the Patea River at the Taranaki Regional Council Skinner Road recorder [Q20:260-064] is less than 690 litres per second, up to 150 litres per second may be abstracted.

5. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2010, and/or June 2016, and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which were either not foreseen at the time the application was considered and which it is appropriate to deal with at the time of review.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4456-1

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Please quote our file number on all correspondence

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:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Change To Conditions Date:	20 January 2000 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain an intake structure in and on the bed of the Patea River at or about GR: Q20:319-049
Expiry Date:	1 June 2028
Review Date(s):	June 1998, June 2004, June 2010, June 2016, June 2022
Site Location:	Patea River, approximately 1 km downstream from the Toko Stream confluence, Toko Road, Toko, Stratford
Legal Description:	Pt Sec 2 DP 1041 Blk IV Ngaere SD
Catchment:	Patea

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

General conditions

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

b) 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) 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. That the consent holder shall notify the Taranaki Regional Council, at least 48 hours prior to the commencement and upon completion of the initial construction and again prior to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water.

2. That 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.

3. That 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.

4. That 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.

5. That 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.

6. That any 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.

7. That 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 2004 and/or June 2010 and/or June 2016 and/or June 2022, 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 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4458-1

TARANAKI REGIONAL COUNCIL

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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: Contact Energy Limited
P O Box 10742
WELLINGTON

Change To Conditions Date: 6 March 2008 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted: To erect, place, use and maintain a diffuser structure in and above the bed of the Patea River for the purpose of discharging used water from Power Stations at East Road, Stratford at or about 2624600E-6206700N

Expiry Date: 1 June 2028

Review Date(s): June 2010, June 2016, June 2022

Site Location: Patea River, Approximately 1 km east of the site above the confluence with the Kahouri Stream, State Highway 43 [East Road], Stratford

Legal Description: Patea Riverbed adjoining Pt Sec 121 Blk II Ngaere SD

Catchment: Patea

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

General conditions

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

b) 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) 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. Prior to commencing construction the consent holder shall provide plans and details of any modifications to the diffuser structure, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council. These plans and details shall be in accordance with 'option C', as outlined in the report 'Comments on Diffuser Design' [J C Rutherford, NIWA Ecosystems] provided with the application for this consent. Any modifications to the diffuser structure shall be in accordance with Section 3 of the report 'Stratford Power Station Expansion Project: Water Resources Engineering Summary Report [G Boyd, Meritec Limited, June 2001].

2. The diffuser structure shall be constructed and maintained in accordance with the plans and details provided under condition 1, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

3. The structure[s] that are the subject of this consent shall not result in the obstruction of fish passage.

4. The consent holder shall notify the Taranaki Regional Council prior to the commencement and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.

5. Modification and any instream maintenance works [that would involve disturbance of or deposition to the riverbed or discharges to water] shall only take place between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

6. 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.

7. 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.

8. 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.

9. 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 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4459-1

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Change To Conditions Date:	6 September 2001 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted:	To discharge up to 1360 litres/second of stormwater from a combined cycle power station site, including stormwater and sediment from construction activities associated with the proposed expansion of the site, into an unnamed tributary of the Piakau Stream and into the Kahouri Stream, both tributaries of the Patea River at or about GR: Q20:238-075
Expiry Date:	1 June 2028
Review Date(s):	June 1998, June 2004, June 2010, June 2016, June 2022
Site Location:	Combined Cycle Power Station, East Road, Stratford
Legal Description:	Lot 2 DP 19365
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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 consent holder shall forward plans of the upgraded stormwater catchment and treatment system within three months of completion of construction activities.

2. The following concentrations shall not be exceeded in the discharge effluent:

Component	Concentration
pH [range]	6 - 9
Oil and grease	15 gm^{-3}
Suspended solids	100 gm^{-3}

This condition shall apply prior to the entry of the stormwater into the receiving waters, at designated sampling points approved by the Chief Executive, Taranaki Regional Council.

3. The consent holder shall prepare and maintain a contingency plan, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of contaminants; the initial plan to be provided at least three months prior to the exercise of this consent.

4. After allowing for reasonable mixing in a 5-metre zone from any discharge point, the discharge must not give rise to any or all of the following effects in the receiving waters:

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 an objectionable odour;
d) the rendering of freshwater unsuitable for consumption by farm animals;
e) any significant adverse effects on aquatic life, habitats, or ecology;
f) any undesirable biological growths.

5. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2004, and/or June 2010, and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Transferred at Stratford on 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4460-1

TARANAKI REGIONAL COUNCIL
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Please quote our file number on all correspondence

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:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Change To Conditions Date:	30 October 2001 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain, in and above the beds of an unnamed tributary of the Piakau Stream and of the Kahouri Stream, both tributaries of the Patea River, structures for the purpose of discharging stormwater from the site of combined cycle power stations at or about GR: Q20:238-075
Expiry Date:	1 June 2028
Review Date(s):	June 1998, June 2004, June 2010, June 2016, June 2022
Site Location:	Stratford Combined Cycle Power Station Site, East Road, Stratford
Legal Description:	Lot 2 DP 19365
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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. Prior to commencing construction the consent holder shall provide plans and details of the stormwater discharge structure[s], to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

2. The stormwater discharge structure[s] shall be constructed and maintained in accordance with the plans and details provided under condition 1, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

3. The structure[s] that are the subject of this consent shall not result in the obstruction of fish passage.

4. The consent holder shall notify the Taranaki Regional Council prior to the commencement and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.

5. Any instream maintenance works [that would involve disturbance of or deposition to the riverbed or discharges to water] shall only take place between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

6. 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.

7. 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.

8. 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.

9. 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 2004 and/or June 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Transferred at Stratford on 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4461-1

TARANAKI REGIONAL COUNCIL
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Please quote our file number on all correspondence

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:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Change To Conditions Date:	30 October 2001 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain in, over and under the bed of the Kahouri Stream a tributary of the Patea River, within the site and adjacent land immediately to the southeast a bridge, pipelines, cables and associated utilities for combined cycle power stations at or about GR: Q20:240-072
Expiry Date:	1 June 2028
Review Date(s):	June 1998, June 2004, June 2010, June 2016, June 2022
Site Location:	Stratford Combined Cycle Power Station Site, East Road, Stratford
Legal Description:	Pt Sec 108 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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. Prior to commencing construction the consent holder shall provide plans and details of the structure, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

2. The structure shall be constructed and maintained in accordance with the plans and details provided under condition 1, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

3. The structure that is the subject of this consent shall not result in the obstruction of fish passage.

4. The consent holder shall notify the Taranaki Regional Council prior to the commencement and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.

5. Any instream maintenance works [that would involve disturbance of or deposition to the riverbed or discharges to water] shall only take place between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

6. 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.

7. 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.

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

9. 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 2004 and/or June 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Transferred at Stratford on 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4462-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	6 March 2008 [Granted: 25 May 1994]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain water pipelines and associated control cables above, through or below the beds of the Toko Stream and various small unnamed streams, for the purpose of water transmission from the Patea River to Power Stations at East Road, Stratford at or about 2631900E-6204900N
Expiry Date:	1 June 2028
Review Date(s):	June 2010, June 2016, June 2022
Site Location:	State Highway 43 [East Road], Stratford
Legal Description:	Pt Secs 134 & 132, Secs 110, 111 & 130 Blk II Ngaere SD, Subdivision 2 of Sec 112 Ngaere SD, Lots 1 & 2 DP 363968, Lot 1 DP 16285, Lot 1 DP 141, Lot 1 DP 17136, Pt Lots 8 to 13 DP 141, Pt Secs 39 & 40 Blk III Ngaere SD, Lot 2 DP 1115, Pt Lots 1 & 2 DP 739, Lot 1 DP 20723
Catchment:	Patea
Tributary:	Toko

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

General conditions

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

b) 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) 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. Prior to commencing construction the consent holder shall provide plans and details of the pipeline and associated structure[s], to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

2. The pipelines and associated structure[s] shall be constructed and maintained in accordance with the plans and details provided under condition 1, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

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

4. The consent holder shall notify the Taranaki Regional Council prior to the commencement and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.

5. Any instream maintenance works [that would involve disturbance of or deposition to the riverbed or discharges to water] shall only take place between 1 November and 30 April, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

6. 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.

7. 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.

8. 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.

9. 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 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 4804-1

TARANAKI REGIONAL COUNCIL
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Please quote our file number on all correspondence

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:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Change To Conditions Date:	30 October 2001 [Granted: 24 July 1995]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain over the bed of an unnamed tributary of the Kahouri Stream in the Patea catchment a bridge structure to convey high voltage electricity cables and associated communication cables for combined cycle power stations at or about GR: Q20:238-071
Expiry Date:	1 June 2028
Review Date(s):	June 1998, June 2004, June 2010, June 2016, June 2022
Site Location:	Stratford Combined Cycle Power Station Site, East Road, Stratford
Legal Description:	Lot 1 DP 19365
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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. Prior to commencing construction the consent holder shall provide plans and details of the structure, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

2. The structure shall be constructed and maintained in accordance with the plans and details provided under condition 1, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

3. The consent holder shall notify the Taranaki Regional Council prior to the commencement and upon completion of any subsequent maintenance works that would involve disturbance of or deposition to the riverbed or discharges to water.

4. Any instream maintenance works [that would involve disturbance of or deposition to the riverbed or discharges to water] shall only take place between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.

5. 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.

6. 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.

7. The structure authorised by this consent shall be removed and the area reinstated, if and when the structure are no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to structure 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 2004 and/or June 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Transferred at Stratford on 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 5063-1

TARANAKI REGIONAL COUNCIL
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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Change To Conditions Date:	6 September 2001 [Granted: 6 December 1996]

Conditions of Consent

Consent Granted:	To discharge up to 5 cubic metres/day of domestic septic tank effluent through a soakage field onto and into land in the vicinity of the Kahouri Stream in the Patea Catchment at or about GR: Q20:238-072
Expiry Date:	1 June 2028
Review Date(s):	June 1998, June 2004, June 2010, June 2016, June 2022
Site Location:	Combined Cycle Power Station, East Road, Stratford
Legal Description:	Lot 2 DP 19365
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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 septic tank and field soakage effluent treatment system shall be installed according to the plan submitted in support of application 96/264.

2. At no time shall the discharge directly enter a surface waterbody.

3. 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 2004 and/or June 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions adequately deal with the environmental effects arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at the time.

Transferred at Stratford on 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 5633-1

TARANAKI REGIONAL COUNCIL
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Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited (WELLINGTON) P O Box 10742 WELLINGTON
Consent Granted Date:	24 May 2000

Conditions of Consent

Consent Granted:	To discharge fine sediment and organic matter from water intake structure tee screens to the Patea River at or about GR: Q20:319-049
Expiry Date:	1 June 2028
Review Date(s):	June 2004, June 2010, June 2016, June 2022
Site Location:	Patea River, approximately 500 m downstream from the Toko Stream confluence, Toko Road, Toko, Stratford
Legal Description:	Pt Sec 2 DP 1041 Blk IV Ngaere SD
Catchment:	Patea

For General, Standard and Special conditions pertaining to this consent please see reverse side of this document
www.trc.govt.nz

General conditions

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

b) 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) 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 discharge licensed by this consent shall be undertaken in accordance with the documentation submitted in support of the application to ensure the conditions of this consent are met.

2. After allowing for mixing within a mixing zone extending 25 metres downstream of the intake structure, the discharge shall not give rise to any of the following effects in the receiving waters of the Patea River:

   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.

3. 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 2004 and/or June 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects of the discharge on the environment arising from the exercise of this consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 4 July 2005

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	22 February 2007 [Granted: 6 September 2002]

Conditions of Consent

Consent Granted:	To discharge contaminants to air from combined cycle power station unit[s] and ancillary plant located adjacent to State Highway 43 [East Road] approximately three kilometres east of Stratford at or about GR: Q20:238-075
Expiry Date:	1 June 2034
Review Date(s):	June 2004, June 2010, June 2016, June 2022, June 2028
Site Location:	Combined Cycle Power Station, State Highway 43 [East Road], Stratford
Legal Description:	Lot 2 DP 19365 Blk II Ngaere SD
Catchment:	Patea

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

General conditions

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

b) 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) 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

Conditions 1 – 14 [unchanged]

1. The holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the environment from the site.

2. A general outline of the methods, specifications, operating guidelines or other measures which represent the best practicable option at the time of commissioning will be supplied by the consent holder and thereafter attached to this consent as Schedule A.

3. The measures representing the best practicable option may be reviewed in accordance with the procedure provided for in conditions 16 and 17.

4. Prior to undertaking any alterations to the plant, processes or operations, as specified in the application, which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and any amendments.

5. The consent holder shall provide to the Council within two years from the first exercise of this consent and again at four years from the exercise of this consent and every six years thereafter a written report:

a) reviewing any technological advances in the reduction or mitigation of emissions, especially but not exclusively in respect of the cooling tower plume and of carbon dioxide, how these might be applicable and/or implemented at the power station, and the costs and benefits of these advances; and
b) detailing an inventory of emissions from the site of such contaminants as the Chief Executive may from time to time specify following consultation with the consent holder; and

c) detailing any measures that have been taken by the consent holder to improve the energy efficiency of the power station; and
d) addressing any other issue relevant to the minimisation or mitigation of emissions from the site that the Chief Executive considers should be included; and
e) detailing carbon dioxide emissions from the site;

and should this consent not have been exercised within 4 years of it being granted, then in any case the consent holder shall provide a written report covering matters (a), (c), and (d) above.

6. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the site, in order that the maximum ground level concentration of carbon monoxide arising from the exercise of this consent in conjunction with the exercise of any other consent for the site measured under ambient conditions does not exceed 10 mg/m^3 [eight-hour average exposure], or 30 mg/m^3 [one-hour average exposure] at or beyond the boundary of the site.

7. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the site, in order that the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent in conjunction with the exercise of any other consent for the site measured under ambient conditions does not exceed 30 ug/m^3 [annual average exposure] or 200 ug/m^3 [one hour average] at or beyond the boundary of the site.

8. The consent holder shall control all emissions to the atmosphere from the site of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, in order that the maximum ground level concentration for any particular contaminant arising from the exercise of this consent in conjunction with the exercise of any other consent for the site 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, or by more than the Workplace Exposure Standard-Short Term Exposure Limit at any time, [all terms as defined in Workplace Exposure Standards, 1994, Department of Labour]; or

b) if no Short Term Exposure Limit is set, by more than three times the Time Weighted Average at any time, [all terms as defined in Workplace Exposure Standards, 1994, Department of Labour].

9. Except in any period of 240 minutes following the initiation of start-up of a turbine or in any period of 30 minutes prior to the cessation of the generation of electricity from a turbine, the discharge of nitrogen oxides arising from the exercise of this consent shall not exceed:

a) a mass emission rate for the plant of 63 g/s, or

b) a mass emission rate per gas turbine stack of [63 divided by n] g/s [where n = number of gas turbine stacks], or

c) a concentration in any gas turbine stack equivalent to 50 mg/m3 at 100°Celsius, or to 50 ppm [volumetric basis].

10. For a maximum of 240 minutes from initiation of combustion until low NO_x operation is achieved or in any period of 30 minutes prior to the cessation of the generation of electricity from a turbine, the discharge of nitrogen oxides arising from the exercise of this consent shall not exceed 230 g/s.

11. The minimum height of discharge of products of combustion from the turbine(s) shall be 35 metres above ground level.

12. The discharges authorised by this consent shall not give rise to any direct significant adverse ecological effect on any ecosystems in the Taranaki region, including but not limited to habitats, plants, animals, microflora and microfauna.

13. The evaporative cooling system to be used shall not produce a visible plume at any ambient condition further from saturation than 6° Celsius and 85% relative humidity.

14. The evaporative cooling system shall be operated in order that the loss of cooling water as droplet drift to atmosphere does not exceed in aggregate 0.02% of the cooling water circulation rate at the time.

Condition 15 [changed]

15. This consent shall lapse on 6 December 2017 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 (b) of the Resource Management Act 1991.

Conditions 16 – 17 [unchanged]

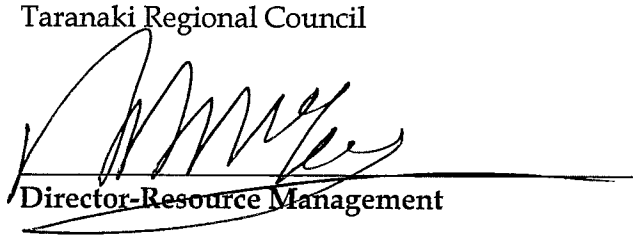
16. Subject to the provisions of this condition, within six months of receiving a report prepared by the consent holder pursuant to condition 5 of this consent, or during June 2004, and/or June 2010, and/or June 2016, and/or June 2022, and/or June 2028, the Taranaki Regional Council may review any or all of the conditions of this consent, by giving notice that it intends to review the conditions of this resource consent in accordance with section 128(1)(a) of the Act 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 and which it is appropriate to deal with at the time of the review; or
b) requiring the holder to adopt the best practicable option to remove or reduce any adverse effect on the environment caused by the discharge.
c) altering, adding, or deleting limits on discharge, receiving environment or ambient concentrations of any contaminant or contaminants, for the purpose of dealing with any significant adverse ecological effect on any ecosystem; or
d) taking into account any Act of Parliament, regulation, national policy statement or national environmental standard which relates to limiting, recording, or mitigating emissions of carbon dioxide and/or nitrogen dioxide, and which is relevant to the air discharge from the Stratford combined cycle power station.

17. Prior to serving notice of its intention to review any condition, the Council shall allow at least 28 days for consultation with the holder as to whether the purposes in condition 16 would be achieved by a review and whether alternative means could be used to achieve those purposes.

Signed at Stratford on 22 February 2007

For and on behalf of
Taranaki Regional Council



Director-Resource Management

Consent 5847-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

Water Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	6 March 2008 [Granted: 27 November 2001]

Conditions of Consent

Consent Granted:	To take and use up to 19,440 cubic metres/day [225 litres/second averaged over 15 minutes] of water from a water intake structure in the Patea River for cooling and power station purposes at or about 2626000E-6206400N
Expiry Date:	1 June 2034
Review Date(s):	June 2010, June 2016, June 2022, June 2028
Site Location:	Skinner Road, Stratford
Legal Description:	Patea Riverbed adjoining Pt Lot 8 DP 141 Blk III Ngaere SD
Catchment:	Patea

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

General conditions

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

b) 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) 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 resource consent holder shall install and operate a measuring device capable of recording instantaneous and daily rates of abstraction and shall make such records available to the Chief Executive, Taranaki Regional Council, upon request.

2. The maximum rate of abstraction authorised by the exercise of this consent shall be managed so that:-

a) when the flow in the Patea River at the point of abstraction is more than 1040 litres per second, up to 225 litres per second may be abstracted;
b) when the flow in the Patea River at the point of abstraction is between 1040 litres per second and 887 litres per second, a residual flow of at least 812 litres per second shall be maintained at all times in the Patea River downstream of the abstraction point;
c) when the flow in the Patea River at the point of abstraction is between 887 litres per second and 695 litres per second, up to 75 litres per second may be abstracted;
d) when the flow in the Patea River at the point of abstraction is between 695 litres per second and 620 litres per second, a residual flow of at least 620 litres per second shall be maintained at all times in the Patea River downstream of the abstraction point; and
e) when the flow in the Patea River at the point of abstraction is less than 620 litres per second, no abstraction is permitted.

For (c) and (d) abstraction is permitted only if the maximum abstraction permitted under consent 4455 is already being extracted.

The residual flow below the abstraction point and at the point of abstraction will be as measured, or as implied from measurements, at the Taranaki Regional Council Skinner Road recorder [Q20:260-064].

3. The maximum rate of abstraction authorised by the exercise of this consent in combination with Water Permit 4455 shall not exceed 225 litres per second.

4. By the agreement of the consent holder the consent holder shall provide a one off donation to the Taranaki Regional Council of $100,000 [plus Goods and Services Tax], for the purposes of enhancing the habitat values of the Patea River and/or its tributaries, benefiting the ecological and/or recreational uses of the Patea catchment, or as otherwise agreed between the Manager, Stratford Power Station, and the Chief Executive, Taranaki Regional Council. The donation is payable at the start of the construction of the power station in respect of which this consent has been sought.

5. This consent shall lapse on 6 December 2017 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 (b) of the Resource Management Act 1991.

6. The Taranaki Regional Council may review any or all of the conditions of this consent, by giving notice of review during June 2010, and/or June 2016 and/or June 2022 and/or June 2028 for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 5848-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	6 March 2008 [Granted: 27 November 2001]

Conditions of Consent

Consent Granted:	To discharge up to 6,740 cubic metres/day [78 litres/second averaged over 15 minutes] of used water, mainly blowdown water from the cooling system from Power Stations at East Road, Stratford into the Patea River at or about 2624600E-6206800N
Expiry Date:	1 June 2034
Review Date(s):	June 2010, June 2016, June 2022, June 2028
Site Location:	State Highway 43 [East Road], Stratford
Legal Description:	Patea Riverbed adjacent to Pt Sec 121 Blk II Ngaere SD
Catchment:	Patea

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

General conditions

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

b) 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) 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

Conditions 1 - 2 [unchanged]

1. The consent shall be exercised in accordance with the procedures set out in an effluent disposal management plan [`the effluent disposal management plan'], which shall demonstrate ability to comply with consent conditions and shall address the following matters:

i) monitoring of discharge effluent;
ii) chemical, physicochemical, ecological and biological [including trout] monitoring of the Patea River;
iii) minimisation of ammonia and dissolved reactive phosphorus in the discharge effluent;
iv) mitigation of the effects of the discharge [including but not limited to, the options of riparian planting and other off-site mitigation measures]; and
v) reporting on the exercise of consent.

2. The effluent disposal management plan shall be submitted to the Chief Executive, Taranaki Regional Council, for approval not later than three months prior to the exercise of the consent, and such approval shall not be unreasonably withheld if the effluent disposal management plan demonstrates ability to comply with the conditions of this consent and addresses the matters set out in special condition 1 above. Thereafter the effluent disposal management plan shall be subject to revision upon three months' notice by either the consent holder or the Taranaki Regional Council.

Conditions 3 - 4 [changed]

3. No later than three months prior to exercise of the consent, the consent holder shall provide to the Chief Executive, Taranaki Regional Council, details of water treatment chemicals for use at Power Stations, East Road, Stratford, including raw water, boiler water and cooling water. Further, the consent holder shall provide to the Chief Executive, Taranaki Regional Council, details of any change in water treatment chemical, or increase in maximum concentration of any water treatment chemical used, no later than one month prior to the change.

4. No later than three months prior to exercise of the consent, the consent holder shall provide to the Chief Executive, Taranaki Regional Council, details of cleaning chemicals for use at Power Stations, East Road, Stratford. Further, the consent holder shall provide to the Chief Executive, Taranaki Regional Council, details of any change in cleaning chemical, or increase in maximum concentration of any cleaning chemical used, no later than one month prior to the change.

Conditions 5 - 15 [unchanged]

5. Pursuant to section 128(1)(a) of the Resource Management Act 1991, the Taranaki Regional Council may review special condition 12 of this consent, by giving notice of review within three months of the provision of information under special condition 3 or 4 involving the use of treatment or cleaning chemicals not already advised to the Council or at concentrations not already advised to the Council, for the purpose of including standards addressing water treatment chemicals, cleaning chemicals and their products.

6. The consent holder shall prepare and maintain a contingency plan, to the satisfaction of the Chief Executive, Taranaki Regional Council, for action to be taken in the event of accidental spillage or discharge of contaminants, the initial plan to be provided no later than three months prior to exercise of this consent.

7. That after allowing for reasonable mixing in a zone of 75 metres extending downstream of the discharge point [`the mixing zone'], the discharge shall not give rise to all or any of the following effects in the receiving water:

   i) the production of any conspicuous oil or grease films, scums or foams or floatable or suspended materials;
   ii) any conspicuous change in the colour or visual clarity;
   iii) any emission of an objectionable odour;
   iv) the rendering of freshwater unsuitable for consumption by farm animals;
   v) any significant adverse effects on aquatic life, habitats, or ecology;
   vi) any undesirable biological growths.

8. Within the mixing zone the discharge shall not give rise to a barrier preventing the movement of fish species.

9. The discharge shall not :

   (i) alter the ambient temperature of the receiving waters of the Patea River by more than 1.5 degrees Celsius for 95% of the time that the discharge is occurring on an annual basis; and
   (ii) alter the ambient temperature of the receiving waters of the Patea River by more than 2.0 degrees Celsius at any time

   when measured simultaneously immediately upstream and 75 metres downstream of the discharge site.

10. The discharge shall not raise the temperature of the receiving water above 25 degrees Celsius when measured 75 metres downstream of the discharge site.

11. The consent holder shall continuously monitor the temperature of the receiving waters so as to assess compliance with special conditions 9 and 10, and forward the results of this monitoring to the Chief Executive, Taranaki Regional Council, at monthly intervals.

12. The following concentrations shall not be exceeded in the discharge effluent:

Component	**Concentration**
pH [range]	6.0 - 9.0
Total Residual Chlorine	0.05 gm^{-3}

   This condition shall apply immediately prior to the entry of the effluent into the receiving water.

13. The discharge shall not cause the concentration of un-ionised ammonia in the Patea River to exceed 0.025 grams per cubic metre when measured at a point 75 metres downstream of the discharge.

14. This consent shall lapse on the expiry of six years after the date of commencement of this consent, 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(b) of the Resource Management Act 1991.

15. The Taranaki Regional Council may review any or all of the conditions of this consent, by giving notice of review during June 2010, and/or June 2016 and/or June 2022 and/or June 2028 for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	22 February 2007 [Granted: 27 November 2001]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain gas pipelines and associated utilities, under the bed, and including disturbance for installation by trenching of the bed, of the Kahouri Stream in the Patea catchment, for combined cycle power station purposes at or about GR: Q20:237-075
Expiry Date:	1 June 2034
Review Date(s):	June 2004, June 2010, June 2016, June 2022, June 2028
Site Location:	Combined Cycle Power Station, State Highway 43 [East Road], Stratford
Legal Description:	Pt Lot 2 DP 7012 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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

Conditions 1 – 6 [unchanged]

1. Prior to commencing construction the consent holder shall provide plans and details of the structures, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

2. The structures shall be constructed and maintained in accordance with the plans and details provided under condition 1, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

3. During and subsequent to construction works the consent holder must observe every practicable measure to minimise the discharge or placement of silt and/or organics and/or debris into the watercourse, and to avoid or remedy erosion and scour attributable to the works.

4. The consent holder must notify the Taranaki Regional Council at least seven days before commencing construction.

5. Construction of the structures must be undertaken only between 1 November and 30 April inclusive. These dates may be altered only by the written approval of the Chief Executive, Taranaki Regional Council.

6. The exercise of this consent must not result in any barrier to the passage of fish species.

Condition 7 [changed]

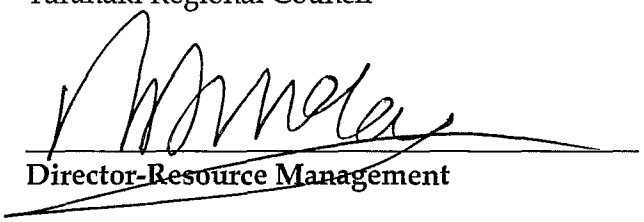
7. This consent shall lapse on 6 December 2017 unless the consent is given effect to before the end of that period, or the Taranaki Regional Council fixes a longer period pursuant to section 125 (b) of the Resource Management Act 1991.

Condition 8 [unchanged]

8. The Taranaki Regional Council may review any or all of the conditions of this consent, by giving notice of review during June 2004, and/or June 2010, and/or June 2016 and/or June 2022 and/or June 2028 for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 22 February 2007

For and on behalf of
Taranaki Regional Council



Director-Resource Management

Consent 5850-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

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: Contact Energy Limited
P O Box 10742
WELLINGTON

Change To Conditions Date: 6 March 2008 [Granted: 27 November 2001]

Conditions of Consent

Consent Granted: To erect, place, use and maintain an intake structure and ancillary pipework and pumps in and on the bed, and including disturbance associated with construction of the bed of the Patea River, for the purpose of taking water for Power Stations at East Road, Stratford at or about 2626000E-6206400N

Expiry Date: 1 June 2034

Review Date(s): June 2010, June 2016, June 2022, June 2028

Site Location: Skinner Road, Stratford

Legal Description: Patea Riverbed adjoining Pt Lot 8 DP 141 Blk III Ngaere SD

Catchment: Patea

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

General conditions

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

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

2. 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.

3. 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.

4. 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.

5. 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.

6. Any 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.

7. This consent shall lapse on 6 December 2017 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 (b) of the Resource Management Act 1991.

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 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions adequately deal with the environmental effects arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 5851-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	22 February 2007 [Granted: 7 December 2001]

Conditions of Consent

Consent Granted:	To discharge fine sediment and organic matter from water intake structure screens to the Patea River at or about GR: Q20:260-064
Expiry Date:	1 June 2034
Review Date(s):	June 2004, June 2010, June 2016, June 2022, June 2028
Site Location:	Skinner Road, Stratford
Legal Description:	Patea Riverbed adjoining Pt Lot 8 DP 141 Blk III Ngaere SD
Catchment:	Patea

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

General conditions

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

b) 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) 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

Conditions 1 – 2 [unchanged]

1. The discharge licensed by this consent shall be undertaken in accordance with the documentation submitted in support of the application to ensure the conditions of this consent are met.

2. After allowing for mixing within a mixing zone extending 25 metres downstream of the intake structure, the discharge shall not give rise to any of the following effects in the receiving waters of the Patea River:

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.

Condition 3 [changed]

3. This consent shall lapse on 6 December 2017 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 (b) of the Resource Management Act 1991.

Condition 4 [unchanged]

4. 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 2004 and/or June 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 22 February 2007

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 5852-1

TARANAKI REGIONAL COUNCIL

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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:	Contact Energy Limited P O Box 10742 WELLINGTON
Change To Conditions Date:	22 February 2007 [Granted: 6 December 2001]

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a bridge, cables and associated utilities over the Kahouri Stream in the Patea catchment for combined cycle power station purposes at or about GR: Q20:239-071
Expiry Date:	1 June 2034
Review Date(s):	June 2004, June 2010, June 2016, June 2022, June 2028
Site Location:	Kahouri Stream, Straford Combined Cycle Power Station Site, State Highway 43 [East Road], Stratford
Legal Description:	Pt Sec 108 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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

Conditions 1 – 6 [unchanged]

1. Prior to commencing construction the consent holder shall provide final plans and details of the bridge, cables and associated utilities, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council.

2. The bridge, cables and associated utilities shall be constructed generally in accordance with the plans and details provided under condition 1, and shall be maintained to ensure the conditions of this consent are met.

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

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 and bank 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[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 the structure[s] removal and reinstatement.

Condition 7 [changed]

7. This consent shall lapse on 6 December 2017 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 (b) of the Resource Management Act 1991.

Condition 8 [unchanged]

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 2004 and/or June 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects on the environment arising from the exercise of this consent which were not foreseen at the time the application was considered and which it is appropriate to deal with at the time of the review.

Signed at Stratford on 22 February 2007

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 7247-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON
Consent Granted Date:	6 March 2008

Conditions of Consent

Consent Granted:	To discharge emissions into the air from the operation of the cooling tower associated with the Stratford Peaker Power Plant at or about 2623861E-6207168N
Expiry Date:	1 June 2034
Review Date(s):	June 2010, June 2016, June 2022, June 2028
Site Location:	State Highway 43 [East Road], Stratford
Legal Description:	Lot 1 DP 17776 & Lot 1 DP 19365 Blk II Ngaere SD

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

General conditions

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

b) 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) 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 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. A hybrid dry/wet mechanical draft cooling tower, as described in section 3.3.4 of the assessment of environmental effects provided with the application, shall be installed.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. The consent holder shall at all times operate, maintain, supervise, monitor and control all processes so that emissions authorised by this consent are maintained at the minimum practicable level.

5. The evaporative cooling system to be used shall not produce a visible plume at any ambient condition further from saturation than 6° Celsius and 85% relative humidity.

6. That the evaporative cooling system shall be operated in order that the loss of cooling water as droplet drift to atmosphere does not exceed in aggregate 0.02% of the cooling water circulation rate at the time.

7. Prior to undertaking any alterations to the plant, processes or operations which may significantly change the nature or quantity of contaminants emitted from the site and authorised by this consent, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act.

8. The consent holder shall provide the Chief Executive, Taranaki Regional Council a description of the water treatment regime to be used in the cooling tower systems no later than 7 days prior to the first exercise of this consent. The consent holder shall thereafter advise the Chief Executive of the current water treatment regime.

9. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that is offensive or objectionable.

10. The discharges authorised by this consent shall not give rise to any significant adverse ecological effect on any ecosystems, including but not limited to habitats, plants, animals, microflora and microfauna.

11. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

12. 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 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 7248-1

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON
Consent Granted Date:	6 March 2008

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a bridge over an unnamed tributary of the Kahouri Stream for pedestrian access and carriage of water pipes, high voltage cables, control cables and associated utilities at or about 2623738E-6207157N
Expiry Date:	1 June 2034
Review Date(s):	June 2010, June 2016, June 2022, June 2028
Site Location:	State Highway 43 [East Road], Stratford
Legal Description:	Lot 1 DP 19365 & Lot 1 DP 18343 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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 exercise of this consent shall be undertaken substantially in accordance with the documentation submitted in support of application 4907. In the case of any contradiction between the documentation submitted in support of application 4907 and the conditions of this consent, the conditions of this consent shall prevail.

2. Before beginning construction of the bridge the consent holder shall provide plans of the bridge to the Chief Executive, Taranaki Regional Council.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. The consent holder shall take all reasonable steps to:

a) minimise the amount of sediment discharged to the stream;
b) minimise the amount of sediment that becomes suspended in the stream; and
c) mitigate the effects of any sediment in the stream.

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

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. Except with the written agreement of the Chief Executive, Taranaki Regional Council, 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.

7. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

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 during the month of June 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 7249-1

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON
Consent Granted Date:	6 March 2008

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a bridge over the Kahouri Stream for vehicle access purposes at or about 2624076E-6207480N
Expiry Date:	1 June 2034
Review Date(s):	June 2010, June 2016, June 2022, June 2028
Site Location:	State Highway 43 [East Road], Stratford
Legal Description:	Lots 1 & 2 DP 19365 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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 exercise of this consent shall be undertaken substantially in accordance with the documentation submitted in support of application 4908. In the case of any contradiction between the documentation submitted in support of application 4908 and the conditions of this consent, the conditions of this consent shall prevail.

2. Before beginning construction of the bridge the consent holder shall provide plans of the bridge to the Chief Executive, Taranaki Regional Council.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. The consent holder shall take all reasonable steps to:

a) minimise the amount of sediment discharged to the stream;
b) minimise the amount of sediment that becomes suspended in the stream; and
c) mitigate the effects of any sediment in the stream.

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

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. Except with the written agreement of the Chief Executive, Taranaki Regional Council, 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.

7. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

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 during the month of June 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 7250-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON
Consent Granted Date:	6 March 2008

Conditions of Consent

Consent Granted:	To erect, place, use and maintain a bridge over the Kahouri Stream for pedestrian access and carriage of water pipes, high voltage cables, control cables and associated utilities at or about 2623777E-6207372N
Expiry Date:	1 June 2034
Review Date(s):	June 2010, June 2016, June 2022, June 2028
Site Location:	State Highway 43 [East Road], Stratford
Legal Description:	Lot 1 DP 17776 & Lots 1 & 2 DP 19365 Blk II Ngaere SD
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

b) 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) 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 exercise of this consent shall be undertaken substantially in accordance with the documentation submitted in support of application 4909. In the case of any contradiction between the documentation submitted in support of application 4909 and the conditions of this consent, the conditions of this consent shall prevail.

2. Before beginning construction of the bridge the consent holder shall provide plans of the bridge to the Chief Executive, Taranaki Regional Council.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. The consent holder shall take all reasonable steps to:

a) minimise the amount of sediment discharged to the stream;
b) minimise the amount of sediment that becomes suspended in the stream; and
c) mitigate the effects of any sediment in the stream.

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

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. Except with the written agreement of the Chief Executive, Taranaki Regional Council, 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.

7. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

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 during the month of June 2010 and/or June 2016 and/or June 2022 and/or June 2028, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 March 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 7605-1

TARANAKI REGIONAL COUNCIL

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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:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Change To Conditions Date:	15 June 2010 [Granted: 23 February 2010]

Conditions of Consent

Consent Granted:	To construct, place and maintain a stormwater outlet structure in the Kahouri Stream at or about (NZTM) 1713704E-5645626N
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	189 East Road, Stratford
Legal Description:	Lot 1 DP 19365
Catchment:	Patea
Tributary:	Kahouri

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 [Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The exercise of this consent shall be undertaken in accordance with the documentation submitted in support of application 6435, in particular, UGL drawing number 3200-0030-S-3609. In the event of a conflict between that material and this consent; the conditions of this consent shall take precedence.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the commencement and upon completion of the initial installation and again at least 48 hours prior to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

3. The consent holder shall ensure that the area and volume of streambed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

4. The consent holder shall take all reasonable steps to:

   a. minimise the amount of sediment discharged to the stream;
   b. minimise the amount of sediment that becomes suspended in the stream; and
   c. mitigate the effects of any sediment in the stream.

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

5. Except with the written agreement of the Chief Executive, Taranaki Regional Council, the structure[s] authorised by this consent shall be removed and the area reinstated, if and when the structure is no longer required. A further resource consent may be required to authorise the removal of the structure, and the consent holder is advised to seek advice from the Council on this matter.

6. This consent shall lapse on 31 March 2015, 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 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 15 June 2010

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Consent 7653-1

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Consent Granted Date:	21 June 2010

Conditions of Consent

Consent Granted:	To construct, place and maintain a stormwater outlet structure in the Kahouri Stream at or about (NZTM) 1713740E-5645575N
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	189 East Road, Stratford
Legal Description:	Lot 1 DP 19365
Catchment:	Patea
Tributary:	Kahouri

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The exercise of this consent shall be undertaken in accordance with the documentation submitted in support of application 6498. Specifically this includes United Group Infrastructure Plan 3200-0030-S-3608. If there is any conflict between the documentation submitted in support of application 6498 and the conditions of this consent, the conditions of this consent shall prevail.

2. Any 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.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the commencement and upon completion of the initial installation and again at least 48 hours prior to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

4. The consent holder shall ensure that the area and volume of streambed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

5. The consent holder shall take all reasonable steps to:

   a. minimise the amount of sediment discharged to the stream;
   b. minimise the amount of sediment that becomes suspended in the stream; and
   c. mitigate the effects of any sediment in the stream.

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

6. Except with the written agreement of the Chief Executive, Taranaki Regional Council, the structure[s] authorised by this consent shall be removed and the area reinstated, if and when the structure is no longer required. A further resource consent may be required to authorise the removal of the structure, and the consent holder is advised to seek advice from the Council on this matter.

7. This consent shall lapse on 30 June 2015, 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.

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 during the month of June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 21 June 2010

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	23 March 2012
Commencement Date:	23 March 2012

Conditions of Consent

Consent Granted:	To discharge stormwater, sediment, dewatering water and washdown water into an unnamed tributary of the Piakau Stream at or about 1713959E-5646039N and into the Kahouri Stream at or about 1713635E-5645679N, from earthworks associated with the construction activities of a power station
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	Stratford Power Station Site, State Highway 43 [East Road], Stratford
Legal Description:	[Part of Stratford Power Station Site – TCC, TCC2/SP2] Lot 2 DP 19365, Lot 3 DP 19365 and Sec 134 Blk II Ngaere SD [Discharge Points] Pt Lot 2 DP 7012 – Kahouri Stream, Lot 3 DP 19365 – unnamed tributary of Piakau Stream
Catchment:	Patea
Tributary:	Kahouri Piakau

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 to section 36 of the Resource Management Act.

Special conditions

1. At least 30 working days prior to the commencement of any earthworks, the consent holder shall prepare and submit to the Chief Executive, Taranaki Regional Council, an erosion and sediment control plan. The erosion and sediment control plan shall detail the methodology that will be used to ensure that erosion and sediment control works comply with the conditions of this consent.

2. The consent holder shall at all times adhere to the erosion and sediment control plan approved under condition 1 of this consent. Any changes to the plan approved shall be submitted for certification to the Chief Executive, Taranaki Regional Council prior to being implemented.

3. At least 7 working days prior to the commencement of works the consent holder shall notify the Taranaki Regional Council of the proposed start date for the work. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz.

4. All runoff from any un-vegetated area shall pass through settlement ponds or sediment traps with a minimum total capacity of:

   a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and

   b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;

   unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.

5. The obligation described in condition 3 above shall cease to apply, and accordingly the erosion and sediment control measures can be removed, in respect of any particular site or area of any site, only when the site is stabilised.

   Note: For the purpose of conditions 4 and 5 "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in the Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an officer of the Taranaki Regional Council, an 80% vegetative cover has been established.

6. All earthworked areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.

   Note: For the purposes of this condition "stabilised" has the same definition as that set out in condition 4.

7. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the power station site.

8. This consent shall lapse on 6 December 2017, 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.

9. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 23 March 2012

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	23 March 2012
Commencement Date:	23 March 2012

Conditions of Consent

Consent Granted:	To discharge contaminants [dust] to air from earthworks associated with the construction activities of a power station at or about (NZTM) 1713810E-5645800N
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	Stratford Power Station Site, State Highway 43 [East Road], Stratford
Legal Description:	[Part of Stratford Power Station Site – TCC, TCC2/SP2] Lot 2 DP 19365, Lot 3 DP 19365 and Sec 134 Blk II Ngaere SD

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The dust discharge shall result from earthworks not exceeding 13 hectares.

2. At least 30 working days prior to the commencement of any earthworks, the consent holder shall prepare and submit to the Chief Executive, Taranaki Regional Council, a dust control management plan. The dust management plan shall detail the methodology that will be used to ensure that discharges to air comply with the conditions of this consent, in particular, special conditions 5 and 6.

3. The consent holder shall at all times adhere to the dust control management plan approved under condition 2 of this consent. Any changes to the plan approved shall be submitted for certification to the Chief Executive, Taranaki Regional Council prior to being implemented.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to the commencement of earthworks associated with this consent . Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

5. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

6. Any discharge to air from the site shall not give rise to any offensive, objectionable, noxious or toxic levels of dust at or beyond the boundary of the property, and in any case, suspended particulate matter shall not exceed 3 mg/m^3 [measured under ambient conditions] beyond the boundary of the project site.

7. The consent holder shall maintain a permanent record of any complaints received alleging adverse effects from or related to the exercise of this consent. This record shall include the following, where practicable:

    a. the name and address of the complainant, if supplied;

    b. date, time and details of the alleged event;

    c. weather conditions at the time of the alleged event (as far as practicable);

    d. investigations undertaken by the consent holder in regards to the complaint and any measures adopted to remedy the effects of the incident/complaint; and

    e. measures put in place to prevent occurrence of a similar incident.

8. The consent holder shall make the complaints record available to officers of Taranaki Regional Council, on request.

9. The consent holder shall notify the Chief Executive, Taranaki Regional Council of any complaints received, which relate to the exercise of this consent, within 24 hours of being received.

10. This consent shall lapse on 6 December 2017, 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.

11. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 23 March 2012

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Appendix II

Resource consents
for Ahuroa Gas Storage

Consent 3681-2

TARANAKI REGIONAL COUNCIL
CHIEF EXECUTIVE
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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date [Change]:	12 January 2011
Commencement Date [Change]:	12 January 2011 [Granted: 22 April 2003]

Conditions of Consent

Consent Granted:	To discharge treated stormwater, uncontaminated treated site water, and uncontaminated treated production water from hydrocarbon exploration and production operations at the Ahuroa-B wellsite onto and into land and into an unnamed tributary of the Makara Stream in the Waitara catchment at or about (NZTM) 1715625E-5652966N
Expiry Date:	1 June 2033
Review Date(s):	June 2015, June 2021, June 2027
Site Location:	Ahuroa-B wellsite, 1278 Croydon Rd, Stratford [Property owner: G & K Bishop]
Legal Description:	Lot 1 DP 16297 Blk X Huiroa SD [Discharge source & site]
Catchment:	Waitara
Tributary:	Makino Makara

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

General conditions

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

b) 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) 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 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 of the discharge on any water body.

2. The stormwater catchment area shall be no more than 40,000 m^2.

3. The Chief Executive shall be advised in writing at least 7 days prior to any site works commencing, and again in writing at least 7 days prior to any well drilling operation commencing.

4. The consent holder shall provide and maintain for the written approval of the Chief Executive site specific details relating to contingency planning for the wellsite.

5. All site water and uncontaminated production water to be discharged under this permit shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.

6. The design, management and maintenance of the stormwater system shall be generally undertaken in accordance with the information submitted in support of application 6634.

7. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not to the stormwater catchment.

8. The following concentrations shall not be exceeded in the discharge:

Component	Concentration
pH (range)	6.5 - 8.5
suspended solids	100 gm^{-3}
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm^{-3}
chloride	50 gm^{-3}

This condition shall apply prior to the entry of the treated stormwater, site water and production water either onto and into land, or into surface water, at a designated sampling point approved by the Chief Executive.

9. After allowing for reasonable mixing, within a mixing zone extending downstream of the discharge point[s] to the confluence of the two unnamed tributaries at [NZTM] 1715531E-5653067N the discharge shall not give rise to any of the following effects in the receiving waters of the unnamed tributary:

   a) an increase in temperature of more than 2 degrees Celsius;
   b) an increase in biochemical oxygen demand of more than 2.00 gm^{-3}.

10. After allowing for reasonable mixing, within a mixing zone extending downstream of the discharge point[s] to the confluence of the two unnamed tributaries at [NZTM] 1715531E-5653067N the discharge shall not give rise to any of the following effects in the receiving waters of the unnamed tributary:

    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.

11. The Chief Executive, Taranaki Regional Council, shall be advised in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise effects on stormwater quality.

12. 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 2009 and/or June 2015 and/or June 2021 and/or June 2027, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 12 January 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	16 July 2003
Commencement Date:	16 July 2003

Conditions of Consent

Consent Granted:	To discharge solid drilling wastes from hydrocarbon exploration operations at the Ahuroa-B wellsite by mix-bury-cover at or about (NZTM) 1715527E-5652866N
Expiry Date:	1 June 2021
Review Date(s):	June 2009, June 2015
Site Location:	Ahuroa-B Wellsite, Croydon Road, Te Popo [Property owner: G & K Bishop]
Legal Description:	Lot 1 DP 16297 Blk X Huiroa SD
Catchment:	Waitara
Tributary:	Makara

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

General conditions

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

b) 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) 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. This resource consent allows for the discharge of up to 1500 m^3 per well of solid drilling wastes [drill cuttings and residual fluids] by way of mix-bury-cover [MBC] into land on the Ahuroa-B Wellsite and surrounding land. MBC discharge areas for wastes from individual wells shall be kept separate and distinct.

2. Prior to the exercise of this consent for each separate mix-bury-cover [MBC] discharge the consent holder shall provide to the written satisfaction of the Chief Executive a report describing proposed MBC, including area, location, nature of material, means of compliance with conditions, etc, and the results of any relevant monitoring of existing MBC discharge sites under this consent. In any case additional MBC discharges shall not take place under this consent within 12 months of any previous MBC discharge, unless this requirement is waived in writing by the Chief Executive.

3. The resource consent holder shall notify the Taranaki Regional Council at least 48 hours prior to commencement, and upon completion of any discharge.

4. The resource consent holder shall ensure that the discharge, licensed by this resource consent, takes place in general accordance with the information submitted in support of application 2198. In particular but without limitation, any amendment to location of mix-bury-cover [MBC], pre-treatment of solids, changes to fluids/additives, method of MBC, or post burial site management, shall be advised to the Chief Executive, and shall not provide or result in any less environmental protection than that set out or provided for in the information submitted in support of application 2198.

5. The consent holder shall keep records of composition and volumes of the material to be discharged, including records of quantities and types of drilling fluids and additives used [materials and their composition], and shall forward the records to the Taranaki Regional Council prior to the discharge.

6. The edge of the mix-bury-cover zone shall be at least 30 metres from any surface water body, or any water supply bore.

7. All ponded water shall be removed from the sump prior to the recovery/mixing operation.

8. The impermeable liner shall be perforated, and where possible removed, so that it no longer encloses the solid drilling wastes.

9. The solid drilling wastes [drill cuttings and residual fluids] shall be incorporated with uncontaminated soils with a mixing ratio of 1 part solid drilling wastes [drill cuttings, additives and residual fluids] to a minimum of 1 part uncontaminated soil.

10. The placement of the solid drilling wastes [drill cuttings and residual fluids] shall as far as practicable be above the watertable.

11. The loading in the disposed solid drilling wastes for each distinct mix-bury-cover disposal area for wastes from an individual well must not exceed those listed in Table 3-1 of the Alberta Energy and Utilities Board, 1996, G-50 guidelines.

12. Post disposal chloride levels in the cover soil layer shall not exceed 2,000 mg kg^{-1}.

13. The loading of chloride must not exceed 1,600 kg for each distinct mix-bury-cover disposal area for wastes from an individual well.

14. The loading of nitrogen must not exceed 400 kg for each distinct mix-bury-cover disposal area for wastes from an individual well.

15. The hydrocarbon content of the soil waste mix shall not exceed 0.1% [1000 mg/kg] on a dry weight basis.

16. The exercise of this consent shall not result in a level of total dissolved salts within any surface or groundwater of more than 2500 gm^{-3}.

17. The disposal of solid drilling wastes shall comply with the heavy metal receiving environment concentration limits specified in Table C, Section 9, Public Guidelines for the Safe Use of Sewage Effluent and Sewage Sludge on Land, Ministry of Health, 1992.

18. The solid drilling wastes [drill cuttings and residual fluids] shall be covered by at least 0.5 m of uncontaminated soil, and shall be revegetated and thereafter maintained with pasture cover within 6 months of the completion of any mix-bury-cover operation.

19. The consent holder shall compact, contour, and maintain the cover layer of soil so as to ensure its integrity at all times to the satisfaction of the Chief Executive.

20. The consent holder shall adopt the best practicable option [as defined in the Resource Management Act 1991] to prevent or minimise any actual or potential effects on the environment arising from the discharge, including but not limited to any water body or soil.

21. The exercise of this resource consent, including the design, management and implementation of the mix-bury-cover discharge, shall not lead, or be liable to lead, to contaminants directly entering a surface water body from overland surface flows.

22. The exercise of the resource consent shall not result in any adverse impacts on groundwater as a result of leaching, or surface water including aquatic ecosystems, and/or result in a change to the suitability of use of the receiving water as determined by the Chief Executive.

23. At any time, the levels of hydrocarbons in the soil shall comply with the guideline values for the designated soil type in the surface layer [less than 0.5 metre depth] set out in Tables 4.12 and 4.15 of the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand [Ministry for the Environment, 1999].

24. At any time, the upper [less than 0.5 metre depth] soil levels shall not exceed the following limits: conductivity, 290 mSm^{-1}; total dissolved salts, 2500 gm^{-3}; sodium 460 gm^{-3}; and chloride 700 gm^{-3}.

25. This resource consent shall lapse on the expiry of six years after the date of issue of this resource consent, unless the resource consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

26. The consent holder may apply to the Taranaki Regional Council for a change or cancellation of any of the conditions of this resource consent in accordance with section 127(1)(a) of the Resource Management Act 1991 to take account of operational requirements or the results of monitoring.

27. The Taranaki Regional Council may review any or all of the conditions of this resource consent within two months of receiving data on the volume and composition of the material under condition 5, for the purpose of assessing the adequacy of monitoring and mitigation measures.

28. 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 2009 and/or June 2015, 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 15 November 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Consent 7432-1

TARANAKI REGIONAL COUNCIL

CHIEF EXECUTIVE
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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date [Change]:	7 April 2011
Commencement Date [Change]:	7 April 2011 [Granted: 2 December 2008]

Conditions of Consent

Consent Granted:	To discharge contaminants [natural gas] into land for the purpose of gas storage at or about (NZTM) 1715630E-5652960N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, Barleymans Road, Tariki [Property owners: GN & KA Bishop]
Legal Description:	Lot 1 DP 16297 Blk X Huiroa SD
Catchment:	Waitara
Tributary:	Makino Makara

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

General conditions

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

b) 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) 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. Notwithstanding any other condition of this consent, 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. Any gas discharged into the ground pursuant to this consent shall meet NZ5442 specifications.

3. The pressure within the gas reservoir shall not exceed 3400psia.

4. The consent holder shall continuously record the injection pressure, and establish and maintain a correlation between the injection pressure and pressure within the gas reservoir, so that the reservoir pressure can be monitored at all time to determine compliance with condition 3. The pressure records shall be made available to the Council on request.

5. This consent shall lapse on 31 December 2013, 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.

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 7 April 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	6 April 2010
Commencement Date:	6 April 2010

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks into two unnamed tributaries of the Makara Stream, associated with site development at the Ahuroa-B wellsite at or about (NZTM) 1715699E-5652829N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, 1278 Croydon Road, Stratford [Property owner: GS & KA Bishop]
Legal Description:	Pt Lot 1 DP 2699 Blk X Huiroa SD
Catchment:	Waitara
Tributary:	Makino Makara

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The exercise of this consent shall be undertaken in accordance with the documentation submitted in support of application 6461. Specifically this includes Appendix B and plans NZ-2784-20-SK-0001/2 and NZ-2784-20-SK-0001/1. If there is any conflict between the documentation submitted in support of application 6461 and the conditions of this consent, the conditions of this consent shall prevail.

2. If any area of soil is exposed, all run off from that area shall pass through settlement ponds or sediment traps with a minimum total capacity of;

   a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and

   b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;

   unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.

3. At least 7 working days prior to the commencement of works the consent holder shall notify the Taranaki Regional Council of the proposed start date for the work. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.

5. This consent shall lapse on 30 June 2015, 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.

6. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 15 November 2013

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

Land Use Consent

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	6 April 2010
Commencement Date:	6 April 2010

Conditions of Consent

Consent Granted:	To install, use and maintain a culvert in an unnamed tributary of the Makara Stream in the Waitara catchment at or about (NZTM) 1715738E-5652776N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, 1278 Croydon Road, Stratford [Property owner: GS & KA Bishop]
Legal Description:	Lot 1 DP 16297 Blk X Huiroa SD
Catchment:	Waitara
Tributary:	Makino Makara

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The culvert pipe shall have a diameter no less than 600 and be no longer than 22 metres.

2. The fill over the top of the culvert pipe shall be no deeper than 2.5 metres.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement and upon completion of the initial installation and again at least 2 working days to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the river bed or discharges to water. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable only if the consent holder does not have access to email.

4. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

5. The culvert shall not obstruct fish passage.

6. The invert of the culvert shall at all times be slightly lower than the level of the surrounding riverbed so that it fills with bed material and simulates the natural bed.

7. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.

8. The consent holder shall take all reasonable steps to:
   a. minimise the amount of sediment discharged to the stream;
   b. minimise the amount of sediment that becomes suspended in the stream; and
   c. mitigate the effects of any sediment in the stream.

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

9. The works shall remain the responsibility of the consent holder and be maintained so that:

   a) it does not become blocked and at all times allows the free flow of water through it;
   b) any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.

10. Except with the written agreement of the Chief Executive, Taranaki Regional Council, the culvert shall be removed and the area reinstated, if and when it is no longer required. A further resource consent may be required to authorise the removal of the structure, and the consent holder is advised to seek advice from the Council on this matter.

11. This consent shall lapse on 30 June 2015, 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.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 15 November 2013

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

TARANAKI REGIONAL COUNCIL
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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	06 October 2009
Commencement Date:	06 October 2009

Conditions of Consent

Consent Granted:	To discharge emissions to air from flaring of hydrocarbons associated with well clean-up and well testing associated with exploration activities at the Ahuroa-B wellsite at or about (NZTM) 1715699E-5652954N
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	Ahuroa-B wellsite, Barleymans Road, Stratford [Property owner: G & K Bishop]
Legal Description:	Lot 1 DP 16297 Blk X Huiroa SD

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

Exercise of consent

1. Flaring shall not occur for more than 45 days, cumulatively, per zone for each well.

Information and notification

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 24 hours before the initial flaring of any new zone being commenced. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

3. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to all residents within 1000 metres of the wellsite[s] of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.

4. No alteration shall be made to plant equipment or processes which may substantially alter the nature or quantity of flare emissions or other wellsite emissions, including but not limited to the recovery of produced gas, other than as authorised by this consent , without prior consultation with the Chief Executive, Taranaki Regional Council.

Flaring

5. Other than for the maintenance of a pilot flare flames, the consent holder shall have regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects.

6. All gas that is flared during well clean-up, drill stem testing, initial testing, well workovers, or production testing, or at any other time, must first be treated by effective liquid and solid separation and recovery, to ensure that smoke emission during flaring is minimised.

7. If separation required by condition 6 cannot be implemented or maintained at any time while there is a flow from the well, whether natural or induced, then the consent holder shall immediately advise the Compliance Manager, Taranaki Regional Council, and shall in any case re-establish liquid separation and recovery within three hours.

8. Subject to special condition 7, no liquid or solid hydrocarbons shall be combusted through the gas flare system.

9. The gas shall be combusted so that emissions of smoke are minimised.

10. The consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare or any other emissions to air from the wellsites authorised under this consent [including use of a separator during well clean-up].

11. Only substances originating from the well stream and treated as outlined by conditions 6, 7, 8, 9, and 10 shall be combusted within the flare pits.

12. There shall not be any objectionable or offensive odour or smoke at or beyond the boundaries of the properties where the wellsites are located.

13. The opacity of any smoke emissions shall not exceed a level of 1, as measured on the Ringelmann Scale, for more than 4 minutes cumulative duration in any 60 minute period.

14. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the flares so that, whether alone or in conjunction with any other emissions from the wellsites, the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [mg/m^3] [eight-hour average exposure], or 30 mg/m^3 one-hour average exposure] at or beyond the boundaries of the property where the wellsites are located.

15. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the flares, so that whether alone or in conjunction with any other emissions from the wellsites, the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 100 micrograms per cubic metre [$\mu g/m^3$] [24-hour average exposure], or 200 $\mu g/m^3$ [1-hour average exposure] at or beyond the boundaries of the properties where the wellsites are located.

16. The consent holder shall control emissions to the atmosphere from the wellsites and flares of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides, so that whether alone or in conjunction with any emissions from the flare, the maximum ground level concentration for any particular contaminant arising from the exercise of this consent measured at or beyond the boundaries of the property where the wellsites are located, is not increased above background levels:

    a) by more than $1/30^{th}$ of the relevant Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any 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 three times the Time Weighted Average at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

Recording and reporting information

17. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C_6 or higher number of compounds.

18. Each time there is visible smoke as a result of the exercise of this consent, the consent holder shall record the time, duration and cause. The consent holder shall make the record available to the Chief Executive, Taranaki Regional Council, upon request.

19. The consent holder shall record and make available to the Chief Executive, Taranaki Regional Council, logs of all flaring, including time, duration, zone, and volumes of substances flared.

Review

20. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, for any of the following purposes:

    a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or
    b) requiring the consent holder to adopt 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.

Transferred at Stratford on 12 January 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	06 October 2009
Commencement Date:	06 October 2009

Conditions of Consent

Consent Granted:	To discharge emissions to air during flaring from well workovers and in emergency situations associated with production activities at the Ahuroa-B wellsite, together with miscellaneous emissions at or about (NZTM) 1715699E-5652954N
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	Ahuroa-B wellsite, Barleymans Road, Stratford [Property owner: G & K Bishop]
Legal Description:	Lot 1 DP 16297 Blk X Huiroa SD

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

Information and notification

1. Other than in emergencies, the consent holder shall notify the Chief Executive, Taranaki Regional Council, whenever the continuous flaring of hydrocarbons [other than purge gas] is expected to occur for more than five minutes in duration. Notification shall be no less than 24 hours before the flaring commences. Notification shall include the consent number and be emailed to worknotification@trc.govt.nz.

2. At least 24 hours before any flaring, other than in emergencies, the consent holder shall provide notification to all residents within 1000 metres of the site[s] of the commencement of flaring. The consent holder shall include in the notification a 24-hour contact telephone number for a representative of the consent holder, and shall keep and make available to the Chief Executive, Taranaki Regional Council, a record of all queries and complaints received in respect of any flaring activity.

3. No alteration shall be made to plant equipment or processes which may substantially alter the nature or quantity of flare emissions or other site emissions, including but not limited to the recovery of produced gas, other than as authorised by this consent, without prior consultation with the Chief Executive, Taranaki Regional Council.

Emissions from the site

4. Other than for the maintenance of a pilot flare flame, the consent holder shall have regard to the prevailing and predicted wind speed and direction at the time of initiation of, and throughout, any episode of flaring so as to minimise offsite effects.

5. All gas that is flared must first be treated by effective liquid and solid separation and recovery to ensure that smoke emission during flaring is minimised.

6. If separation required by special condition 5 cannot be implemented or maintained at any time while there is a flow from the well, whether natural or induced, then the consent holder shall immediately advise the Compliance Manager, Taranaki Regional Council, and shall in any case re-establish liquid and solid separation and recovery within three hours.

7. Subject to special condition 6, no liquid or solid hydrocarbons shall be combusted through the gas flare system, other than in an emergency.

8. Notwithstanding any other condition of this consent the consent holder shall adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any emission to air from the flare or any other emissions to air from the wellsites authorised under this consent [including use of a separator during well clean-up].

9. Only substances originating from the well stream and treated as outlined by conditions 5, 6, 7, and 8 shall be combusted within the flare pit.

10. There shall not be any objectionable or offensive odour or smoke at or beyond the boundaries of the properties where the wellsites are located.

11. All hydrocarbon storage vessels shall be fitted with vapour recovery systems.

12. The opacity of any smoke emissions shall not exceed a level of 1, as measured on the Ringelmann Scale, for more than 4 minutes cumulative duration in any 60 minute period.

13. The consent holder shall control all emissions of carbon monoxide to the atmosphere from the flare so that, whether alone or in conjunction with any other emissions from the wellsite, the maximum ground level concentration of carbon monoxide arising from the exercise of this consent measured under ambient conditions does not exceed 10 milligrams per cubic metre [mg/m^3] [eight-hour average exposure], or 30 mg/m^3 one-hour average exposure] at or beyond the boundaries of the properties where the wellsites are located.

14. The consent holder shall control all emissions of nitrogen oxides to the atmosphere from the flares so that, whether alone or in conjunction with any other emissions from the wellsites, the maximum ground level concentration of nitrogen dioxide arising from the exercise of this consent measured under ambient conditions does not exceed 100 micrograms per cubic metre [$\mu g/m^3$] [24-hour average exposure], or 200 $\mu g/m^3$ [1-hour average exposure] at or beyond the boundaries of the of the properties where the wellsites are located.

15. The consent holder shall control emissions to the atmosphere from the wellsites and flare of contaminants other than carbon dioxide, carbon monoxide, and nitrogen oxides so that, whether alone or in conjunction with any emissions from the flares, the maximum ground level concentration for any particular contaminant arising from the exercise of this consent measured at or beyond the boundaries of the properties where the wellsites are located, is not increased above background levels:

    a) by more than $1/30^{th}$ of the relevant Occupational Threshold Value-Time Weighted Average, or by more than the Short Term Exposure Limit at any 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 three times the Time Weighted Average at any time [all terms as defined in Workplace Exposure Standards, 2002, Department of Labour].

Recording and reporting information

16. The consent holder shall make available to the Chief Executive, Taranaki Regional Council, upon request, an analysis of a typical gas and condensate stream from the field, covering sulphur compound content and the content of carbon compounds of structure C_6 or higher number of compounds.

17. Each time there is visible smoke as a result of the exercise of this consent, the consent holder shall record the time, duration and cause. The consent holder shall make the record available to the Chief Executive, Taranaki Regional Council, upon request.

18. The consent holder shall record and maintain a log of all continuous flaring events longer than five minutes duration, and any intermittent flaring lasting for an aggregate of ten minutes or longer in any 120-minute period. The log shall contain the date, the start and finish times of the flaring event, 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 19.

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

i) detailing any energy efficiency measures implemented on the site;
ii) detailing smoke emissions as required under condition 17;
iii) detailing any measures undertaken or proposed to reduce smoke emissions;
iv) detailing any measures undertaken or proposed to reduce flaring;
v) addressing any other issue relevant to the minimisation or mitigation of emissions from the flare;
vi) detailing any complaints received and any measures undertaken to address complaints; and
vii) reviewing all options and technological advances relevant to the reduction or mitigation of any discharge to air from the site, how these might be applicable and/or implemented at the site, and the benefits and costs of these advances.

Review

20. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, for any of the following purposes:

a) dealing with any significant adverse effect on the environment arising from the exercise of the consent which was not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or

b) requiring the consent holder to adopt 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.

Transferred at Stratford on 12 January 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

TARANAKI REGIONAL COUNCIL
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Please quote our file number on all correspondence

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	18 January 2011
Commencement Date:	18 January 2011

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks during the construction of the extension of the Ahuroa-B wellsite onto and into land at or about (NZTM) 1715527E-5652866N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, 1278 Croydon Rd, Stratford [Property owner: G & K Bishop]
Legal Description:	Pt Lot 1 DP 2699 Blk X Huiroa SD [Discharge source & site]
Catchment:	Waitara
Tributary:	Makino Makara

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

2. If any area of soil is exposed, all run off from that area shall pass through settlement ponds or sediment traps with a minimum total capacity of;

   a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and

   b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;

   unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.

3. The obligation described in condition 2 above shall cease to apply, and accordingly the erosion and sediment control measures can be removed, in respect of any particular site or area of any site, only when the site is stabilised.

   Note: For the purpose of conditions 3 and 4 "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in the Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an officer of the Taranaki Regional Council, an 80% vegetative cover has been established.

4. All earthworked areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.

   Note: For the purposes of this condition "stabilised" has the same definition as that set out in condition 3.

5. At least 7 working days prior to the commencement of works the consent holder shall notify the Taranaki Regional Council of the proposed start date for the work. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz.

6. This consent shall lapse on 31 March 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

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

Signed at Stratford on 18 January 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	18 January 2011
Commencement Date:	18 January 2011

Conditions of Consent

Consent Granted:	To install and use a pipe in the bed of an unnamed tributary of the Makara Stream, including the associated reclamation, disturbance and deposition of material between (NZTM) 1715533E-5652692N and 1715550E-5652821N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, 1278 Croydon Road, Stratford [Property owner: G & K Bishop]
Legal Description:	Pt Lot 1 DP 2699 Blk X Huiroa SD [Site of structure]
Catchment:	Waitara
Tributary:	Makino Makara

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance to section 36 of the Resource Management Act.

Special conditions

1. This consent authorises the laying pipe in 140 metres of stream bed and subsequently filling the piped reach between grid references [NZTM] 1715533E-5652692N and 1715550E-5652821N.

2. The pipe shall have a diameter of not less than 600 mm.

3. The piping shall be maintained to ensure it does not become blocked and at all times allows the free flow of water through it.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement and upon completion of the initial installation and again at least 2 working days to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the river bed or discharges to water. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

5. Any instream works shall take place only between 1 November and 30 April inclusive.

6. The consent holder shall take all reasonable steps to:

   a) minimise the amount of sediment discharged to the stream;

   b) minimise the amount of sediment that becomes suspended in the stream; and

   c) mitigate the effects of any sediment in the stream.

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

7. No vegetation shall be buried within 20 metres of the stream.

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

9. This consent shall lapse on 31 March 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 18 January 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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Please quote our file number on all correspondence

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:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	18 January 2011
Commencement Date:	18 January 2011

Conditions of Consent

Consent Granted:	To place and use a culvert in an unnamed tributary of the Makara Stream for access purposes at or about (NZTM) 1715558E-5652753N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, 1278 Croydon Road, Stratford
Legal Description:	Pt Lot 1 DP 2699 Blk X Huiroa SD [Site of structure]
Catchment:	Waitara
Tributary:	Makino Makara

For General, Standard and Special conditions pertaining to this consent please see reverse side of this document
www.trc.govt.nz

Doc# 850215-v1

General condition

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

Special conditions

1. The culvert shall be constructed in accordance with the plan prepared by Transfield Worley Hawkins titled "Ahuroa Gas Storage Project Stage 2B/2C Sediment & Drainage Management" reference NZ-W820-15-EA-0001/2, provided to the Council with application 6637. In the case of any contradiction between the drawing[s] and the conditions of this consent, the conditions of this consent shall prevail.

2. The culvert pipe shall have a diameter no less than 600 mm and be no longer than 20 metres.

3. The fill over the top of the culvert pipe shall be no deeper than 4 metres.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement and upon completion of the initial installation. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

5. Any instream works shall take place only between 1 November and 30 April inclusive.

6. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

7. The culvert shall not obstruct fish passage.

8. The invert of the culvert shall at all times be slightly lower than the level of the surrounding riverbed so that it fills with bed material and simulates the natural bed.

9. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.

10. The consent holder shall take all reasonable steps to:

    a. minimise the amount of sediment discharged to the stream;

    b. minimise the amount of sediment that becomes suspended in the stream; and

    c. mitigate the effects of any sediment in the stream.

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

11. The works shall remain the responsibility of the consent holder and be maintained so that:

    a. it does not become blocked and at all times allows the free flow of water through it;

    b. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.

12. Except with the written agreement of the Chief Executive, Taranaki Regional Council, the culvert shall be removed and the area reinstated, if and when it is no longer required. A further resource consent may be required to authorise the removal of the structure, and the consent holder is advised to seek advice from the Council on this matter.

13. This consent shall lapse on 31 March 2016, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 18 January 2011

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Appendix III

Resource consents
for AGS to SPS pipeline

Discharge Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	30 August 2012
Commencement Date:	30 August 2012

Conditions of Consent

Consent Granted:	To discharge stormwater and sediment from earthworks associated with the construction and installation of a pipeline between the Ahuroa-B wellsite and Stratford Power Station onto and into land in circumstances where it may enter surface water between (NZTM) 1715545E-5652969N and 1713576E-5645663N
Expiry Date:	1 June 2017
Site Location:	Pipeline route between Ahuroa-B wellsite and the Stratford Power Station
Legal Description:	Various
Catchment:	Patea Waitara
Tributary:	Kahouri Makara Ahuroa Pikau

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act.

Special conditions

1. The discharge of stormwater and sediment authorised by this consent, shall only originate from works associated with the installation and construction of the pipeline in accordance with details submitted with application 7151.

2. At least 7 working days prior to the commencement of works the consent holder shall notify the Taranaki Regional Council of the proposed start date for the work. Notification shall include the consent number and a brief description of the activity consented and shall be emailed to worknotification@trc.govt.nz.

3. All discharge which may enter surface water from any unvegetated area shall pass through settlement ponds or sediment traps with a minimum total capacity of:

   a) 100 cubic metres for every hectare of exposed soil between 1 November to 30 April; and

   b) 200 cubic metres for every hectare of exposed soil between 1 May to 31 October;

   unless other sediment control measures that achieve an equivalent standard are agreed to by the Chief Executive of the Taranaki Regional Council.

4. The obligation described in condition 3 above shall cease to apply, and accordingly the erosion and sediment control measures can be removed, in respect of any particular site or area of any site, only when the site is stabilised.

5. All earthworked areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.

   Note: For the purpose of conditions 4 and 5 "stabilised" in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using rock or by the application of basecourse, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in the Taranaki Regional Council's Guidelines for Earthworks in the Taranaki Region, 2006. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an officer of the Taranaki Regional Council, an 80% vegetative cover has been established.

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

7. This consent shall lapse on 30 September 2017, 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.

Signed at Stratford on 30 August 2012

For and on behalf of
Taranaki Regional Council

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Chief Executive

Water Permit

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	30 August 2012
Commencement Date:	30 August 2012

Conditions of Consent

Consent Granted:	To take and use water from the Kahouri Stream for hydrostatic testing of pipelines at or about (NZTM) 1713550E-5645800N
Expiry Date:	1 June 2017
Site Location:	East Road, Stratford [Property owner: Hwitan Tune Farm Trusts Partnership]
Legal Description:	Lot 2 DP 20934 Blk II Ngaere SD [site of take]
Catchment:	Patea
Tributary:	Kahouri

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act.

Special conditions

1. The total volume of water taken shall not exceed 1500 cubic metres.

2. The consent holder shall maintain a record of the take including date, rate, pumping hours and volume abstracted and supply these records to the Chief Executive, Taranaki Regional Council, upon request.

3. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of water, including, but not limited to, the efficient and conservative use of water.

4. The consent holder shall ensure that the intake is screened and designed to avoid fish entering the intake or being trapped against the screen.

5. This consent shall lapse on 30 September 2017, 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.

Signed at Stratford on 30 August 2012

For and on behalf of
Taranaki Regional Council

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Chief Executive

Consents 9309-1, 9310-1, 9311-1, 9312-1, 9313-1, 9314-1, 9315-1
9316-1, 9317-1, 9318-1, 9319-1, 9320-1, 9321-1, 9322-1

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:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	30 August 2012
Commencement Date:	30 August 2012

Conditions of Consent

Consent Granted:	To install and use a pipeline for conveying gaseous hydrocarbons under the bed of the Kahouri and Piakau Streams, and 12 unnamed tributaries of the Makara, Ahuroa, Kahouri and Piakau Streams
Expiry Date:	1 June 2028
Review Date(s):	June 2016 and June 2022
Site Location:	Pipeline route between Ahuroa-B wellsite and the Stratford Power Station
Legal Description:	Various
Catchment:	Patea Waitara
Tributary:	Kahouri Makara Ahuroa Pikau

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 [the Council] all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act.

Special conditions

1. These consents authorise the installation and use of a pipeline at or about the locations specified below:

Crossing No.	Consent No.	Location [Map Reference]	Stream
1	9309-1	1715550E-5652867N	Unnamed tributary – Makara Stream
2	9310-1	1715691E-5651133N	Unnamed tributary – Ahuroa Stream
3	9311-1	1715731E-5650473N	Unnamed tributary – Makara Stream
4	9312-1	1715781E-5650005N	Unnamed tributary – Makara Stream
5	9313-1	1715617E-5649687N	Unnamed tributary – Makara Stream
6	9314-1	1715374E-5649461N	Unnamed tributary – Makara Stream
7	9315-1	1714309E-5648554N	Unnamed tributary – Kahouri Stream
8	9316-1	1714065E-5648223N	Unnamed tributary – Kahouri Stream
9	9317-1	1713960E-5647439N	Unnamed tributary – Piakau Stream
10	9318-1	1713745E-5647083N	Piakau Stream
11	9319-1	1713646E-5646976N	Unnamed tributary – Piakau Stream
12	9320-1	1713627E-5646659N	Unnamed tributary – Piakau Stream
13	9321-1	1713619E-5646155N	Unnamed tributary – Piakau Stream
14	9322-1	1713547E-5645926N	Kahouri Stream

2. At least 48 hours prior to the commencement of works the consent holder shall provide the Taranaki Regional Council with a programme for the installation of the pipelines including: a schedule of proposed start dates and an estimation of the duration of the works, and details of the contractor including contact information for the project manager. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

3. 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 the discharge of sediment to any surface water body and to prevent or minimise any adverse effects of the disturbance activities on any surface water body.

4. All pipelines shall be buried to an initial burial depth not less than 2 metres below the bed of the streams.

5. Any work undertaken in the bed of the streams shall be undertaken only between 1 November and 31 May.

6. The consent holder shall ensure that the area and volume of river bed disturbance is restricted to a practicable minimum and that areas disturbed from the exercise of this consent are reinstated as near as practicable to pre-work condition.

7. The consent holder shall take all reasonable steps to:

   a. minimise the amount of sediment discharged to the stream;
   b. minimise the amount of sediment that becomes suspended in the stream; and
   c. mitigate the effects of any sediment in the stream.

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

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

9. This consent shall lapse on 30 September 2017, 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.

10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 30 August 2012

For and on behalf of
Taranaki Regional Council

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Chief Executive

Land Use Consent

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

Name of Consent Holder:	Contact Energy Limited P O Box 10742 WELLINGTON 6143
Decision Date:	6 June 2013
Commencement Date:	6 June 2013

Conditions of Consent

Consent Granted:	To install and use a culvert in an unnamed tributary of the Makara Stream, including associated realignment, streambed disturbance and reclamation
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2021
Site Location:	Ahuroa-B wellsite, 1278 Croydon Road, Stratford
Legal Description:	Pt Lot 1 DP 2699 (Site of structure)
Grid Reference (NZTM)	1715566E-5652807N
Catchment:	Waitara
Tributary:	Makino Makara

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

General condition

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

Special conditions

1. The culvert and stream realignment shall be constructed in accordance with the information provided in the application, including drawing NZ-W828-20-DD-31001-01, Revision A0 and dated March 2013. In the case of any contradiction between the information and the conditions of this consent, the conditions of this consent shall prevail.

2. The culvert shall be no longer than 22 metres.

3. The fill over the top of the culvert shall be no deeper than 3 metres.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 2 working days prior to the commencement of the outstanding works. Notification shall include the consent number and a brief description of the activity consented and be emailed to worknotification@trc.govt.nz.

5. The gradient of the culvert shall be no steeper than the natural gradient of the stream bed at the site.

6. The consent holder shall install headwalls and rock rip rap at the outlet and inlet of the culvert.

7. The grading of the rock rip rap is of the following specification:
   a. 100% less than 450 mm diameter;
   b. 50% greater than 350 mm diameter; and
   c. 90% greater than 150 mm diameter.

8. That consent holder shall ensure that rock rip rap armouring is placed a minimum:
   a. height and distance of 0.5 metres and 3 metres along the banks of the new channel and at the location where the new alignment deviates from the old alignment; and
   b. distance of 3 metres across the full width of the bed of the new stream channel.

9. On completion of the realignment work:
   a. the banks of the reconstructed channel shall have a slope no steeper than 1 horizontal to 1 vertical. Where the bank consists of fill, the slope will be no steeper than 2 horizontal to 1 vertical; and
   b. the bed of the reconstructed channel shall be at an appropriate grade so as to provide for fish passage; and

10. The final slope of the channel banks above the culvert shall be no steeper than 1.5 horizontal to 1 vertical.

11. The invert of the culvert shall be set below the existing streambed by at least 20% of the culvert diameter so that it fills with bed material and simulates the natural bed.

12. The consent holder shall ensure that the area and volume of stream bed disturbance is, as far as practicable, minimised and any areas that are disturbed are, as far as practicable, reinstated.

13. The consent holder shall take all reasonable steps to:

    a. minimise the amount of sediment discharged to the stream;

    b. minimise the amount of sediment that becomes suspended in the stream; and

    c. mitigate the effects of any sediment in the stream.

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

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

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

15. The culvert structure and new stream channel shall remain the responsibility of the consent holder and be maintained so that:

    a. the culvert does not become blocked and at all times allows the free flow of water through them; and

    b. any erosion, scour or instability of the stream bed or banks that is attributable to the works carried out as part of this consent is remedied by the consent holder.

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

17. 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.

18. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2015 and/or June 2021, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 June 2013

For and on behalf of
Taranaki Regional Council

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Director-Resource Management

Appendix IV

Biomonitoring reports

To	Job Manager, J Kitto
From	Scientific Officer, C R Fowles
Document	1133438
Report No	CF558
Date	December 2012

Spring biomonitoring of the Patea River in relation to the discharge of cooling water and abstraction of water for Contact Energy Ltd's combined cycle and peaker power stations, October 2012

1. Introduction

Biomonitoring forms a component of the consents compliance monitoring programme implemented by the TRC following the construction of the Taranaki Combined Cycle [TCC1] power station in 1998, and the addition of the Stratford Peaker Plant [SPP] in 2011. This particular biological monitoring survey (the first of two biannual surveys for the 2012-2013 monitoring period) related primarily to consent 5848 which permits the discharge of cooling water into the Patea River approximately 1 km upstream of the river's confluence with the Kahouri Stream, east of Stratford.

Five sites in total were surveyed in the Patea River (see Section 2), two in the immediate vicinity of the outfall, as required by Special Condition 7 of the consent (relating to the 'mixing zone'), and one (for reference purposes), at the Council's State of the Environment (SEM) long-term trend detection site at Skinner Road, approximately 1.5 km further downstream. Consents granted in 2001 (5847 and 5850) for the future expansion of the power station [TCC2] required the establishment and monitoring of two additional sites in the mid-reaches of the Patea River between the site of the proposed additional water abstraction (Skinner Road) and the confluence with the Mangaehu River. These sites (Figure 1) at Hungers Road (9 km downstream of Skinner Road) and a further 13 km downstream (adjacent to Raupuha Road, below the Makuri Stream confluence) which initially were sampled as a component of the environmental effects assessment for the power station expansion (Stark and Young, 2001 and CF251), continue to provide baseline information in anticipation of this expansion.

Biomonitoring of the TCC1 station stormwater discharges to the Kahouri Stream is also performed as a separate monitoring programme and, together with biomonitoring of the Stratford municipal WWTP discharge to the Patea River, these are reported separately. This present biomonitoring survey was performed on 1 October 2012 in conjunction with the spring component of the Regional Council's SEM programme.

2. Method

The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates and algae from five riffle sites in the Patea River. These sites were located as listed in Table 1 and illustrated in Figure 1.

Table 1 Location of sampling sites in the Patea River

Site No	Code	Map reference	Location	Altitude (m asl)	Distance from coast (km)	Distance from National Park (km)
1	PAT000356	Q20:246068	U/s of TCC1 cooling wastes discharge	250	131.8	17.2
2	PAT000357	Q20:247068	100 m d/s of TCC1 cooling wastes discharge	250	131.6	17.4
3	PAT000360	Q20:259064	Skinner Road	240	129.8	19.2
4	PAT000397	Q20:291053	Hungers Road	200	120.5	28.5
5	PAT000430	Q10:340028	Raupuha Road	160	106.9	42.1

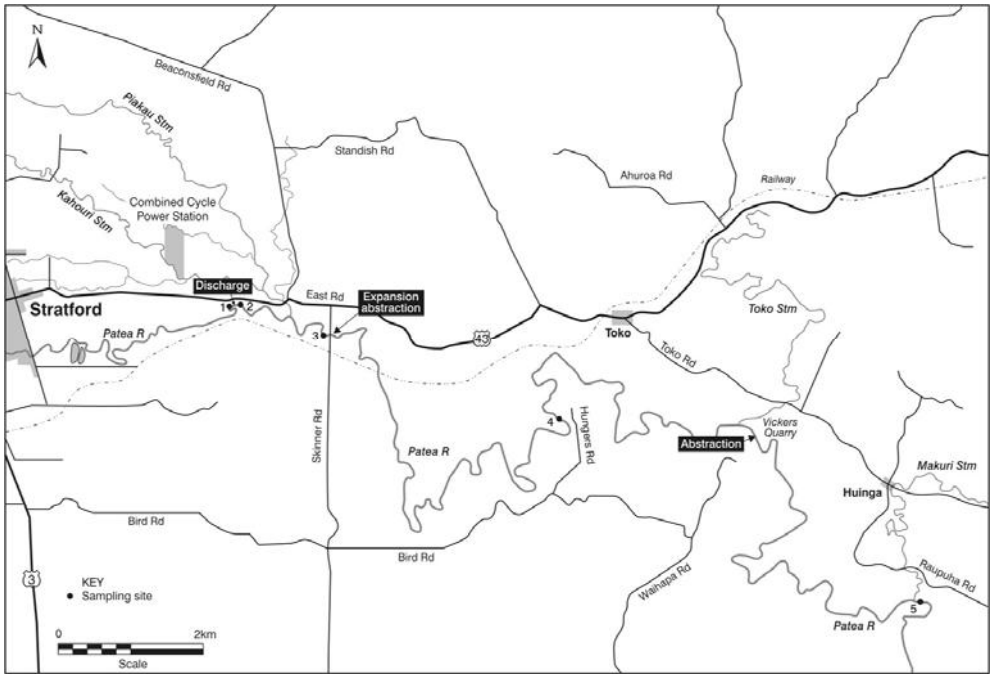


Figure 1 Location of biomonitoring sites in the Patea River in relation to the combined cycle power station, Stratford

Figure 2 Biomonitoring sites location in the Patea River

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).

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 as:

R (rare)	= less than 5 individuals
C (common)	= 5-19 individuals
A (abundant)	= 20-99 individuals
VA (very abundant)	= 100-499 individuals
XA (extremely abundant)	= 500 or more individuals

Macroinvertebrate Community Index (MCI) values were calculated for taxa present at each site (Stark 1985) with certain taxa scores modified in accordance with Taranaki experience.

A semi-quantitative MCI value, $SQMCI_S$ (Stark 1999) 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 scores, and dividing by the sum of the loading factors. 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).

3. Results and discussion

This survey was performed on 1 October 2012 during a period of spring, moderately low recession flow, 14 days after a fresh in excess of 3x median flow and 7x median flow. It also followed a wet late winter-early spring period when 14 freshes were recorded over the preceding eight week period. River flow at Skinner Road was 3.25 m^3/sec representing a flow well below the average monthly mean October flow (5.88 m^3/sec) but above the minimum mean monthly flow for October (2.49 m^3/sec) recorded for the period 1978-2011.

Periphyton mats were patchy at all sites except site 4 where they were only thin, and patchy filamentous algae were present at all but site 4 where there was no filamentous algae. Patchy moss was recorded at all but site 4 from observations of the stony riffle substrates. River flow was slightly cloudy and low at the two sites (1 and 2) adjacent to the discharge site where water temperatures recorded (at the time of this mid morning survey) ranged from 11.4 C to 11.5 C during a period when power station cooling water discharge to the river was occurring. Discharges had occurred from the combined cycle plant almost daily for nearly seven months, and intermittently on most days for several months from the peaker plant, up until two days before the survey.

River flow was moderate, uncoloured, and slightly cloudy at sites 3, 4 and 5 further downstream from the Kahouri Stream confluence, where water temperatures ranged from 11.7 C to 13.7 C at these three sites at the time of this mid to late morning survey.

Macroinvertebrate communities

Prior to the establishment of the Contact Energy Ltd's programme, biomonitoring surveys had been performed at site 1 (in association with other consents' monitoring programmes) and site 3 (SEM and investigation programmes). Site 2 was established specifically for the purpose of the Contact Energy Ltd consent monitoring programme and sampled initially in spring 1998. The two lower sites (sites 4 and 5) had been surveyed on fewer previous occasions, principally for environmental assessment purposes. A summary of the results of these previous surveys and the existing programme's results are presented in Table 2 (Note: The results of surveys at sites 4 and 5 performed by Cawthron are not included in this summary but are presented and discussed in TRC report CF251).

Table 2 Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1992 and February 2012

Site	No of surveys	Taxa no		MCI values		Survey of Oct 2012	
		Range	Median	Range	Median	Taxa No.	MCI
1	35	17-31	24	82-116	98	23	110
2	28	14-33	23	86-111	98	16	103
3	36	15-33	24	86-105	98	18	100
4	21	16-30	22	82-102	95	18	101
5	21	15-26	22	82-102	93	19	101

The macroinvertebrate fauna results from the present survey are presented in Table 3, with various survey results since 1992 illustrated in Figure 2.

Sites in the vicinity of the power station outfall (sites 1 and 2)

A moderate range of taxa richnesses (16 to 23 taxa) was recorded at sites 1 and 2 immediately upstream and downstream of the discharge. These taxa numbers were within ranges but one to seven taxa below median richnesses previously surveyed at each site (Table 1 and Figure 2). These numbers were from 3 to 10 taxa below the median (26) taxa richness previously recorded from 158 surveys of 'control' sites at similar altitudes (250 to 300 m asl) in Taranaki ring plain rivers and streams sourced within the National Park (TRC, 1999 (updated, 2012)).

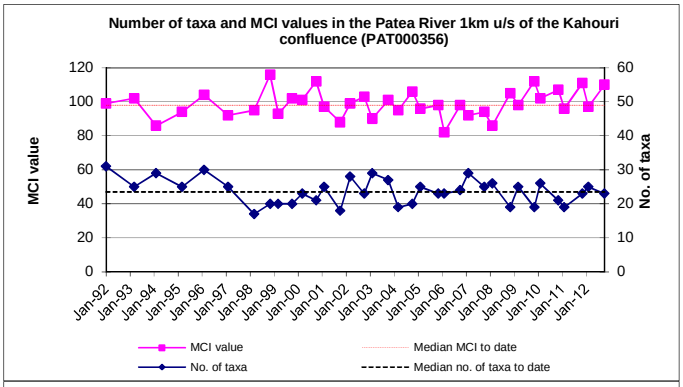
The characteristic taxa in this short reach of the river included one 'highly sensitive' taxon (very abundant mayfly (*Deleatidium*)); up to three 'moderately sensitive' taxa (mayfly (*Coloburiscus*), dobsonfly (*Archichauliodes*), and cranefly (*Aphrophila*)) and up to three 'tolerant' taxa (net-building caddisfly (*Aoteapsyche*) and midges (*Maoridiamesa* and orthoclads)). This dominance represented several changes from the community dominance at the time of the previous summer survey when three additional 'sensitive' taxa and three additional 'tolerant' taxa were dominant numerically following a moderate low flow recession period and more extensive periphyton substrate cover. Very few significant differences in individual taxon abundances were recorded between sites 1 and 2, with a higher abundance of only one 'tolerant' taxon (orthoclad midges) at site 2 accounting for the slightly lower $SQMCI_s$ value which was 0.4 unit lower than the value at site 1 (Table 3).

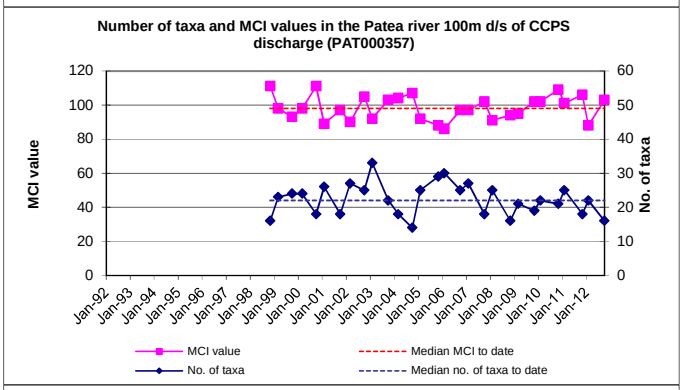
Table 3 Macroinvertebrate fauna of the Patea River in relation to Stratford Power Ltd sampled on 1 October 2012

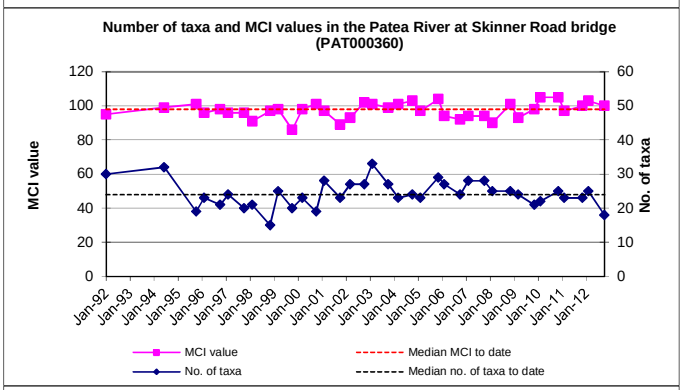
Taxa List	Site Number	MCI score	1	2	3	4	5
	Site Code		PAT000356	PAT000357	PAT000360	PAT000397	PAT000430
	Sample Number		FWB12318	FWB12319	FWB12320	FWB12321	FWB12322
NEMERTEA	Nemertea	3	-	-	-	R	-
ANNELIDA (WORMS)	Oligochaeta	1	C	R	C	A	VA
MOLLUSCA	*Potamopyrgus*	4	-	-	R	VA	C
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	R	-	-	-	A
	Coloburiscus	7	VA	VA	A	A	R
	Deleatidium	8	XA	XA	XA	XA	VA
	Nesameletus	9	C	R	-	R	-
	Zephlebia group	7	R	-	-	R	C
PLECOPTERA (STONEFLIES)	*Acroperla*	5	C	R	-	-	-
	Zelandobius	5	R	R	C	A	R
	Zelandoperla	8	R	-	R	-	-
COLEOPTERA (BEETLES)	Elmidae	6	C	C	A	XA	A
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	A	C	A	C	C
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	A	A	A	A	A
	Costachorema	7	C	C	C	R	C
	Hydrobiosis	5	R	-	R	R	C
	Beraeoptera	8	R	-	-	-	-
	Confluens	5	C	-	R	-	-
	Pycnocentria	7	-	-	-	-	R
	Pycnocentrodes	5	R	R	C	VA	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	A	A	A	R	A
	Eriopterini	5	R	R	R	-	-
	Maoridiamesa	3	A	C	C	R	C
	Orthocladiinae	2	A	VA	A	R	C
	Tanypodinae	5	R	-	-	-	-
	Tanytarsini	3	-	C	C	-	R
	Empididae	3	R	-	-	R	-
	Austrosimulium	3	-	-	-	-	R
		No of taxa	23	16	18	18	19
		MCI	110	103	100	101	101
		SQMCIs	7.2	6.8	7.3	6.4	4.8
		EPT (taxa)	14	8	9	9	10
		%EPT (taxa)	61	50	50	50	53

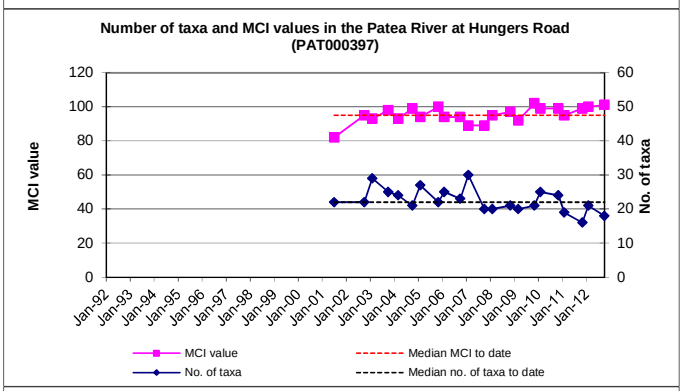
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

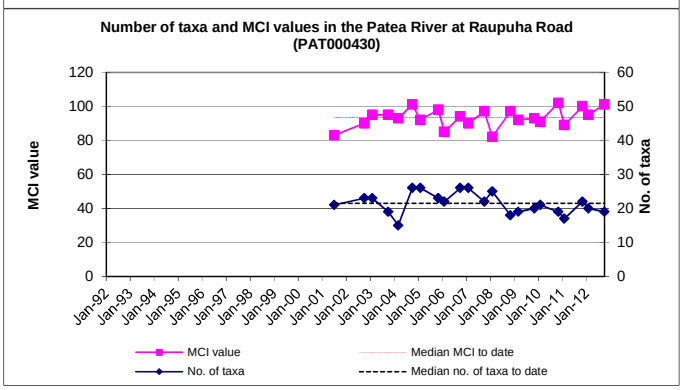
R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant


Number of taxa and MCI values in the Patea River 1km u/s of the Kahouri confluence (PAT000356)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


Number of taxa and MCI values in the Patea river 100m d/s of CCPS discharge (PAT000357)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


Number of taxa and MCI values in the Patea River at Skinner Road bridge (PAT000360)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


Number of taxa and MCI values in the Patea River at Hungers Road (PAT000397)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date


Number of taxa and MCI values in the Patea River at Raupuha Road (PAT000430)
MCI value
No. of taxa
MCI value
No. of taxa
Median MCI to date
Median no. of taxa to date

The presence of up to four 'highly sensitive' taxa, one of which was extremely abundant, in this reach of the Patea River, was an indication of generally good physicochemical water quality conditions preceding the survey under moderately low flow conditions following a wet late winter-early spring period and in the presence of moderate periphyton substrate cover which could be expected to have had some impact on physical habitat. However, improved treated wastewater quality (and greater dilution) of the upgraded Stratford municipal WWTP discharge, may have contributed to these conditions on occasions (see reports CF526 and CF545).

MCI scores (Tables 2 and 3) reflected the high proportion (69 to 78% of taxa richness) of 'sensitive' taxa in the communities at each site, with the scores recorded (103 to 110 units) between 5 and a significant 12 units higher than the medians of scores previously recorded at both sites (Table 1). The scores reflected the relative similarity in community composition between sites as reflected by the 15 shared taxa (of a total 28 taxa) between sites. These scores categorised both of these sites as having 'good' river health (TRC, 2012) at the time of this spring survey. They were also a significant 1 to 6 units higher than the predicted MCI score for National Park-sourced ringplain sites at an altitude of 250m asl and an insignificant 4 units to a significant 11 units above the predicted MCI scores for these sites, 17.2 km and 17.4 km respectively downstream of the National Park boundary (Stark and Fowles, 2009).

The MCI scores at these two sites showed an insignificant 7 units downstream decrease in scores which was indicative of minimal recent impacts of any cooling water discharge on the macroinvertebrate fauna of the Patea River at the periphery of the permitted mixing zone. This MCI difference between adjacent sites was due entirely to the presence/absence of several 'sensitive' taxa recorded only as rarities (less than 5 individuals per taxon) rather than any significant community composition differences between sites.

Sites in the reach between Skinner Road and Raupuha Road (sites 3, 4 and 5)

Taxa richnesses at these three sites had a very narrow range of moderate richnesses (18 to 19 taxa), and were 3 to 6 taxa lower than historical medians at these sites (Table 2). They were also slightly less than median richnesses (20 and 23 taxa) previously recorded by surveys of 'control' sites at similar altitudes (155 to 199 m asl and 200 to 249 m asl) in Taranaki ringplain rivers and streams sourced within the National Park (TRC, 1999 (updated 2012)).

The characteristic taxa within this 23 km reach of the Patea River included one 'highly sensitive' taxon (extremely abundant mayfly (*Deleatidium*)); up to seven 'moderately sensitive' taxa (mayflies (*Austroclima* and *Coloburiscus*), stonefly (*Zelandobius*), elmid beetles, dobsonfly (*Archichauliodes*), stony-cased caddisfly (*Pycnocentrodes*), and cranefly (*Aphrophila*)); and up to four 'tolerant' taxa (oligochaete worms, snail (*Potamopyrgus*), net-building caddisfly (*Aoteapsyche*), and orthoclad midges)). The patchy periphyton cover on the riverbed coincided with reductions in the abundances within a few of the more 'sensitive' taxa and in particular increases in abundances of 'tolerant' snails and oligochaete worms in a downstream direction. A few significant differences in individual taxon abundances between adjacent sites

were recorded along this river reach (principally increased abundances within two 'tolerant' taxa) which accounted for the significant variation in $SQMCI_S$ scores of 1.6 units between sites 4 and 5, and 2.5 units between sites 3 and 5.

The small increase in downstream proportions of lower scoring 'tolerant' taxa (33%, 39%, and 37% of total taxa) in the communities at sites 3, 4, and 5 were reflected in the MCI scores (100, 101, and 101) recorded through this reach of the mid Patea River. These scores were an insignificant 2 to 8 units higher than the medians of scores previously recorded at each of the three sites (Table 1) and from 3 units lower to 6 units higher than those recorded by the previous summer survey which followed a longer flow recession period. The scores recorded at these three sites by this survey did not change significantly through the reach of the river surveyed. These scores categorised the sites as having 'good' river health (TRC, 2012) at the time of this spring survey. They were 8 to 9 units lower (sites 3 and 4) and 5 units lower (site 5) than the predicted MCI scores for National Park-sourced ringplain sites at altitudes of 160 to 240m asl but an insignificant 2 to a significant 11 units higher (site 5) than the predicted MCI scores for these sites, 19.2 km to 42.1 km downstream of the National Park boundary (Stark and Fowles, 2009).

The absences of downstream decreases in MCI scores between sites 3 and 5 and sites 4 and 5 were contrary to the predicted downstream MCI decrease (an average rate of 0.3 to 0.4 units per km) predicted for this reach of a Taranaki ringplain stream (Stark and Fowles, 2009). Observations in this reach of the river, and particularly below the Skinner Road site (site 3), have indicated that riffles tended to be shorter and/or deeper than those typical of the upper reaches of the river (particularly upstream of the Kahouri Stream confluence), where the 'more sensitive' (particularly mayfly and stonefly) taxa are a more common component of the macroinvertebrate communities (TRC, 2001). No decrease in MCI scores was found between sites 3 and 4, or sites 4 and 5, resulting in no overall decrease found over this reach (23km), but a 9 unit decrease over the total reach (25km) of the river surveyed, was due to slightly higher scores upstream of the Kahouri Stream confluence. This overall rate of decrease equated to 0.36 MCI unit/km, equivalent to that predicted for this reach of the river.

4. Conclusions

This twenty-sixth biomonitoring survey performed in relation to the discharge of cooling water from the power station indicated no significant impacts of recent discharges upon the biological communities of the Patea River in the vicinity of the discharge outfall east of Stratford during a period of moderate recession flow conditions following a wet period in late winter-early spring. Macroinvertebrate community richness and MCI scores typical of habitats with only moderate periphyton substrate cover were within ranges of results previously recorded and slightly lower than median richnesses and in all cases above median MCI scores coincident with moderately low flow conditions. Although there were some subtle differences in community compositions between sites, no statistically significant difference in MCI score was recorded at the periphery of the permitted discharge mixing zone in comparison with the upstream 'control' site.

Biomonitoring performed at sites further downstream in the river was continued for the purpose of establishing baseline information in relation to the proposed

expansion of the power station. Moderate community richnesses were found at the three sites in the 23 km reach between Skinner Road and Raupuha Road (where the principal effects of future water abstraction would be expected to occur), and community composition showed few changes from communities found at sites 1 and 2, upstream of the Kahouri Stream confluence . Of the total of 28 taxa found over the entire reach of the river surveyed, 21 taxa were present at one or more sites in both of the two reaches, above and below the Kahouri Stream confluence. However, only 12 taxa were present at all five sites along the reach surveyed, of which one 'highly sensitive', three 'moderately sensitive', and three 'tolerant' taxa were abundant at a minimum of three of the sites. One 'tolerant' taxon (net-building caddisfly (*Aoteapsyche*)); no 'moderately sensitive' taxa; and one 'highly sensitive' taxon (mayfly (*Deleatidium*)), were abundant at all five sites; fewer than the number of taxa which have been uniformly characteristic of these sites' communities from time to time in past surveys and coincident with moderate substrate periphyton cover conditions following a wet late winter-early spring period.

A relationship between MCI score and distance from the National Park established for National Park-sourced ringplain rivers and streams from Taranaki Regional Council data (Stark and Fowles, 2009) indicates that MCI values for the three sites (3, 4 and 5) in this reach of the mid-Patea River survey might be expected to range between 90 and 99 units. Therefore, the results of this survey found a higher range of scores to that expected in the mid-Patea River reaches below Skinner Road, although the riffles tended to be deeper than those surveyed further upstream, during a period of moderately low spring flow conditions and less than usual periphyton substrate cover following a wet weather period.

The general trend in MCI scores found throughout the reach of the river at the time of this spring survey, which were not significantly different in comparison with similar reaches of rivers elsewhere in Taranaki, reflected minimal influence of the major point source municipal oxidation ponds system discharge to the river some 3 km upstream (see report CF545) following the relatively recent upgrading of the Stratford municipal WWTP system

Biannual biomonitoring surveys will form a component of future monitoring programmes associated with consents granted to the Contact Energy Ltd's combined cycle power station and will be integrated into other existing consents and state of the environment monitoring programmes. They will also continue to provide baseline information for the assessment of future effects of increased abstraction and cooling water discharge in the mid reaches of the Patea River with the consented expansion of the Stratford power station.

5. Summary

The Council's standard 'kick-sampling' technique was used at five established sites to collect streambed macroinvertebrates from the Patea River. Samples were sorted and identified to provide number of taxa (richness) and 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 abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly 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 spring macroinvertebrate survey undertaken following a lengthy period of power station discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge. Rather, changes were more subtle involving presence/absence of several (mainly 'sensitive') taxa rarities.

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained high proportions of 'sensitive' taxa at both sites (more typical of spring flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were typically dominated by a small increase in numbers of 'tolerant' taxa at some sites. The range in taxonomic richnesses (number of taxa) tended to be lower at the time of this spring survey compared to those of the previous summer 2012 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the river reach were of 'good' health and slightly better than the condition predicted for similar Taranaki ringplain rivers, following a period of higher flow conditions in winter and early spring.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar conditions to those monitored in the vicinity of the cooling water discharge but with a very small increase in the percentage of 'tolerant' taxa. Minimal significant changes in abundances within particular 'tolerant' and 'sensitive' taxa were recorded within this reach, and downstream decreases in the $SQMCI_s$ values through this reach were typical of past results. MCI scores were above historical median values at all sites and slightly higher than typical of communities at these distances from the National Park, but coincident with moderate periphyton substrate cover following a wet and higher flow period in late winter-early spring.

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To	Job Manager, J Kitto
From	Scientific Officer, C R Fowles
Document	1224480
Report No	CF576
Date	July 2013

Summer biomonitoring of the Patea River in relation to the discharge of cooling water and abstraction of water for Contact Energy Ltd's combined cycle and peaker power stations, February 2013

1. Introduction

Biomonitoring forms a component of the consents compliance monitoring programme implemented by the TRC following the construction of the Taranaki Combined Cycle [TCC1] power station in 1998, and the addition of Stratford Peaker Plant [SPP] in 2011. This particular biological monitoring survey (the second of two biannual surveys for the 2012-2013 monitoring period) related primarily to consent 5848 which permits the discharge of cooling water into the Patea River approximately 1 km upstream of the river's confluence with the Kahouri Stream, east of Stratford.

Five sites in total were surveyed in the Patea River (see Section 2), two in the immediate vicinity of the outfall, as required by Special Condition 7 of the consent (relating to the 'mixing zone'), and one (for reference purposes), at the Council's State of the Environment (SEM) long-term trend detection site at Skinner Road, approximately 1.5 km further downstream. Consents granted in 2001 (5847 and 5850) for the future expansion of the power station [TCC2] required the establishment and monitoring of two additional sites in the mid-reaches of the Patea River between the site of the proposed additional water abstraction (Skinner Road) and the confluence with the Mangaehu River. These sites (Figure 1) at Hungers Road (9 km downstream of Skinner Road) and a further 13 km downstream (adjacent to Raupuha Road, below the Makuri Stream confluence) which initially were sampled as a component of the environmental effects assessment for the power station expansion (Stark and Young, 2001 and CF251), continue to provide baseline information in anticipation of this expansion.

Biomonitoring of the TCC1 station stormwater discharges to the Kahouri Stream is also performed as a separate monitoring programme and, together with biomonitoring of the Stratford municipal WWTP discharge to the Patea River, these are reported separately. This present biomonitoring survey was performed on 28 February 2013 in conjunction with the summer component of the Regional Council's SEM programme and the consent monitoring programme for the Stratford Wastewater Treatment Plant.

2. Method

The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates and algae from five riffle sites in the Patea River. These sites were located as listed in Table 1 and illustrated in Figure 1.

Table 1 Location of sampling sites in the Patea River

Site No	Code	Map reference	Location	Altitude (m asl)	Distance from coast (km)	Distance from National Park (km)
1	PAT000356	Q20:246068	U/s of TCC1 cooling wastes discharge	250	131.8	17.2
2	PAT000357	Q20:247068	100 m d/s of TCC1 cooling wastes discharge	250	131.6	17.4
3	PAT000360	Q20:259064	Skinner Road	240	129.8	19.2
4	PAT000397	Q20:291053	Hungers Road	200	120.5	28.5
5	PAT000430	Q10:340028	Raupuha Road	160	106.9	42.1

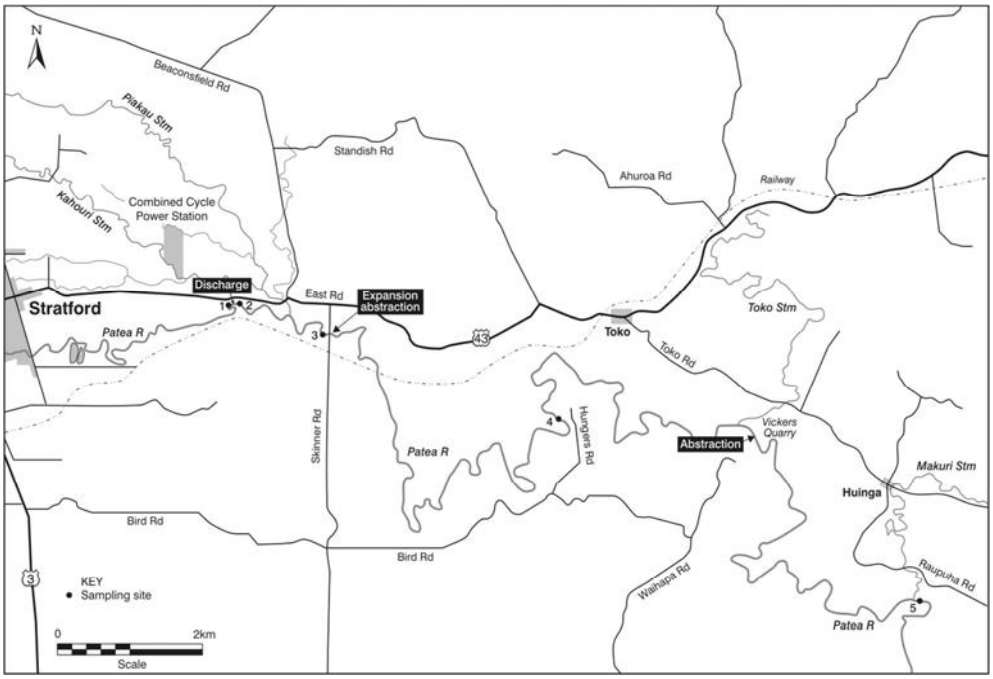

Figure 1 Location of biomonitoring sites in the Patea River in relation to the combined cycle power station, Stratford

Figure 2 Biomonitoring sites location in the Patea River

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).

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 as:

R (rare)	= less than 5 individuals
C (common)	= 5-19 individuals
A (abundant)	= 20-99 individuals
VA (very abundant)	= 100-499 individuals
XA (extremely abundant)	= 500 or more individuals

Macroinvertebrate Community Index (MCI) values were calculated for taxa present at each site (Stark 1985) with certain taxa scores modified in accordance with Taranaki experience.

A semi-quantitative MCI value, $SQMCI_S$ (Stark 1999) 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 scores, and dividing by the sum of the loading factors. 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).

3. Results and discussion

This survey was performed on 28 February 2013 during a period of summer low recession flow, 23 days after a fresh in excess of 3x median flow and 7x median flow. It followed a very dry late summer period when only three freshes were recorded over the preceding nine week period. River flow at Skinner Road was 0.87 m^3/sec representing a flow well below the average monthly mean February flow (2.80 m^3/sec) but above the minimum mean monthly flow for February (0.64 m^3/sec) recorded for the period 1978-2012.

Periphyton mats were widespread at all sites except site 2 where they were patchy. Patchy filamentous algae were present at sites 1 and 4 and widespread at sites 2, 3, and 5. Patchy moss was recorded at sites 2, 8, and 5 from observations of the stony riffle substrates. River flow was slightly cloudy and low at the two sites (1 and 2) adjacent to the discharge site where water temperatures recorded (at the time of this mid morning survey) ranged from 16.5 C to 16.2 C during a period when power station cooling water discharge to the river was occurring.

Discharges had occurred intermittently from the combined cycle plant at about 10-day intervals over the previous three months and daily for the previous three months from the peaker plant, prior to this survey. Peaker plant discharges were occurring to the river at the time of the survey.

River flow was low, uncoloured, and slightly cloudy (sites 3) to clear (sites 4 and 5) further downstream from the Kahouri Stream confluence, where water temperatures

ranged from 16.1 C to 21.2 C at these three sites at the time of this mid morning to midday survey.

Macroinvertebrate communities

Prior to the establishment of the Contact Energy Ltd's programme, biomonitoring surveys had been performed at site 1 (in association with other consents' monitoring programmes) and site 3 (SEM and investigation programmes). Site 2 was established specifically for the purpose of the Contact Energy Ltd consent monitoring programme and sampled initially in spring 1998. The two lower sites (sites 4 and 5) had been surveyed on fewer previous occasions, principally for environmental assessment purposes. A summary of the results of these previous surveys and the existing programme's results are presented in Table 2 (Note: The results of surveys at sites 4 and 5 performed by Cawthron are not included in this summary but are presented and discussed in TRC report CF251).

Table 2 Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1992 and October 2012

Site	No of surveys	Taxa no		MCI values		Survey of Feb 2013	
		Range	Median	Range	Median	Taxa No.	MCI
1	36	17-31	24	82-116	98	27	99
2	29	14-33	22	86-111	98	22	98
3	37	15-33	24	86-105	98	25	95
4	22	16-30	22	82-102	95	22	94
5	22	15-26	22	82-102	94	22	95

The macroinvertebrate fauna results from the present survey are presented in Table 3, with various survey results since 1992 illustrated in Figure 2.

Sites in the vicinity of the power station outfall (sites 1 and 2)

A moderate range of taxa richnesses (22 to 27 taxa) was recorded at sites 1 and 2 immediately upstream and downstream of the discharge. These taxa numbers were within ranges and equivalent with to three taxa above median richnesses previously surveyed at each site (Table 1 and Figure 2). These numbers were from 4 taxa fewer to one taxon more than the median (26) taxa richness previously recorded from 158 surveys of 'control' sites at similar altitudes (250 to 300 m asl) in Taranaki ring plain rivers and streams sourced within the National Park (TRC, 1999 (updated, 2012)).

The characteristic taxa in this short reach of the river included one 'highly sensitive' taxon [very abundant mayfly (*Deleatidium*)]; up to six 'moderately sensitive' taxa [mayfly (*Coloburiscus*), elmid beetle, dobsonfly (*Archichauliodes*), free-living caddisflies (*Hydrobiosis* and *Costachorema*), and cranefly (*Aphrophila*)]; and up to six 'tolerant' taxa [oligochaete worms, net-building caddisfly (*Aoteapsyche*), ephydrid flies, and midges (tanytarsids, *Maoridiamesa,* and orthoclads)]. This dominance represented several changes from the community dominance at the time of the previous summer survey when three fewer 'moderately sensitive' taxa and three fewer 'tolerant' taxa were dominant numerically following a moderate low flow recession. Very few significant differences in individual taxon abundances were recorded between sites 1 and 2, with a higher abundance of one 'tolerant' taxon (orthoclad midges) and lower abundances of two 'moderately sensitive' taxa at site 2 accounting for the slight reduction in $SQMCI_s$ value which was 0.6 unit lower than the value at site 1 (Table 3).

Table 3 Macroinvertebrate fauna of the Patea River in relation to Stratford Power Ltd sampled on 28 February 2013

Taxa List	Site Number	MCI score	1	2	3	4	5
	Site Code		PAT000356	PAT000357	PAT000360	PAT000397	PAT000430
	Sample Number		FWB13123	FWB13124	FWB13125	FWB13126	FWB13127
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	-	-	-	R	-
NEMERTEA	Nemertea	3	-	-	R	C	R
ANNELIDA (WORMS)	Oligochaeta	1	A	C	C	A	A
	Lumbricidae	5	-	-	-	-	R
MOLLUSCA	*Latia*	5	-	-	-	-	R
	Potamopyrgus	4	R	-	C	A	A
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	-	-	R	A	A
	Coloburiscus	7	A	A	A	C	R
	Deleatidium	8	VA	VA	VA	VA	VA
	Nesameletus	9	C	R	-	-	-
PLECOPTERA (STONEFLIES)	*Zelandoperla*	8	R	R	-	-	-
COLEOPTERA (BEETLES)	Elmidae	6	VA	A	VA	VA	VA
	Hydraenidae	8	C	C	C	-	-
	Staphylinidae	5	-	-	R	-	-
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	VA	C	A	A	C
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	XA	XA	XA	VA	XA
	Costachorema	7	A	A	C	C	R
	Hydrobiosis	5	A	A	A	A	VA
	Neurochorema	6	-	-	R	-	-
	Beraeoptera	8	R	-	-	-	-
	Confluens	5	R	-	R	-	-
	Oxyethira	2	C	R	R	-	-
	Pycnocentria	7	-	-	-	R	R
	Pycnocentrodes	5	C	R	R	C	R
	Zelolessica	7	-	-	R	-	-
DIPTERA (TRUE FLIES)	*Aphrophila*	5	VA	VA	VA	A	VA
	Eriopterini	5	R	R	-	R	-
	Maoridiamesa	3	A	VA	VA	A	A
	Orthocladiinae	2	A	VA	A	VA	VA
	Tanypodinae	5	R	-	-	-	-
	Tanytarsini	3	A	A	VA	A	A
	Empididae	3	R	C	C	R	R
	Ephydridae	4	A	R	-	R	-
	Muscidae	3	R	R	C	-	R
	Austrosimulium	3	C	C	R	-	-
	Tanyderidae	4	R	-	-	R	R
		No of taxa	27	22	25	22	22
		MCI	99	98	95	94	95
		SQMCIs	5.0	4.4	4.6	4.8	4.5
		EPT (taxa)	10	8	10	8	8
		%EPT (taxa)	37	36	40	36	36

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

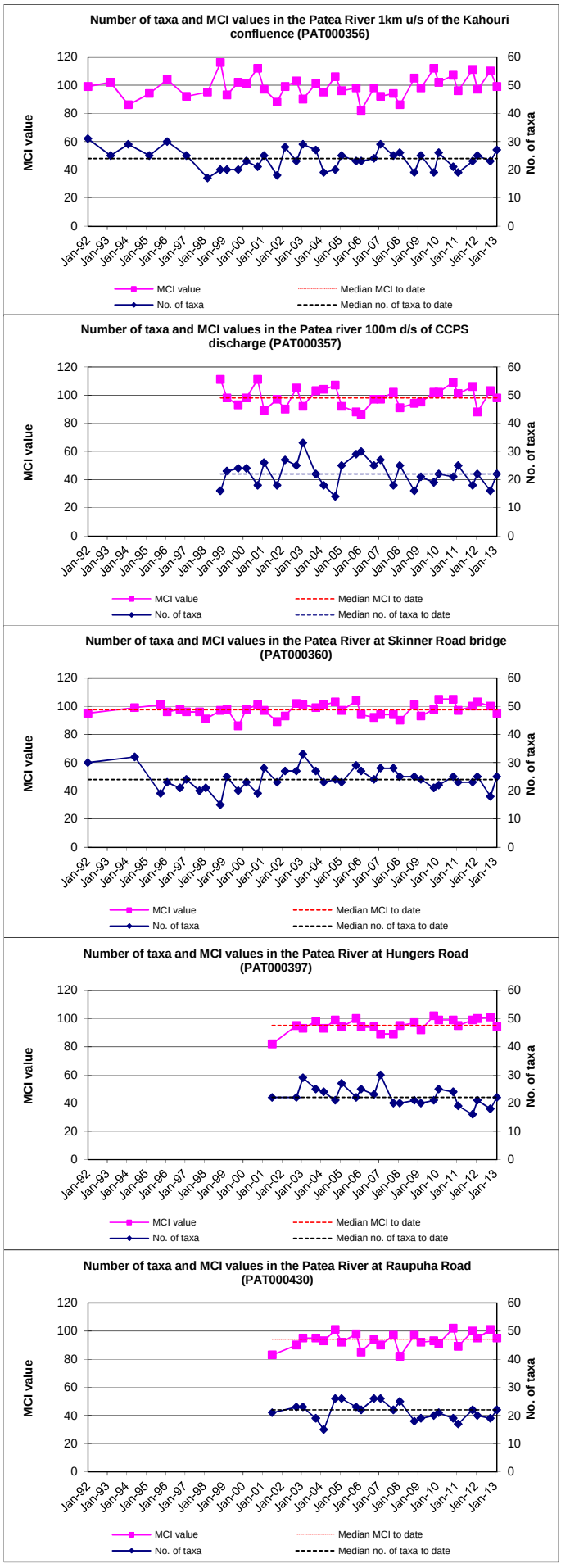

Figure 3 Taxa richness and MCI scores recorded to date at each of the five Patea River sites

The presence of up to five 'highly sensitive' taxa, one of which was very abundant, in this reach of the Patea River, was an indication of generally good physicochemical water quality conditions preceding the survey under low flow conditions following a dry late summer period and in the presence of moderate periphyton substrate cover which could be expected to have had some impact on physical habitat. However, improved treated wastewater quality (and greater dilution) of the upgraded Stratford municipal WWTP discharge, may have contributed to these conditions on occasions (see reports CF526, CF545, and CF575).

MCI scores (Tables 2 and 3) reflected the moderate proportion (55 to 56% of taxa richness) of 'sensitive' taxa in the communities at both sites, with the scores recorded (99 and 98 units) within one unit of the medians of scores previously recorded at both sites (Table 1). The scores also reflected the relative similarity in community composition between sites as reflected by the 22 shared taxa (of a total 27 taxa) between sites. These scores categorised both of these sites as having 'fair' river health (TRC, 2013) at the time of this summer survey. They were also a significant 11 to 12 units lower than the predicted MCI score for National Park-sourced ringplain sites at an altitude of 250m asl but an insignificant 1 to 2 units below the predicted MCI scores for these sites, 17.2 km and 17.4 km respectively downstream of the National Park boundary (Stark and Fowles, 2009).

The MCI scores at these two sites showed an insignificant 1 unit downstream decrease in scores which was not indicative of recent impacts of any cooling water discharge on the macroinvertebrate fauna of the Patea River at the periphery of the permitted mixing zone. This minor MCI difference between adjacent sites reflected the similarity in community composition between sites.

Sites in the reach between Skinner Road and Raupuha Road (sites 3, 4 and 5)

Taxa richnesses at these three sites had a narrow range of moderate richnesses (22 to 25 taxa), which were within one taxon of historical medians at these sites (Table 2). They were also slightly higher than median richnesses (20 and 23 taxa) previously recorded by surveys of 'control' sites at similar altitudes (155 to 199 m asl and 200 to 249 m asl) in Taranaki ringplain rivers and streams sourced within the National Park (TRC, 1999 (updated 2012)).

The characteristic taxa within this 23 km reach of the Patea River included one 'highly sensitive' taxon [very abundant mayfly (*Deleatidium*)]; up to six 'moderately sensitive' taxa [mayflies (*Austroclima* and *Coloburiscus*), elmid beetle, dobsonfly (*Archichauliodes*), free-living caddisfly (*Hydrobiosis*), and cranefly (*Aphrophila*)]; and up to six 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), net-building caddisfly (*Aoteapsyche*), and midges (orthoclads, tanytarsids, and *Maoridiamesa*)]. The patchy to widespread periphyton cover on the riverbed coincided with reductions in the abundances within a few of the more 'sensitive' taxa and in particular increases in abundances of 'tolerant' snails and oligochaete worms in a downstream direction. Only very few significant differences in individual taxon abundances between adjacent sites were recorded along this river reach which accounted for the insignificant variation in $SQMCI_S$ scores of 0.2 unit between sites 4 and 5, and 0.3 unit between sites 3 and 5.

The very small increase in downstream proportions of lower scoring 'tolerant' taxa (44%, 50%, and 45% of total taxa) in the communities at sites 3, 4, and 5 were reflected in the MCI scores (95, 94, and 95 units) recorded through this reach of the mid Patea River. These scores were an insignificant 3 units lower to 1 unit higher than the medians of scores previously recorded at each of the three sites (Table 1) and from 5 units to 7 units lower than those recorded by the previous spring survey which was undertaken during higher flow conditions. The scores recorded at these three sites by this survey did not change significantly through the reach of the river surveyed. These scores categorised the sites as having 'fair' river health (TRC, 2013) at the time of this summer survey. They were a significant 14 and 11 units lower (sites 3 and 4) and an insignificant 6 units lower (site 5) than the predicted MCI scores for National Park-sourced ringplain sites at altitudes of 160 to 240m asl but an insignificant 4 units lower to 5 units higher (site 5) than the predicted MCI scores for these sites, 19.2 km to 42.1 km downstream of the National Park boundary (Stark and Fowles, 2009).

The absences of downstream decreases in MCI scores between sites 3 and 5 and sites 4 and 5 were contrary to the predicted downstream MCI decrease (an average rate of 0.3 to 0.4 units per km) predicted for this reach of a Taranaki ringplain stream (Stark and Fowles, 2009). Observations in this reach of the river, and particularly below the Skinner Road site (site 3), have indicated that riffles tended to be shorter and/or deeper than those typical of the upper reaches of the river (particularly upstream of the Kahouri Stream confluence), where the 'more sensitive' (particularly mayfly and stonefly) taxa are a more common component of the macroinvertebrate communities (TRC, 2001). Minimal decrease in MCI scores was found between sites 3 and 4, and no decrease between sites 4 and 5, resulting in no overall decrease found over this reach (23km), but a 4 unit decrease over the total reach (25km) of the river surveyed, was due to slightly higher scores upstream of the Kahouri Stream confluence. This overall rate of decrease equated to 0.16 MCI unit/km, lower than that predicted for this reach of the river.

4. Conclusions

This twenty-seventh biomonitoring survey performed in relation to the discharge of cooling water from the power station indicated no significant impacts of recent discharges upon the biological communities of the Patea River in the vicinity of the discharge outfall east of Stratford during a period of low recession flow conditions following a very dry late summer. Macroinvertebrate community richness and MCI scores typical of habitats with widespread periphyton substrate cover were within ranges of results previously recorded, slightly higher than median richnesses, and very similar to median MCI scores coincident with low flow conditions. There were few subtle differences in community compositions between sites resulting in a minimal difference in MCI score recorded at the periphery of the permitted discharge mixing zone in comparison with the upstream 'control' site.

Biomonitoring performed at sites further downstream in the river has continued for the purpose of establishing baseline information in relation to the proposed expansion of the power station. Moderately high community richnesses were found at the three sites in the 23 km reach between Skinner Road and Raupuha Road (where the principal effects of future water abstraction would be expected to occur),

and community composition showed few changes from communities found at sites 1 and 2, upstream of the Kahouri Stream confluence . Of the total of 36 taxa found over the entire reach of the river surveyed (compared with 28 taxa in spring, 2012), 23 taxa were present at one or more sites in both of the two reaches, above and below the Kahouri Stream confluence. However, only 14 taxa were present at all five sites along the reach surveyed, of which one 'highly sensitive', five 'moderately sensitive', and five 'tolerant' taxa were abundant at a minimum of three of the sites. Four 'tolerant' taxa [net-building caddisfly (*Aoteapsyche*) and midges (orthoclads, tanytarsids, and *Maoridiamesa*)]; three 'moderately sensitive' taxa [elmid beetle, dobsonfly (*Archichauliodes*), and cranefly (*Aphrophila*)]; and one 'highly sensitive' taxon [mayfly (*Deleatidium*)], were abundant at all five sites; more typical of the number of taxa which have been uniformly characteristic of these sites' communities from time to time in past surveys and coincident with relatively extensive substrate periphyton cover conditions following a very dry late summer period.

A relationship between MCI score and distance from the National Park established for National Park-sourced ringplain rivers and streams from Taranaki Regional Council data (Stark and Fowles, 2009) indicates that MCI values for the three sites (3, 4 and 5) in this reach of the mid-Patea River survey might be expected to range between 90 and 99 units. Therefore, the results of this survey found a typical range of scores for that expected in the mid-Patea River reaches below Skinner Road, although the riffles tended to be deeper than those surveyed further upstream, during a period of low summer flow conditions and typical extensive periphyton substrate cover following a dry late summer period.

The general trend in MCI scores found throughout the reach of the river at the time of this summer survey, which were not significantly different in comparison with similar reaches of rivers elsewhere in Taranaki, also reflected minimal influence of the major point source municipal oxidation ponds system discharge to the river some 3 km upstream (see report CF575) following the relatively recent upgrading of the Stratford municipal WWTP system

Biannual biomonitoring surveys will form a component of future monitoring programmes associated with consents granted to the Contact Energy Ltd's combined cycle power station and will be integrated into other existing consents and state of the environment monitoring programmes. They will also continue to provide baseline information for the assessment of future effects of increased abstraction and cooling water discharge in the mid reaches of the Patea River with the consented expansion of the Stratford power station.

5. Summary

The Council's standard 'kick-sampling' technique was used at five established sites to collect streambed macroinvertebrates from the Patea River. Samples were sorted and identified to provide number of taxa (richness) and 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 abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly 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 summer macroinvertebrate survey undertaken following periods of power station discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained moderately high proportions of 'sensitive' taxa at both sites (more typical of summer flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were typically dominated by a small increase in numbers of 'tolerant' taxa at some sites. The range in taxonomic richnesses (number of taxa) tended to be higher at the time of this summer survey compared to those of the previous spring 2012 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the river reach were of 'fair' health and in the condition predicted for similar sites in other Taranaki ringplain rivers, following a period of lower flow conditions over a dry late summer.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar community compositions to those monitored in the vicinity of the cooling water discharge but with very small increases in the percentages of 'tolerant' taxa. Minimal significant changes in individual taxon abundances were recorded within this reach, and minor downstream decreases in the $SQMCI_s$ values through this reach were smaller than typical of past results. MCI scores were near historical median values at all sites and typical of communities at these distances from the National Park, coincident with relatively extensive periphyton substrate cover following a very dry, low flow period in late summer.

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To	Job Manager, J Kitto
From	Scientific Officer, C R Fowles
Document	1316900
Report No	CF593
Date	February 2014

Spring biomonitoring of the Patea River in relation to the discharge of cooling water and abstraction of water for Contact Energy Ltd's combined cycle and peaker power stations, November 2013

Introduction

Biomonitoring forms a component of the consents compliance monitoring programme implemented by the TRC following the construction of the Taranaki Combined Cycle [TCC1] power station in 1998, and the addition of Stratford Peaker Plant [SPP] in 2011. This particular biological monitoring survey (the first of two biannual surveys for the 2013-2014 monitoring period) related primarily to consent 5848 which permits the discharge of cooling water into the Patea River approximately 1 km upstream of the river's confluence with the Kahouri Stream, east of Stratford.

Five sites in total were surveyed in the Patea River (see Section 2), two in the immediate vicinity of the outfall, as required by Special Condition 7 of the consent (relating to the 'mixing zone'), and one (for reference purposes), at the Council's State of the Environment (SEM) long-term trend detection site at Skinner Road, approximately 1.5 km further downstream. Consents granted in 2001 (5847 and 5850) for the future expansion of the power station [TCC2] required the establishment and monitoring of two additional sites in the mid-reaches of the Patea River between the site of the proposed additional water abstraction (Skinner Road) and the confluence with the Mangaehu River. These sites (Figure 1) at Hungers Road (9 km downstream of Skinner Road) and a further 13 km downstream (adjacent to Raupuha Road, below the Makuri Stream confluence) which initially were sampled as a component of the environmental effects assessment for the power station expansion (Stark and Young, 2001 and CF251), continue to provide baseline information in anticipation of this expansion.

Biomonitoring of the TCC1 station stormwater discharges to the Kahouri Stream is also performed as a separate monitoring programme and this is reported separately. The present biomonitoring survey was performed on 11 November 2013 in conjunction with the spring component of the Regional Council's SEM programme .

Method

The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates and algae from five riffle sites in the Patea River. These sites were located as listed in Table 1 and illustrated in Figure 1.

Table 1 Location of sampling sites in the Patea River

Site No	Code	GPS reference	Location	Altitude (m asl)	Distance from coast (km)	Distance from National Park (km)
1	PAT000356	E1714497 N5645112	U/s of TCC1 cooling wastes discharge	250	131.8	17.2
2	PAT000357	E1714662 N5645076	100 m d/s of TCC1 cooling wastes discharge	250	131.6	17.4
3	PAT000360	E1715919 N5644681	Skinner Road	240	129.8	19.2
4	PAT000397	E1718991 N5643531	Hungers Road	200	120.5	28.5
5	PAT000430	E1723952 N5641068	Raupuha Road	160	106.9	42.1

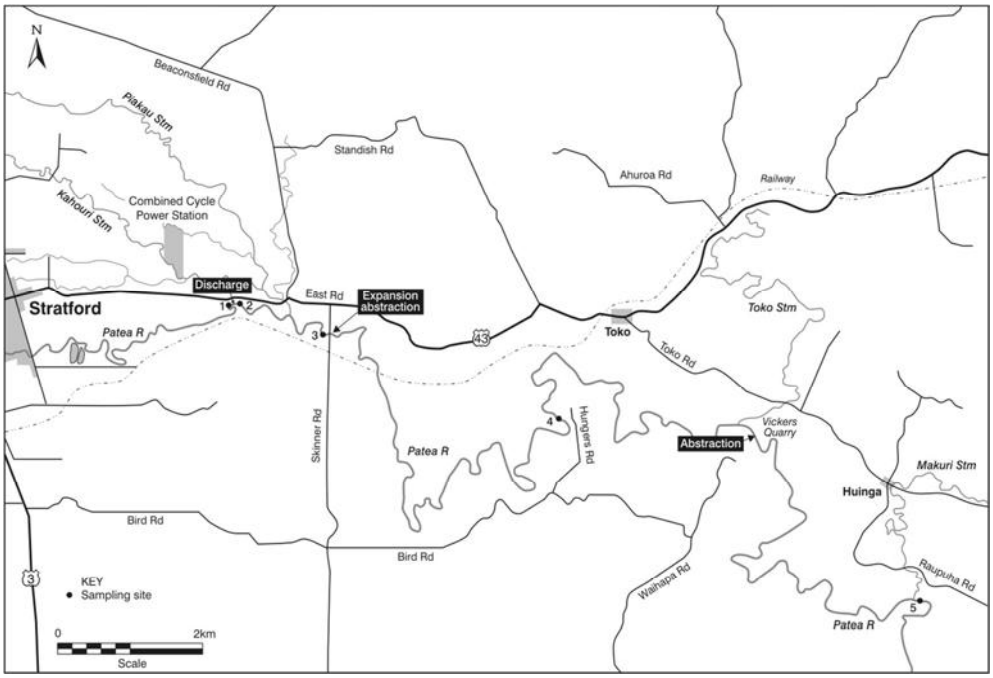

Figure 1 Location of biomonitoring sites in the Patea River in relation to the combined cycle power station, Stratford

Figure 2 Biomonitoring sites location in the Patea River

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).

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 as:

R (rare) = less than 5 individuals
C (common) = 5-19 individuals
A (abundant) = 20-99 individuals
VA (very abundant) = 100-499 individuals
XA (extremely abundant) = 500 or more individuals

Macroinvertebrate Community Index (MCI) values were calculated for taxa present at each site (Stark 1985) with certain taxa scores modified in accordance with Taranaki experience.

A semi-quantitative MCI value, $SQMCI_S$ (Stark 1999) 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 scores, and dividing by the sum of the loading factors. 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).

Results and discussion

This survey was performed on 11 November 2013 during a period of spring recession flow, 10 days after a fresh in excess of 3x median flow and 7x median flow. It followed a wet early spring period when twelve freshes were recorded over the preceding two month period. River flow at Skinner Road was 2.92 m^3/sec representing a flow below the average monthly mean November flow (4.43 m^3/sec) but well above the minimum mean monthly flow for November (1.13 m^3/sec) recorded for the period 1978-2012.

Periphyton mats were patchy at all sites. Patchy filamentous algae were present at site 3 but absent from all four other sites. Patchy moss was recorded at sites except site 4 from observations of the stony riffle substrates. River flow was clear and relatively low at the two sites (1 and 2) adjacent to the discharge site where water temperatures recorded (at the time of this early morning survey) were 14.2 C at both sites during a period when power station cooling water discharge to the river was occurring.

Few daily discharges had occurred from the combined cycle plant in October and only over a few days in November and only intermittent discharges for the previous month from the peaker plants, prior to this survey. A peaker plant discharge was occurring to the river at the time of the survey.

River flow was moderate, uncoloured, and slightly cloudy at the three sites (3, 4, & 5) downstream from the Kahouri Stream confluence, where water temperatures ranged from 14.1 C to 15.9 C at these three sites at the time of this mid morning survey.

Macroinvertebrate communities

Prior to the establishment of the Contact Energy Ltd's programme, biomonitoring surveys had been performed at site 1 (in association with other consents' monitoring programmes) and site 3 (SEM and investigation programmes). Site 2 was established specifically for the purpose of the Contact Energy Ltd consent monitoring programme and sampled initially in spring 1998. The two lower sites (sites 4 and 5) had been surveyed on fewer previous occasions, principally for environmental assessment purposes. A summary of the results of these previous surveys and the existing programme's results are presented in Table 2 (Note: The results of surveys at sites 4 and 5 performed by Cawthron are not included in this summary but are presented and discussed in TRC report CF251).

Table 2 Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1992 and February 2013

Site	No of surveys	Taxa no		MCI values		Survey of November 2013	
		Range	Median	Range	Median	Taxa No.	MCI
1	37	17-31	24	82-116	98	17	98
2	30	14-33	22	86-111	98	18	102
3	38	15-33	24	86-105	98	23	99
4	23	16-30	22	82-102	95	20	99
5	23	15-26	22	82-102	94	18	94

The macroinvertebrate fauna results from the present survey are presented in Table 3, with various survey results since 1992 illustrated in Figure 2.

Sites in the vicinity of the power station outfall (sites 1 and 2)

A narrow range of taxa richnesses (17 to 18 taxa) was recorded at sites 1 and 2 immediately upstream and downstream of the discharge. These taxa numbers were toward the lower end of ranges and four to seven taxa below median richnesses previously surveyed at each site (Table 1 and Figure 2). These numbers were from 7 to 8 taxa fewer than the median (25) taxa richness previously recorded from 170 surveys of 'control' sites at similar altitudes (250 to 300 m asl) in Taranaki ring plain rivers and streams sourced within the National Park (TRC, 1999 (updated, 2013)).

The characteristic taxa in this short reach of the river included one 'highly sensitive' taxon [extremely abundant mayfly (*Deleatidium*)]; up to two 'moderately sensitive' taxa [mayfly (*Coloburiscus*) and elmid beetles]; and up to three 'tolerant' taxa [net-building caddisfly (*Aoteapsyche*) and midges (*Maoridiamesa* and orthoclads)]. This dominance represented several changes from the community dominance at the time of the previous summer survey when four additional 'moderately sensitive' taxa and another three 'tolerant' taxa were dominant numerically following a very low flow recession. No significant differences in individual taxon abundances were recorded between sites 1 and 2, accounting for the very similar $SQMCI_s$ values which were within 0.1 unit at sites 1 and 2 (Table 3).

Table 3 Macroinvertebrate fauna of the Patea River in relation to Stratford Power Ltd sampled on 11 November 2013

Taxa List	Site Number	MCI score	1	2	3	4	5
	Site Code		PAT000356	PAT000357	PAT000360	PAT000397	PAT000430
	Sample Number		FWB13276	FWB13277	FWB13278	FWB13279	FWB13280
NEMERTEA	Nemertea	3	-	-	R	-	-
NEMATODA	Nematoda	3	-	-	R	-	-
ANNELIDA (WORMS)	Oligochaeta	1	C	R	A	A	A
	Lumbricidae	5	-	R	-	-	-
MOLLUSCA	*Latia*	5	-	-	-	R	-
	Potamopyrgus	4	-	R	R	VA	A
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	R	-	C	-	C
	Coloburiscus	7	VA	A	A	C	R
	Deleatidium	8	XA	XA	XA	XA	XA
	Nesameletus	9	-	R	-	-	-
	Zephlebia group	7	-	-	R	-	-
PLECOPTERA (STONEFLIES)	*Acroperla*	5	R	-	-	-	-
	Zelandobius	5	R	-	R	C	C
COLEOPTERA (BEETLES)	Elmidae	6	C	A	A	XA	A
	Hydraenidae	8	-	-	R	-	-
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	C	C	A	A	C
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	A	C	A	A	A
	Costachorema	7	C	C	C	A	C
	Hydrobiosis	5	R	R	C	C	C
	Beraeoptera	8	-	R	R	R	-
	Pycnocentria	7	-	-	-	R	-
	Pycnocentrodes	5	C	C	A	VA	A
DIPTERA (TRUE FLIES)	*Aphrophila*	5	C	C	A	R	C
	Maoridiamesa	3	A	A	VA	R	A
	Orthocladiinae	2	VA	VA	VA	C	C
	Tanytarsini	3	C	R	A	-	C
	Empididae	3	-	-	R	R	R
	Austrosimulium	3	R	R	R	-	R
	Tabanidae	3	-	-	-	R	-
	Tanyderidae	4	-	-	-	R	-
	No of taxa		17	18	23	20	18
	MCI		98	102	99	99	94
	SQMCIs		6.7	6.8	6.1	6.4	7.1
	EPT (taxa)		9	8	10	9	8
	%EPT (taxa)		53	44	43	45	44

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

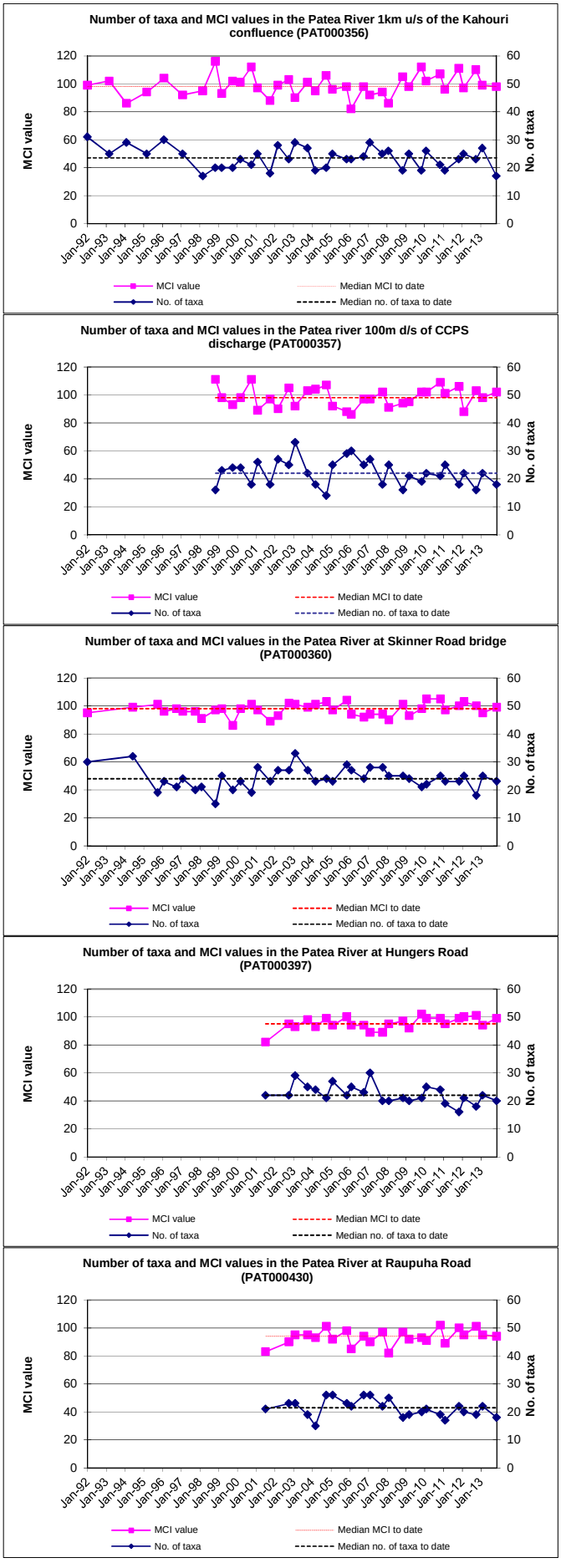

Figure 3 Taxa richness and MCI scores recorded to date at each of the five Patea River sites

The presence of up to three 'highly sensitive' taxa, one of which was extremely abundant, in this reach of the Patea River, was an indication of generally good physicochemical water quality conditions preceding the survey under relatively low flow conditions following a wet early spring period and in the presence of limited periphyton substrate cover which could be expected to have had some impact on physical habitat. However, improved treated wastewater quality (and greater dilution) of the upgraded Stratford municipal WWTP discharge, may have contributed to these conditions on occasions (see reports CF526, CF545, and CF575).

MCI scores (Tables 2 and 3) reflected the moderate proportion (55 to 56% of taxa richness) of 'sensitive' taxa in the communities at both sites, with the scores recorded (98 and 102 units) within four units of the medians of scores previously recorded at both sites (Table 1). The scores also reflected the relative similarity in community composition between sites as reflected by the 14 shared taxa (of a total 20 taxa) between sites. These scores categorised these sites as having 'fair' (site 1) and 'good' (site 2) river health (TRC, 2014) at the time of this spring survey. However, they were 8 units to a significant 12 units lower than the predicted MCI score for National Park-sourced ringplain sites at an altitude of 250m asl but within an insignificant 2 units of the predicted MCI scores for these sites, 17.2 km and 17.4 km respectively downstream of the National Park boundary (Stark and Fowles, 2009).

The MCI scores at these two sites showed an insignificant and atypical 4 unit downstream increase in scores which was indicative of no recent impacts of any cooling water discharge on the macroinvertebrate fauna of the Patea River at the periphery of the permitted mixing zone. This minor MCI difference (4 units) between adjacent sites reflected the similarity in community composition between sites.

Sites in the reach between Skinner Road and Raupuha Road (sites 3, 4 and 5)

Taxa richnesses at these three sites had a narrow range of moderate richnesses (18 to 23 taxa), which were within four taxa of historical medians at these sites (Table 2). They were also slightly higher than median richnesses (20 and 23 taxa) previously recorded by surveys of 'control' sites at similar altitudes (155 to 199 m asl and 200 to 249 m asl) in Taranaki ringplain rivers and streams sourced within the National Park (TRC, 1999 (updated 2013)).

The characteristic taxa within this 23 km reach of the Patea River included one 'highly sensitive' taxon [extremely abundant mayfly (*Deleatidium*)]; up to six 'moderately sensitive' taxa [mayfly (*Coloburiscus*), elmid beetles, dobsonfly (*Archichauliodes*), free-living caddisfly (*Costachorema*), stony-cased caddisfly (*Pycnocentrodes*), and cranefly (*Aphrophila*)]; and up to six 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), net-building caddisfly (*Aoteapsyche*), and midges (orthoclads, tanytarsids, and *Maoridiamesa*)]. The similar periphyton cover on the riverbed to that recorded upstream (at sites 1 & 2) coincided with increased abundances within a few of the more 'sensitive' taxa and, in particular, increases in abundances of 'tolerant' snails and oligochaete worms in a downstream direction. This resulted in a small decrease of 0.7 $SQMCI_s$ unit between sites 2 and 3.Only a few significant differences in individual taxon abundances between adjacent sites were recorded along this river reach which accounted for the insignificant variation in $SQMCI_S$ scores of 0.2 unit between sites 3 and 4, and 0.7 unit between sites 4 and 5.

The very small increase in downstream proportions of lower scoring 'tolerant' taxa (44%, 50%, and 45% of total taxa) in the communities at sites 3, 4, and 5 were reflected in the MCI scores (99, 99, and 94 units) recorded through this reach of the mid Patea River. These scores were an insignificant equal with to 4 units higher than the medians of scores previously recorded at each of the three sites (Table 1) and from 1 unit lower to 5 units higher than those recorded by the previous summer survey which was undertaken under lower flow conditions. The scores recorded at these three sites by this survey did not change significantly through the reach of the river surveyed. These scores categorised the sites as having 'fair' river health (TRC, 2014) at the time of this spring survey. They were an insignificant 10, 6, and 7 units lower (sites 3, 4, and 5) than the predicted MCI scores for National Park-sourced ringplain sites at altitudes of 160 to 240m asl but equal with (site 3) to an insignificant 5 units (site 4) and 4 units higher (site 5) than the predicted MCI scores for these sites, 19.2 km to 42.1 km downstream of the National Park boundary (Stark and Fowles, 2009).

The small downstream rates of decreases in MCI scores between sites 3 and 5 (0.2 unit/km) and sites 4 and 5 (0.4 unit/km) were similar to the predicted downstream MCI decrease (an average rate of 0.3 to 0.4 units per km) predicted for this reach of a Taranaki ringplain stream (Stark and Fowles, 2009). Observations in this reach of the river, and particularly below the Skinner Road site (site 3), have indicated that riffles tended to be shorter and/or deeper than those typical of the upper reaches of the river (particularly upstream of the Kahouri Stream confluence), where the 'more sensitive' (particularly mayfly and stonefly) taxa are a more common component of the macroinvertebrate communities (TRC, 2001). No decrease in MCI scores was found between sites 3 and 4, but a small decrease between sites 4 and 5 resulted in an overall decrease of 5 units over this reach (23km) and a 8 unit decrease over the total reach (25km) of the river surveyed, was due to slightly higher scores upstream of the Kahouri Stream confluence. This overall rate of decrease equated to 0.32 MCI unit/km, similar to that predicted for this reach of the river.

Conclusions

This twenty-eight biomonitoring survey performed in relation to the discharge of cooling water from the power station indicated no significant impacts of recent discharges upon the biological communities of the Patea River in the vicinity of the discharge outfall east of Stratford during a period of moderate recession flow conditions following a wet early spring. Macroinvertebrate community richness and MCI scores typical of habitats with limited periphyton substrate cover were within ranges of results previously recorded, lower than median richnesses, and slightly above median MCI scores coincident with moderately low flow conditions. There were few subtle differences in community compositions between sites resulting in a minimal difference in MCI score recorded at the periphery of the permitted discharge mixing zone in comparison with the upstream 'control' site.

Biomonitoring performed at sites further downstream in the river has continued for the purpose of establishing baseline information in relation to the proposed expansion of the power station. Moderate community richnesses were found at the three sites in the 23 km reach between Skinner Road and Raupuha Road (where the principal effects of future water abstraction would be expected to occur), and community composition showed few changes from communities found at sites 1 and 2, upstream of the Kahouri Stream confluence . Of the total of 30 taxa found over the entire reach of the river surveyed (compared with 28 taxa in spring, 2012 and 36 taxa in the previous summer), 18 taxa were present at one or more

sites in both of the two reaches, above and below the Kahouri Stream confluence. However, only 12 taxa were present at all five sites along the reach surveyed, of which one 'highly sensitive', three 'moderately sensitive', and four 'tolerant' taxa were abundant at a minimum of three of the sites. Only one 'highly sensitive' taxon [mayfly (*Deleatidium*)] was abundant at all five sites; less typical of the number of taxa which have been uniformly characteristic of these sites' communities from time to time in past surveys and coincident with less extensive substrate periphyton cover conditions following a wet early spring period.

A relationship between MCI score and distance from the National Park established for National Park-sourced ringplain rivers and streams from Taranaki Regional Council data (Stark and Fowles, 2009) indicates that MCI values for the three sites (3, 4 and 5) in this reach of the mid-Patea River survey might be expected to range between 90 and 99 units. Therefore, the results of this survey found a typical range of scores for that expected in the mid-Patea River reaches below Skinner Road, although some of the riffles tended to be deeper than those surveyed further upstream, during a period of moderate spring flow conditions and limited periphyton substrate cover following a wet early spring period.

The general trend in MCI scores found throughout the reach of the river at the time of this spring survey, which were not significantly different in comparison with similar reaches of rivers elsewhere in Taranaki, also reflected limited influence of the major point source municipal oxidation ponds system discharge to the river some 3 km upstream (see report CF575) following the relatively recent upgrading of the Stratford municipal WWTP system

Biannual biomonitoring surveys will form a component of future monitoring programmes associated with consents granted to the Contact Energy Ltd's combined cycle power station and will be integrated into other existing consents and state of the environment monitoring programmes. They will also continue to provide baseline information for the assessment of future effects of increased abstraction and cooling water discharge in the mid reaches of the Patea River with the consented expansion of the Stratford power station.

Summary

The Council's standard 'kick-sampling' technique was used at five established sites to collect streambed macroinvertebrates from the Patea River. Samples were sorted and identified to provide number of taxa (richness) and 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 abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly 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 spring macroinvertebrate survey undertaken following periods of power station discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities

were recorded between the upstream 'control' site and site immediately downstream of the discharge

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained moderately high proportions of 'sensitive' taxa at both sites (typical of spring flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were dominated by higher numbers of both 'moderately sensitive' and 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) tended to be lower at the time of this spring survey compared to those of the previous summer 2012-2013 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the river reach were of 'fair' to 'good' generic health and in the condition predicted for similar sites in other Taranaki ringplain rivers, following a period of moderate flow conditions following a wet early spring.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar community compositions to those monitored in the vicinity of the cooling water discharges. Minimal significant changes in individual taxon abundances were recorded within this reach, and minor downstream decreases in most of the $SQMCI_s$ values through this reach were smaller than typical of past results. MCI scores were equal with or slightly higher than historical median values at all sites and typical of communities at these distances from the National Park, coincident with limited periphyton substrate cover following a wet period in early spring.

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To	Job Manager, J Kitto
From	Scientific Officer, C R Fowles
Document	1322744
Report No	CF605
Date	March 2014

Summer biomonitoring of the Patea River in relation to the discharge of cooling water and abstraction of water for Contact Energy Ltd's combined cycle and peaker power stations, February 2014

Introduction

Biomonitoring forms a component of the consents compliance monitoring programme implemented by the TRC following the construction of the Taranaki Combined Cycle [TCC1] power station in 1998, and the addition of Stratford Peaker Plant [SPP] in 2011. This particular biological monitoring survey (the second of two biannual surveys for the 2013-2014 monitoring period) related primarily to consent 5848 which permits the discharge of cooling water into the Patea River approximately 1 km upstream of the river's confluence with the Kahouri Stream, east of Stratford.

Five sites in total were surveyed in the Patea River (see Section 2), two in the immediate vicinity of the outfall, as required by Special Condition 7 of the consent (relating to the 'mixing zone'), and one (for reference purposes), at the Council's State of the Environment (SEM) long-term trend detection site at Skinner Road, approximately 1.5 km further downstream. Consents granted in 2001 (5847 and 5850) for the future expansion of the power station [TCC2] required the establishment and monitoring of two additional sites in the mid-reaches of the Patea River between the site of the proposed additional water abstraction (Skinner Road) and the confluence with the Mangaehu River. These sites (Figure 1) at Hungers Road (9 km downstream of Skinner Road) and a further 13 km downstream (adjacent to Raupuha Road, below the Makuri Stream confluence) which initially were sampled as a component of the environmental effects assessment for the power station expansion (Stark and Young, 2001 and CF251), continue to provide baseline information in anticipation of this expansion.

Biomonitoring of the TCC1 station stormwater discharges to the Kahouri Stream is also performed as a separate monitoring programme and this is reported separately. The present biomonitoring survey was performed on 18 February 2014 in conjunction with the summer component of the Regional Council's SEM programme and the consent monitoring programme for the Stratford Wastewater Treatment Plant .

Method

The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates and algae from five riffle sites in the Patea River. These sites were located as listed in Table 1 and illustrated in Figure 1.

Table 1 Location of sampling sites in the Patea River

Site No	Code	GPS reference	Location	Altitude (m asl)	Distance from coast (km)	Distance from National Park (km)
1	PAT000356	E1714497 N5645112	U/s of TCC1 cooling wastes discharge	250	131.8	17.2
2	PAT000357	E1714662 N5645076	100 m d/s of TCC1 cooling wastes discharge	250	131.6	17.4
3	PAT000360	E1715919 N5644681	Skinner Road	240	129.8	19.2
4	PAT000397	E1718991 N5643531	Hungers Road	200	120.5	28.5
5	PAT000430	E1723952 N5641068	Raupuha Road	160	106.9	42.1

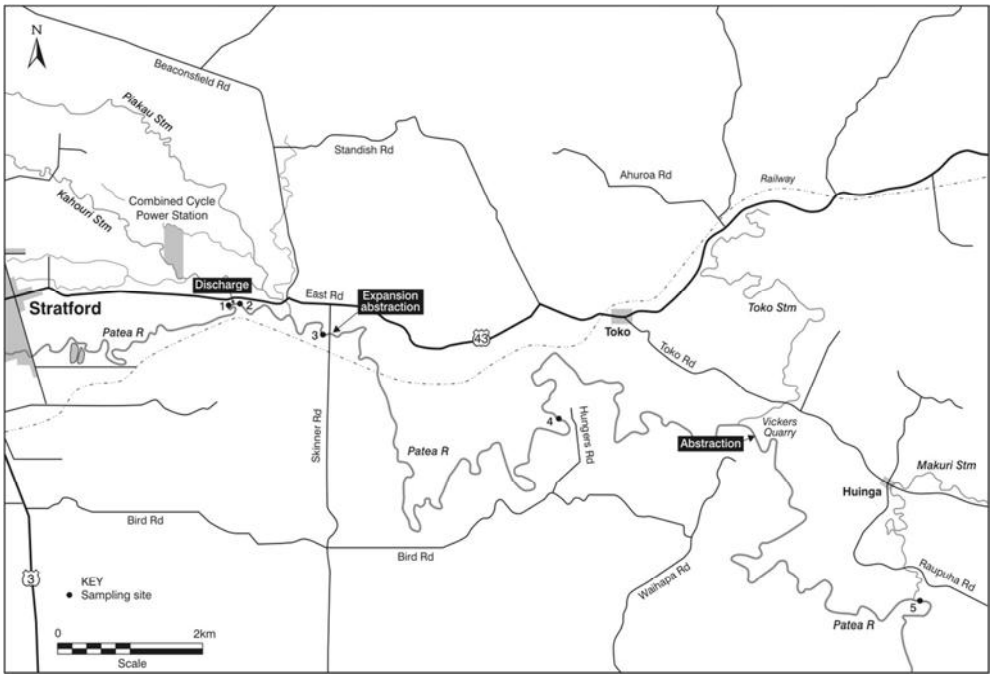


Figure 1 Location of biomonitoring sites in the Patea River in relation to the combined cycle power station, Stratford

Figure 2 Biomonitoring sites location in the Patea River

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).

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 as:

R (rare) = less than 5 individuals
C (common) = 5-19 individuals
A (abundant) = 20-99 individuals
VA (very abundant) = 100-499 individuals
XA (extremely abundant) = 500 or more individuals

Macroinvertebrate Community Index (MCI) values were calculated for taxa present at each site (Stark 1985) with certain taxa scores modified in accordance with Taranaki experience.

A semi-quantitative MCI value, $SQMCI_S$ (Stark 1999) 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 scores, and dividing by the sum of the loading factors. 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).

Results and discussion

This survey was performed on 18 February 2014 during a period of late summer low, recession flow, 28 days after a fresh in excess of 3x median flow and 44 days after a fresh in excess of 7x median flow. It followed a relatively dry late summer period when only four freshes were recorded over the preceding six week period. River flow at Skinner Road was 0.94 m^3/sec representing a flow well below the average monthly mean February flow (2.78 m^3/sec) but above the minimum mean monthly flow for February (0.64 m^3/sec) recorded for the period 1978-2013.

Periphyton mats were widespread at all sites except the furthest downstream site 5 where they were patchy. Patchy filamentous algae were present at all five sites and moss was patchy at sites 3 and 5 from observations of the stony riffle substrates. River flow was slightly turbid and low at the two sites (1 and 2) adjacent to the discharge site where water temperatures recorded (at the time of this mid morning survey) were 16.9 C (site 1) and 16.6 C (site 2) during a period when the power station peaker plant cooling water discharges to the river were occurring.

Both peaker plants had been operated almost daily since 27 January 2014 and before then one peaker plant almost daily since 1 December 2013. The (main) combined cycle plant had been shut down since the end of November 2013.

River flow was low, uncoloured, and slightly cloudy at the three sites (3, 4, & 5) downstream from the Kahouri Stream confluence, where water temperatures ranged from 16.6 C to 20.3 C at these three sites at the time of this mid to late morning survey.

Macroinvertebrate communities

Prior to the establishment of the Contact Energy Ltd's programme, biomonitoring surveys had been performed at site 1 (in association with other consents' monitoring programmes) and site 3 (SEM and investigation programmes). Site 2 was established specifically for the purpose of the Contact Energy Ltd consent monitoring programme and sampled initially in spring 1998. The two lower sites (sites 4 and 5) had been surveyed on fewer previous occasions, principally for environmental assessment purposes. A summary of the results of these previous surveys and the existing programme's results are presented in Table 2 (Note: The results of surveys at sites 4 and 5 performed by Cawthron are not included in this summary but are presented and discussed in TRC report CF251).

Table 2 Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1992 and November 2013

Site	No of surveys	Taxa no		MCI values		Survey of February 2014	
		Range	Median	Range	Median	Taxa No.	MCI
1	38	17-31	24	82-116	98	24	100
2	31	14-33	22	86-111	98	22	100
3	39	15-33	24	86-105	98	21	91
4	24	16-30	22	82-102	95	23	101
5	24	15-26	22	82-102	94	22	99

The macroinvertebrate fauna results from the present survey are presented in Table 3, with various survey results since 1992 illustrated in Figure 2.

Sites in the vicinity of the power station outfall (sites 1 and 2)

A narrow range of taxa richnesses (22 to 24 taxa) was recorded at sites 1 and 2 immediately upstream and downstream of the discharge. These taxa numbers were identical with median richnesses previously surveyed at each site (Table 1 and Figure 2). These numbers were from 1 to 3 taxa fewer than the median (25) taxa richness previously recorded from 170 surveys of 'control' sites at similar altitudes (250 to 300 m asl) in Taranaki ring plain rivers and streams sourced within the National Park (TRC, 1999 (updated, 2013)).

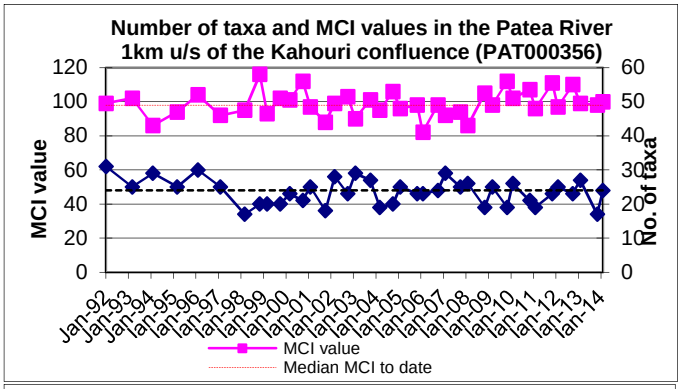
The characteristic taxa in this short reach of the river included one 'highly sensitive' taxon [very abundant mayfly (*Deleatidium*)]; up to five 'moderately sensitive' taxa [mayfly (*Coloburiscus*), dobsonfly (*Archichauliodes*), free-living caddisflies (*Costachorema* and *Hydrobiosis)*, and cranefly (*Aphrophila*)]; and up to five 'tolerant' taxa [oligochaete worms, net-building caddisfly (*Aoteapsyche*), and midges (*Maoridiamesa* and orthoclads), and muscid flies]. This dominance represented several changes from the community dominance at the time of the previous spring survey when three fewer 'moderately sensitive' taxa and two fewer 'tolerant' taxa were dominant numerically following a higher flow period. Only one significant difference in individual taxon abundance was recorded between sites 1 and 2, which together with some decreased numerical abundances of 'tolerant' taxa at site 2, accounted for the relatively similar $SQMCI_s$ values which increased by 0.6 unit at sites 2 (Table 3).

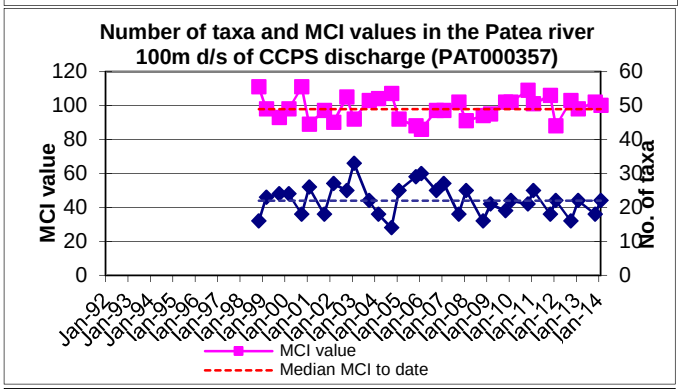
Table 3 Macroinvertebrate fauna of the Patea River in relation to Stratford Power Ltd sampled on 18 February 2014

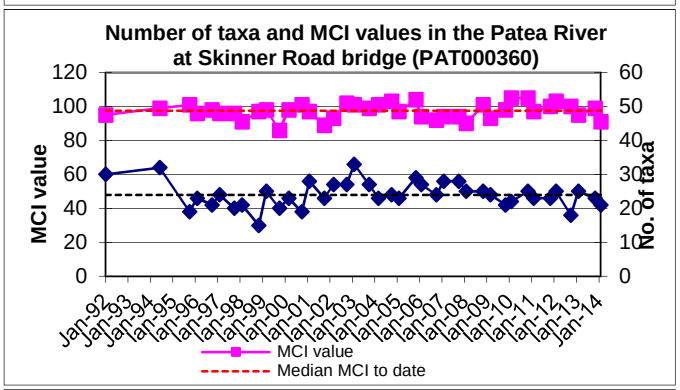
Taxa List	Site Number	MCI score	1	2	3	4	5
	Site Code		PAT000356	PAT000357	PAT000360	PAT000397	PAT000430
	Sample Number		FWB14131	FWB14132	FWB14133	FWB14134	FWB14135
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	-	-	R	-	-
NEMERTEA	Nemertea	3	-	-	R	-	R
NEMATODA	Nematoda	3	-	-	-	R	-
ANNELIDA (WORMS)	Oligochaeta	1	A	A	C	A	R
MOLLUSCA	*Potamopyrgus*	4	R	-	R	A	A
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	R	R	-	A	A
	Coloburiscus	7	A	A	C	C	R
	Deleatidium	8	VA	VA	VA	XA	VA
	Nesameletus	9	C	C	-	C	-
	Zephlebia group	7	-	-	-	-	R
PLECOPTERA (STONEFLIES)	*Zelandoperla*	8	R	R	-	R	R
COLEOPTERA (BEETLES)	Elmidae	6	C	C	VA	VA	A
	Hydraenidae	8	C	C	R	R	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	A	C	A	A	C
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	XA	VA	XA	XA	VA
	Costachorema	7	A	A	A	A	A
	Hydrobiosis	5	A	C	A	A	A
	Neurochorema	6	-	-	R	-	-
	Confluens	5	-	-	R	-	-
	Oxyethira	2	R	R	-	-	-
	Pycnocentrodes	5	R	R	-	C	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	A	A	A	C	VA
	Eriopterini	5	-	-	-	R	-
	Maoridiamesa	3	VA	VA	VA	VA	VA
	Orthocladiinae	2	VA	A	A	A	A
	Tanypodinae	5	R	-	-	-	-
	Tanytarsini	3	C	C	C	A	A
	Empididae	3	C	C	C	C	R
	Ephydridae	4	-	C	-	-	-
	Muscidae	3	A	C	C	R	C
	Austrosimulium	3	C	C	R	R	R
ACARINA (MITES)	Acarina	5	R	-	-	-	-
		No of taxa	24	22	21	23	22
		MCI	100	100	91	101	99
		SQMCIs	4.3	4.9	4.7	5.6	5.0
		EPT (taxa)	9	9	7	9	9
		%EPT (taxa)	38	41	33	39	41

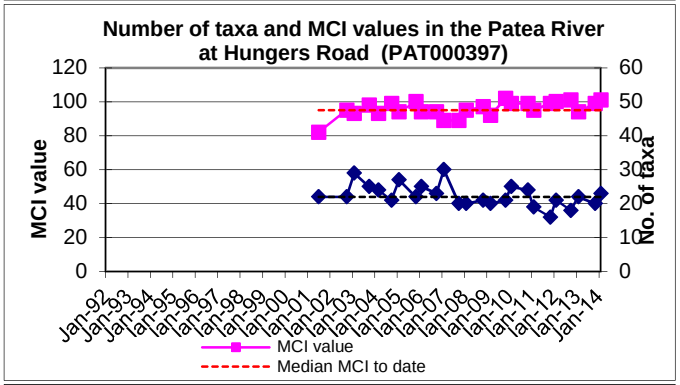
'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

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


Number of taxa and MCI values in the Patea River
1km u/s of the Kahouri confluence (PAT000356)
MCI value
No. of taxa
MCI value
Median MCI to date


Number of taxa and MCI values in the Patea river
100m d/s of CCPS discharge (PAT000357)
MCI value
No. of taxa
MCI value
Median MCI to date


Number of taxa and MCI values in the Patea River
at Skinner Road bridge (PAT000360)
MCI value
No. of taxa
MCI value
Median MCI to date


Number of taxa and MCI values in the Patea River
at Hungers Road (PAT000397)
MCI value
No. of taxa
MCI value
Median MCI to date

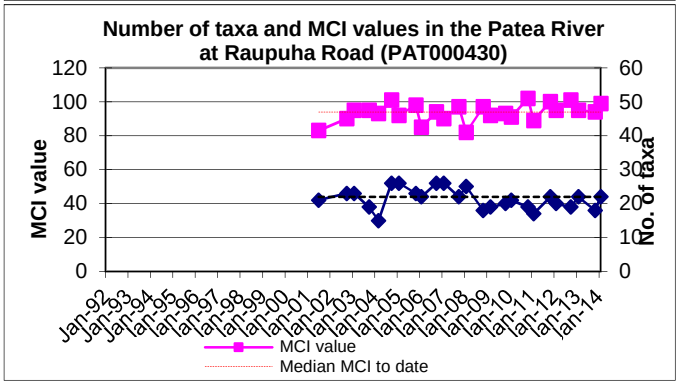

Number of taxa and MCI values in the Patea River
at Raupuha Road (PAT000430)
MCI value
No. of taxa
MCI value
Median MCI to date

Figure 3 Taxa richness and MCI scores recorded to date at each of the five Patea River sites

The presence of four 'highly sensitive' taxa, one of which was very abundant, in this reach of the Patea River, was an indication of generally good physicochemical water quality conditions preceding the survey under low flow conditions following a dry late summer period and in the presence of relatively widespread periphyton substrate cover which could be expected to have had an impact on physical habitat. However, improved treated wastewater quality (and moderate dilution) of the upgraded Stratford municipal WWTP discharge, may have contributed to these conditions on occasions (see reports CF526, CF545, and CF575).

MCI scores (Tables 2 and 3) reflected the moderate proportion (55 to 58% of taxa richness) of 'sensitive' taxa in the communities at both sites, with the scores recorded (100 units) two units higher than the medians of scores previously recorded at both sites (Table 1). The scores also reflected the relative similarity in community composition between sites as reflected by the 21 shared taxa (of a total 25 taxa) between sites. These scores categorised these sites as having 'good' river health (TRC, 2014) at the time of this summer survey. However, they were 10 units lower than the predicted MCI score for National Park-sourced ringplain sites at an altitude of 250m asl but equal with the predicted MCI scores for these sites, at distances of 17.2 km and 17.4 km respectively downstream of the National Park boundary (Stark and Fowles, 2009).

The MCI scores at these two sites showed no downstream decrease in scores (which were identical) which was indicative of no recent impacts of any cooling water discharge on the macroinvertebrate fauna of the Patea River at the periphery of the permitted mixing zone. These identical MCI scores between adjacent sites reflected the high degree of similarity in community composition between sites.

Sites in the reach between Skinner Road and Raupuha Road (sites 3, 4 and 5)

Taxa numbers at these three sites had a very narrow range of moderate richnesses (21 to 23 taxa), which were within three taxa of historical medians at these sites (Table 2). They were also very similar to median richnesses (20 and 23 taxa) previously recorded by surveys of 'control' sites at similar altitudes (155 to 199 m asl and 200 to 249 m asl) in Taranaki ringplain rivers and streams sourced within the National Park (TRC, 1999 (updated 2013)).

The characteristic taxa within this 23 km reach of the Patea River included one 'highly sensitive' taxon [very to extremely abundant mayfly (*Deleatidium*)]; up to six 'moderately sensitive' taxa [mayfly (*Austroclima*), elmid beetles, dobsonfly (*Archichauliodes*), free-living caddisflies (*Hydrobiosis* and *Costachorema*), and cranefly (*Aphrophila*)]; and up to six 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), net-building caddisfly (*Aoteapsyche*), and midges (orthoclads, tanytarsids, and *Maoridiamesa*)]. The similar relatively widespread periphyton cover on the riverbed to that recorded upstream (at sites 1 & 2) coincided with decreased abundances within a few of the more 'sensitive' taxa and, in particular, increases in abundances of 'tolerant' snails and some midges in a downstream direction. This resulted in a very small decrease of 0.2 $SQMCI_s$ unit between sites 2 and 3. However, only a few significant differences in individual taxon abundances between adjacent sites were recorded further downstream along this river reach which accounted for the variation in $SQMCI_S$

scores of 0.9 unit between sites 3 and 4, and 0.6 unit between sites 4 and 5. The improvement in $SQMCI_s$ score between sites 3 and 4 was due to increased abundances of 'sensitive' mayflies.

The increase in downstream proportion of lower scoring 'tolerant' taxa (52% of total taxa) in the community at site 3, and very small decreases (43% and 46% of total taxa) at sites 4 and 5 were reflected in the MCI scores (91, 101, and 99 units) recorded through this reach of the mid Patea River. These scores were an insignificant 7 units lower (site 3) to 6 units higher than the medians of scores previously recorded at each of the three sites (Table 1) and from 8 units lower to 5 units higher than those recorded by the previous spring survey which was undertaken under higher flow conditions. The scores recorded at these three sites by this survey varied by an insignificant 10 units through the reach of the river surveyed with a 9 unit decrease immediately downstream of the Kahouri Stream confluence (at site 3). These scores categorised the sites as having 'fair' to 'good' river health (TRC, 2014) at the time of this summer survey. They were a significant 18 units and an insignificant 4 and 2 units lower (sites 3, 4, and 5) than the predicted MCI scores for National Park-sourced ringplain sites at altitudes of 160 to 240m asl but an insignificant 8 units lower (site 3) to 7 units (site 4) and 9 units higher (site 5) than the predicted MCI scores for these sites, 19.2 km to 42.1 km downstream of the National Park boundary (Stark and Fowles, 2009).

The atypical increase in MCI scores between sites 3 and 5 and small decrease between sites 4 and 5 (0.15 unit/km) were dissimilar to the predicted downstream MCI decrease (an average rate of 0.3 to 0.4 units per km) predicted for this reach of a Taranaki ringplain stream (Stark and Fowles, 2009). Observations in this reach of the river, and particularly below the Skinner Road site (site 3), have indicated that riffles tended to be shorter and/or deeper than those typical of the upper reaches of the river (particularly upstream of the Kahouri Stream confluence), where the 'more sensitive' (particularly mayfly and stonefly) taxa often are a more common component of the macroinvertebrate communities (TRC, 2001). An improvement in MCI scores was found between sites 3 and 4 and only a small decrease between sites 4 and 5 resulted in an overall atypical increase of 8 units over this reach (23km) and only one unit decrease over the total reach (25km) of the river surveyed, which was due to very similar scores upstream of the Kahouri Stream confluence. This overall rate of decrease equated to < 0.05 MCI unit/km, much lower than that predicted for this reach of the river.

Conclusions

This twenty-ninth biomonitoring survey performed in relation to the discharge of cooling water from the power station indicated no significant impacts of recent discharges upon the biological communities of the Patea River in the vicinity of the discharge outfall east of Stratford during a period of low recession flow conditions following a dry mid-summer. Macroinvertebrate community richness and MCI scores typical of habitats with moderate periphyton substrate cover were within ranges of results previously recorded, equal with median richnesses, and slightly above median MCI scores coincident with low flow conditions. There were minimal subtle differences in community compositions between sites resulting in no difference in the MCI score recorded at the periphery of the permitted discharge mixing zone in comparison with the upstream 'control' site.

Biomonitoring performed at sites further downstream in the river has continued for the purpose of establishing baseline information in relation to the proposed expansion of the

power station. Moderate community richnesses were found at the three sites in the 23 km reach between Skinner Road and Raupuha Road (where the principal effects of future water abstraction would be expected to occur), and community composition showed only a few changes from communities found at sites 1 and 2, upstream of the Kahouri Stream confluence . Of the total of 32 taxa found over the entire reach of the river surveyed (compared with 36 taxa in the previous summer and 30 taxa in spring 2013), 21 taxa were present at one or more sites in both of the two reaches above and below the Kahouri Stream confluence. A relatively high proportion of these (16 taxa) was present at all five sites along the reach surveyed, of which one 'highly sensitive', five 'moderately sensitive', and four 'tolerant' taxa were abundant at a minimum of three of the sites. One 'highly sensitive' taxon (mayfly), one 'moderately sensitive' taxon (caddisfly), and three 'tolerant' taxa (caddisfly and two midges) were abundant at all five sites; more typical of the number of taxa which have been uniformly characteristic of these sites' communities from time to time in past surveys and coincident with more extensive substrate periphyton cover conditions following a dry mid-summer period.

A relationship between MCI score and distance from the National Park established for National Park-sourced ringplain rivers and streams from Taranaki Regional Council data (Stark and Fowles, 2009) indicates that MCI values for the three sites (3, 4 and 5) in this reach of the mid-Patea River survey are expected to range between 90 and 99 units. Therefore, the results of this survey found a lower than expected score at site 3 but higher than typical range of scores for those expected in the mid-Patea River reaches below Skinner Road, during a period of low summer flow conditions and relatively extensive periphyton substrate cover following a dry mid-summer period.

The general trend in MCI scores found throughout the reach of the river at the time of this late summer survey, which were not significantly different in comparison with similar reaches of rivers elsewhere in Taranaki, also reflected a relatively limited influence of the major point source municipal oxidation ponds system discharge to the river some 3 km upstream (see report CF604) following the relatively recent upgrading of the Stratford municipal WWTP system

Biannual biomonitoring surveys will form a component of future monitoring programmes associated with consents granted to the Contact Energy Ltd's combined cycle power station and will be integrated into other existing consents and state of the environment monitoring programmes. They will also continue to provide baseline information for the assessment of future effects of increased abstraction and cooling water discharge in the mid reaches of the Patea River with the consented expansion of the Stratford power station.

Summary

The Council's standard 'kick-sampling' technique was used at five established sites to collect streambed macroinvertebrates from the Patea River. Samples were sorted and identified to provide number of taxa (richness) and 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 abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly 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 late summer macroinvertebrate survey undertaken following periods of power station peaker plant discharges, indicated that recent discharges of treated cooling water from the Contact Energy Ltd's site had not had any significant detrimental effect on the macroinvertebrate communities of the river. No significant changes in the macroinvertebrate communities were recorded between the upstream 'control' site and site immediately downstream of the discharge

The macroinvertebrate communities in the reach of the Patea River adjacent to the discharge contained moderately high proportions of 'sensitive' taxa at both sites (typical of summer lower flow conditions) whereas the communities further downstream (below the Kahouri Stream confluence) were dominated by higher numbers of both 'moderately sensitive' and 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) tended to be higher at the time of this summer survey and MCI scores insignificantly different compared to those of the previous spring 2013 survey.

MCI and $SQMCI_S$ scores indicate that the stream communities throughout the entire river reach were of 'fair' to 'good' generic health and generally in the condition predicted for similar sites in other Taranaki ringplain rivers, following a period of low flow conditions following a dry mid-summer.

Biomonitoring at three sites further downstream in the Patea River, for the establishment of baseline conditions in relation to consented power station expansion, found relatively similar community compositions to those monitored in the vicinity of the cooling water discharges with few significant changes in individual taxon abundances recorded. Downstream increases in the $SQMCI_s$ values through the reach below the Skinner Road site were atypical of past results. With the exception of the Skinner Road site (3), MCI scores were slightly higher than historical median values at all sites and typical of communities at these distances from the National Park, despite the survey coinciding with more extensive periphyton substrate cover following a dry period in mid-summer.

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To	Job Manager, J Kitto
From	Scientific Officer, B Jansma
Doc No	1287287
Report No	BJ219
Date	6 December 2013

Biomonitoring of the Kahouri Stream in relation to the Contact Energy sites, East Road, June 2013

Introduction

This survey fulfilled one of two biological components of the 2012-2013 monitoring programme for the Contact Energy site located on East Road, Stratford. It was performed to determine whether or not consented stormwater discharges from the site had had any recent detrimental effect upon the macroinvertebrate communities of the Kahouri stream. The monitoring related to the following consents:

Contact Energy Limited	3939 to discharge stormwater; 4459 to discharge stormwater;

The results of biological surveys performed in the Kahouri Stream since 1996 are discussed in various reports referenced at the end of this report.

The other biological component of the monitoring programme, in relation to the abstraction of water from and the discharge of effluent to the Patea River, is reported on separately.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from two established sites in the Kahouri Stream, (Table 1, Figure 1) on 12 June 2013. 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).

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 as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

Table 1 Biomonitoring sites in the Kahouri Stream sampled in relation to the Contact Energy site.

Site No.	Site code	Location
1	KHI000457	Kahouri Stream, upstream of the Contact Energy site
2	KHI000480	Kahouri Stream, downstream of the Contact Energy site

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. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value.

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) inhabit less polluted waterways. The use of this index in non-stony streams is possible if results are related to physical habitat (good quality muddy/weedy sites tend to produce lower MCI values than good quality stony sites).

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, therefore $SQMCI_s$ values range from 1 to 10, while MCI values range from 20 to 200.

Figure 1 Kahouri Stream Sites sampled for macroinvertebrates, in relation to the Contact Energy site.

Results and discussion

At the time of this mid-afternoon survey the Kahouri Stream flow had a moderate flow, due to frequent rainfall events preceding this survey. The last flood event of three times the median flow or greater occurred 7 days prior to the sampling date, and the stream was still in recession as a result. A swift, cloudy but uncoloured flow was sampled at each site.

The stream bed material at site 1 comprised predominantly gravels and cobbles, and a minor component of silt, sand and boulder. Site 2 was very similar, with only slightly more cobble and boulder, and slightly less fine and coarse gravel than that sampled at site 1. Due to the recent flood, periphyton growth was reduced, being slippery at both sites. Neither site supported any filamentous algae. An important change observed during this survey was that site 1 had experienced significant disturbance since the last survey, with the installation of a pipeline used for the conveyance of hydrocarbons. This resulted in a complete change in the stream bed, and a total loss of shading, from a site which was previously stable and completely shaded.

Water temperatures recorded in the Kahouri Stream during this survey ranged from 12.1˚C at site 1 to 12.3 ˚C at site 2.

Macroinvertebrate communities

Previous surveys performed in the Kahouri Stream have indicated that the macroinvertebrate communities are generally in good condition with relatively high numbers of taxa and MCI values. Results of previous surveys performed at sites 1 and 2 are summarised in Table 2, together with current results and the full results are shown in Table 3.

Table 2 Summary of the numbers of taxa and MCI values recorded previously in the Kahouri Stream and tributaries, together with current results

Site	Number of previous surveys	Numbers of taxa			MCI values			$SQMCI_S$ values (14 previous surveys only)		
		Median	Range	Current Survey	Median	Range	Current Survey	Median	Range	Current Survey
1	19	23	18-31	20	99	87-112	109	5.3	2.3-7.4	7.6
2	26	24	6-34	25	95	73-104	103	4.8	3.8-7.5	6.7

Site 1: Kahouri Stream (KHI000457)

This site, immediately upstream of the Stratford Power Station (elevation: 270 m asl), had a moderate community richness of 20 taxa, three taxa less than the historical median (Table 3). Only three 'highly sensitive' taxa were present (indicative of good water quality conditions), one of which was extremely abundant (*Deleatidium* mayfly), dominating the community with only one other taxon, the 'moderately sensitive' mayfly *Coloburiscus* also being recorded as abundant. This reduced number of 'highly sensitive' taxa and reduced number of abundant taxa is probably a reflection of the habitat disturbance related to the installation of the pipeline, from which the community had not yet fully recovered. However, the two taxa recorded in abundance are often recorded in abundance at this site. The $SQMCI_S$ score (7.6) reflects the dominance of *Deleatidium* mayfly, and although it indicates that preceding water quality conditions had been very good, it is also a reflection of the recent flood and disturbance works. This is supported by the fact that this is the highest $SQMCI_S$ score recorded at this site to date, and by a comparison with the long term median of 5.3 units, a significant 2.3 units lower than the current score (Table 2) (Stark, 1998). This is the fifth consecutive survey to record a high $SQMCI_S$ score.

Table 3 Macroinvertebrate fauna of the Kahouri Stream (sites 1 & 2) during the current survey.

Taxa List	Site Number	MCI score	1	2
	Site Code		KHI000457	KHI000480
	Sample Number		FWB13212	FWB13213
PLATYHELMINTHES (FLATWORMS)	*Cura*	3	-	R
ANNELIDA (WORMS)	Oligochaeta	1	C	A
MOLLUSCA	*Potamopyrgus*	4	R	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	R	R
	Coloburiscus	7	VA	VA
	Deleatidium	8	XA	XA
	Ichthybotus	8	-	R
	Nesameletus	9	C	-
	Zephlebia group	7	R	R
PLECOPTERA (STONEFLIES)	*Zelandobius*	5	C	R
COLEOPTERA (BEETLES)	Elmidae	6	C	VA
	Hydraenidae	8	-	C
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	C	A
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	C	VA
	Costachorema	7	C	C
	Hydrobiosis	5	R	C
	Orthopsyche	9	R	-
	Beraeoptera	8	-	R
	Confluens	5	R	C
	Oxyethira	2	-	R
	Pycnocentrodes	5	C	C
DIPTERA (TRUE FLIES)	*Aphrophila*	5	C	VA
	Eriopterini	5	-	C
	Maoridiamesa	3	-	C
	Orthocladiinae	2	C	C
	Polypedilum	3	C	-
	Muscidae	3	-	C
	Austrosimulium	3	R	-
	Tanyderidae	4	-	R
		No of taxa	20	25
		MCI	109	103
		SQMCIs	7.6	6.7
		EPT (taxa)	12	12
		%EPT (taxa)	60	48

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

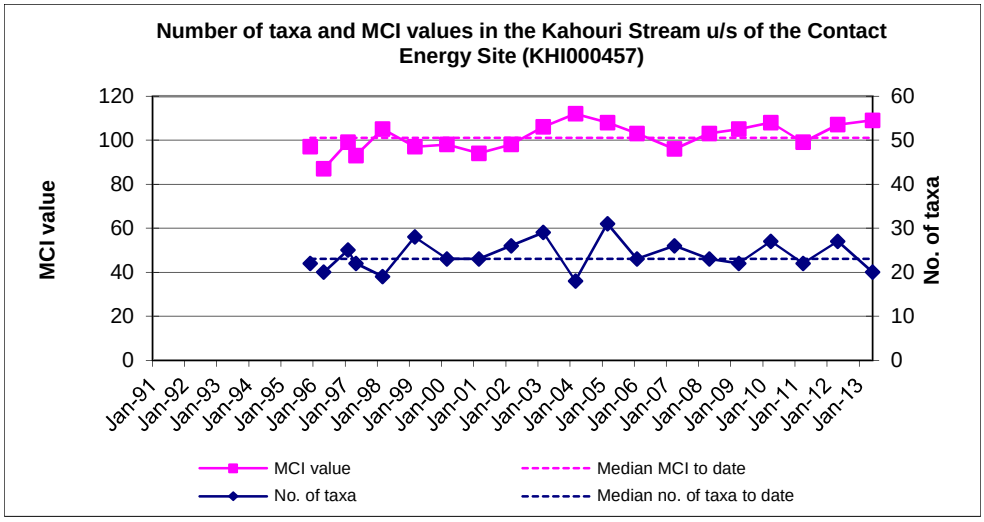

Figure 2 Number of taxa and MCI values in the Kahouri Stream at site 1 (KHI000457)

The community at site 1 had a moderately high proportion of 'sensitive' taxa (70% of total richness), which was reflected in the MCI score of 109 units, ten units higher than the long term median score (Table 3). This MCI score was thirteen units higher than the predicted MCI score for streams sourced outside of the National Park at an altitude of 270m asl (Stark and Fowles, 2009). Overall, these results indicate that 'good' water quality preceded this survey at this site, located upstream of the Contact Energy site.

Site 2: Kahouri Stream (KHI000480)

This lower catchment site, located immediately upstream of the confluence with the Piakau Stream, had a slightly higher community richness of 25 taxa. This was one taxon more than the median richness recorded by previous surveys (Table 2) and within the range of previous records, and five taxa more than that recorded upstream.

Four 'highly sensitive' taxa (indicative of good water quality conditions) were present at this site, and one was present in extreme abundance (*Deleatidium* mayfly). Other taxa characteristic of this site's community (Table 3) included four 'moderately sensitive' taxa (*Coloburiscus* mayfly, elmid beetles, *Archichauliodes* dobsonfly and *Aphrophila* cranefly), and two 'tolerant' taxa (oligochaete worms and *Aoteapsyche* caddisfly); similar to that recorded in the previous survey. The higher number of taxa recorded in abundance at this site, when compared with site 1 upstream, reflects the stability of this site, and contrasts well with the disturbance recently experienced at site 1.

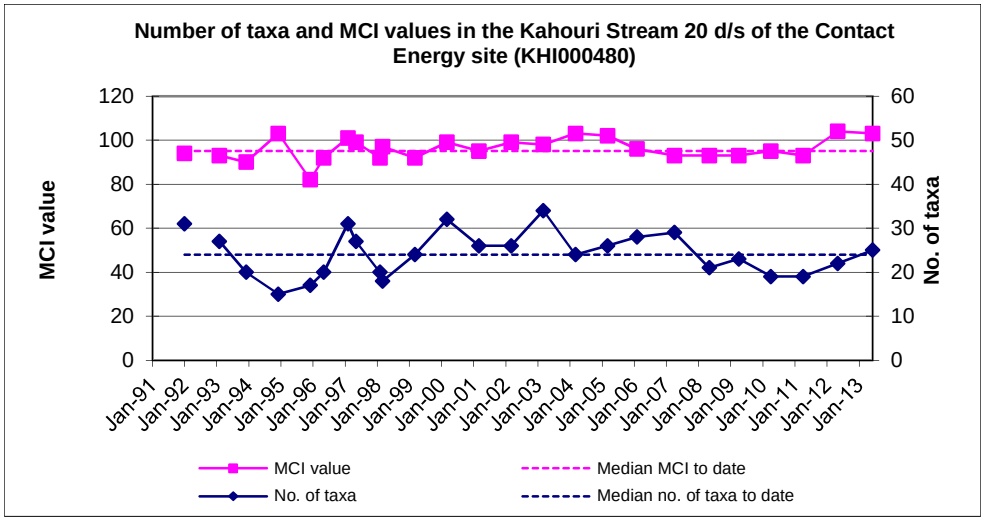

Figure 3 Number of taxa and MCI values in the Kahouri Stream at site 2 (KHI000480)

Nine significant differences in individual taxon abundances were found between sites 1 and 2, most being increases in abundance. This also reflects the impact of the disturbance works at site 1, and the stable habitat at site 2. As a result there was a statistically significant drop in $SQMCI_S$ score (Stark, 1998), which decreased by 0.9 units from site 1. However, like that recorded at site 1, this score (7.5) was significantly higher than the median for this site, and was equal to the second highest recorded at this site to date (Table 2). In addition, the MCI score was only six units lower than that recorded at site 1 upstream, reflective of the similar composition of the two communities. This score was eight units higher than the median for this site, and similar to that recorded in the previous year (Figure 3, Table 2). In addition, this MCI score was eight units higher than the predicted MCI score for streams sourced outside of the National Park at an altitude of 250m asl (Stark and Fowles, 2009). Overall, the MCI and $SQMCI_S$ scores did not indicate any deterioration at this site.

Conclusions

This late autumn 2013 biomonitoring survey of the Kahouri Stream that receives stormwater from the Contact Energy site on East Road was undertaken during receding flows, seven days following a minor flood. Results indicated that the stormwater discharges had not had an impact on the macroinvertebrate communities of the stream. The MCI score did not change significantly from site 1 to site 2. Although the $SQMCI_S$ score did drop significantly, this is considered to be a result of the disturbance works noted at site 1, rather than deterioration at site 2. In addition, the MCI scores at both sites were higher than their respective median MCI scores, and for the predicted MCI scores for streams sourced outside of the National Park at an altitude of 250-270 metres. Overall, the scores at both sites were reflective of good preceding water quality, with no discernible impact from the Contact Energy Site.

Summary

The Council's standard 'kick-sampling' technique was used at two sites to collect streambed macroinvertebrates from the Kahouri Stream on 12 June 2013 to determine whether or not consented stormwater discharges from the Contact Energy site had had any recent detrimental effect upon the macroinvertebrate communities of the Kahouri stream. Samples were sorted and identified to provide the 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. It may be used in soft-bottomed streams to detect trends over time. The $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly if non-organic impacts are occurring.

Significant differences in either MCI or $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of discharges being monitored.

This late autumn macroinvertebrate survey indicated that the discharge of stormwater from the Contact Energy site had not had any significant detrimental effect on the macroinvertebrate communities of the stream, in comparison with historical results and also predicted MCI scores.

The macroinvertebrate communities of the stream contained a moderately high proportion of 'sensitive' taxa, with some 'highly sensitive' taxa also recorded, one in extreme abundance at both sites. At both sites taxonomic richness (number of taxa) and MCI scores did not differ significantly from the medians of previous surveys. There was some improvement in the $SQMCI_S$ score at both sites, as both recorded scores significantly higher than their respective median score. This was principally due to the 'highly sensitive' mayfly *Deleatidium* being extremely abundant, which is most likely attributable to the short period of time since a flood (seven days).

The results at site 1 did reflect a minor lingering impact of the disturbance works associated with the installation of a pipeline used to convey hydrocarbons, which preceded this survey.

MCI and $SQMCI_S$ scores indicated that the stream communities were of good 'health' and typical of communities in ring plain streams that are sourced outside of the National Park. Overall, the results do not indicate any discernible impact from the Contact Energy Site.

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To	Job Manager, J Kitto
From	Scientific Officers, B Jansma and CR Fowles
Doc No	1398032
Report No	CF616
Date	3 September 2014

Biomonitoring of the Kahouri Stream in relation to the Contact Energy sites, East Road, February 2014

Introduction

This survey fulfilled one of two biological components of the 2013-2014 monitoring programme for the Contact Energy site located on East Road, Stratford. It was performed to determine whether or not consented stormwater discharges from the site had had any recent detrimental effect upon the macroinvertebrate communities of the Kahouri Stream. The monitoring related to the consents (3939 and 4459) held by Contact Energy Limited to discharge stormwater to the Kahouri Stream.

The results of biological surveys performed in the Kahouri Stream since 1996 are discussed in various reports referenced at the end of this report.

The other biological component of the monitoring programme, in relation to the abstraction of water from and the discharge of effluent to the Patea River, is reported on separately (see CF605).

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from two established sites in the Kahouri Stream, (Table 1, Figure 1) on 25 February 2014. 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).

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 as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

Table 1 Biomonitoring sites in the Kahouri Stream sampled in relation to the Contact Energy site.

Site No.	Site code	Location	GPS location
1	KHI000457	Kahouri Stream, upstream of the Contact Energy site	E 1713512 N 5645931
2	KHI000480	Kahouri Stream, 20 m upstream of the Piakau Stream confluence	E 1714880 N 5645282

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. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value.

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) inhabit less polluted waterways. The use of this index in non-stony streams is possible if results are related to physical habitat (good quality muddy/weedy sites tend to produce lower MCI values than good quality stony sites).

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, therefore $SQMCI_s$ values range from 1 to 10, while MCI values range from 20 to 200.

Figure 1 Kahouri Stream Sites sampled for macroinvertebrates, in relation to the Contact Energy site.

Results and discussion

At the time of this mid-morning survey the Kahouri Stream had a very low flow with the last flood event of three times the median flow or greater occurring 35 days prior to the sampling date. A swift, clear, uncoloured flow was sampled at each site.

The stream bed material at site 1 comprised predominantly gravels and cobbles, and a minor component of silt, sand and boulder. Site 2 was very similar, with only slightly more gravel, and less silt than that sampled at site 1. Despite the lack of recent floods, periphyton growth was patchy at both sites and neither site supported any filamentous algae. An important change observed at the time of the previous survey (June, 2013) was that site 1 had experienced significant disturbance since the May 2012 survey, with the installation of a pipeline used for the conveyance of hydrocarbons. This had resulted in a marked change in the stream bed and a total loss of shading from a site which was previously stable and completely shaded.

Water temperatures recorded in the Kahouri Stream during the present survey ranged from 13.1˚C at site 1 to 13.5 ˚C at site 2.

Macroinvertebrate communities

Previous surveys performed in the Kahouri Stream have indicated that the macroinvertebrate communities have generally been in good condition with relatively high numbers of taxa and MCI values. Results of previous surveys performed at sites 1 and 2 are summarised in Table 2, together with current results, and the full results are reported in Table 3.

Table 2 Summary of the numbers of taxa and MCI values recorded previously in the Kahouri Stream in relation to the Contact Energy site, together with the results of the current survey

Site	Number of previous surveys	Numbers of taxa			MCI values			$SQMCI_S$ values (15 previous surveys)		
		Median	Range	Current Survey	Median	Range	Current Survey	Median	Range	Current Survey
1	20	23	18-31	23	101	87-112	108	5.3	2.3-7.6	7.0
2	21	24	17-34	21	96	82-104	110	4.8	3.8-7.5	6.6

Site 1: Kahouri Stream (KHI000457)

This site, immediately upstream of the Stratford Power Station (elevation: 270 m asl), had a moderate community richness of 23 taxa, equivalent with the historical median richness (Table 3 and Figure 2). Four 'highly sensitive' taxa were present (indicative of good water quality conditions), while the community was characterised by two 'highly sensitive' taxa [extremely abundant mayfly (*Deleatidium*) and another mayfly (*Nesameletus*)]; four 'moderately sensitive' taxa [mayfly (*Coloburiscus*), elmid beetles, dobsonfly (*Archichauliodes*), and cranefly (*Aphrophila*)]; and one 'tolerant' taxon (net-building caddisfly (*Aoteapsyche*))]. This number of 'highly sensitive' taxa and improved number of abundant taxa were a reflection of a reduction in habitat disturbance related to the installation of the pipeline, from which the community appeared to have fully recovered subsequent to the previous survey. The $SQMCI_S$ score (7.0) reflected the dominance of 'sensitive' taxa, particularly the 'highly sensitive' mayfly taxon. The $SQMCI_S$ score was 1.7 units above the long term median of 5.3 units (Table 2) and was the sixth consecutive survey to record a high $SQMCI_S$ score.

Table 3 Macroinvertebrate fauna of the Kahouri Stream (sites 1 & 2) in relation to Contact Energy, East Road during the survey of 25 February 2014

Taxa List	Site Number	MCI score	1	2
	Site Code		KHI000457	KHI000480
	Sample Number		FWB14168	FWB14169
ANNELIDA (WORMS)	Oligochaeta	1	R	C
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	C	C
	Coloburiscus	7	A	VA
	Deleatidium	8	XA	XA
	Nesameletus	9	A	C
PLECOPTERA (STONEFLIES)	*Zelandobius*	5	R	-
	Zelandoperla	8	-	R
COLEOPTERA (BEETLES)	Elmidae	6	VA	XA
	Hydraenidae	8	R	R
	Ptilodactylidae	8	-	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	A	A
TRICHOPTERA (CADDISFLIES)	*Aoteapsyche*	4	VA	VA
	Costachorema	7	C	C
	Hydrobiosis	5	C	C
	Beraeoptera	8	R	-
	Oxyethira	2	R	-
	Pycnocentria	7	R	-
	Pycnocentrodes	5	R	R
DIPTERA (TRUE FLIES)	*Aphrophila*	5	A	VA
	Eriopterini	5	R	R
	Harrisius	6	R	-
	Maoridiamesa	3	-	C
	Orthocladiinae	2	C	C
	Polypedilum	3	R	-
	Tanytarsini	3	R	-
	Muscidae	3	-	C
	Austrosimulium	3	-	R
	Tanyderidae	4	R	R
		No of taxa	23	21
		MCI	108	110
		SQMCIs	7.0	6.6
		EPT (taxa)	11	9
		%EPT (taxa)	48	43

'Tolerant' taxa	'Moderately sensitive' taxa	'Highly sensitive' taxa

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

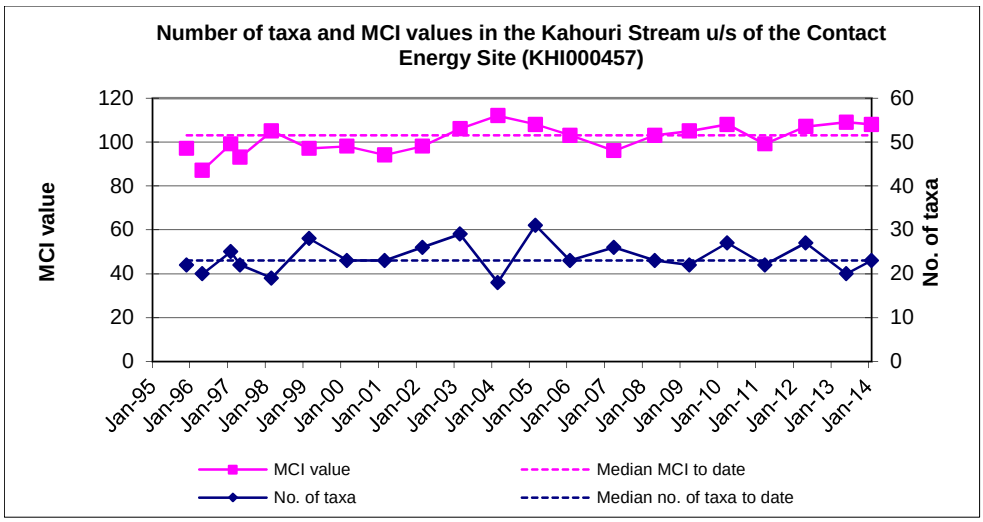

Figure 2 Number of taxa and MCI values in the Kahouri Stream at site 1 (KHI000457)

The community at site 1 had a relatively high proportion of 'sensitive' taxa (70% of total richness) which was reflected in the MCI score of 108 units, seven units higher than the long term median score (Table 3). This MCI score was an insignificant four units lower than the predicted MCI score for streams sourced within the National Park at an altitude of 270m asl and 7 units above the predicted score for a site 14.9 km downstream from the Park boundary (Stark and Fowles, 2009). Overall, the 'good' generic biological health (TRC, 2014) of the community indicated that 'good' physicochemical water quality conditions preceded the survey at this site, located upstream of the Contact Energy site.

Site 2: Kahouri Stream (KHI000480)

This lower catchment site, located immediately upstream of the confluence with the Piakau Stream, had a slightly lower community richness of 21 taxa. This was three taxa fewer than the median richness recorded by previous surveys (Table 2 and Figure 3) and within the range of previous records, and two taxa less than the richness recorded upstream.

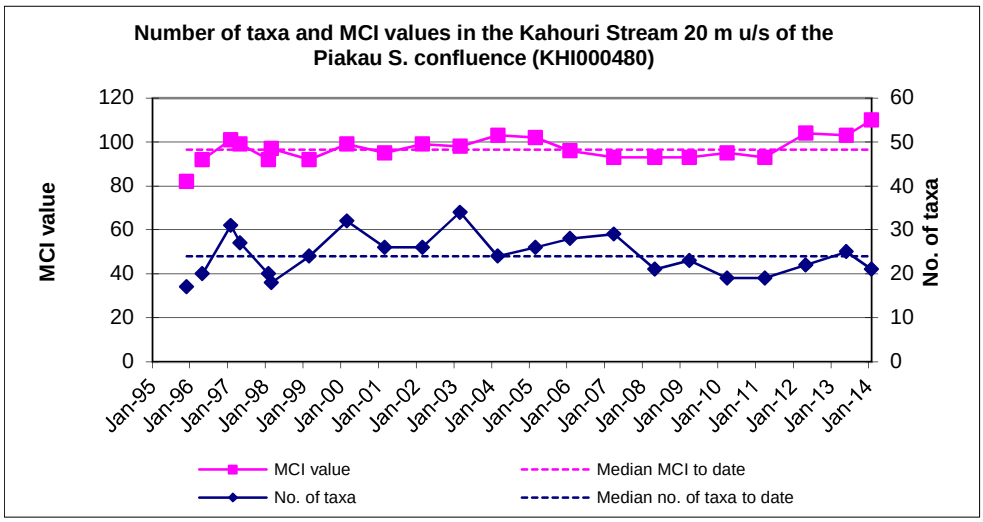

Figure 3 Number of taxa and MCI values in the Kahouri Stream at site 2 (KHI000480)

Five 'highly sensitive' taxa (indicative of good habitat quality conditions) were present at this site and one was extremely abundant. The taxa characteristic of this site's community (Table 3) included one 'highly sensitive' taxon [extremely abundant mayfly (*Deleatidium*)]; four 'moderately sensitive' taxa [mayfly (*Coloburiscus*), extremely abundant elmid beetles, dobsonfly (*Archichauliodes*), and cranefly (*Aphrophila*)]; and one 'tolerant' taxon [net-building caddisfly (*Aoteapsyche*)]: a very similar characteristic community to that at the upstream site.

Only two significant differences in individual taxon abundances were found between sites 1 and 2, these being increases in abundances of two 'tolerant' taxa. As a result there was minimal change in $SQMCI_S$ score, which decreased by 0.4 unit between sites 1 and 2. However, this $SQMCI_S$ score (6.6 units) was significantly higher than the median for this site, and was one of the highest recorded at this site to date (Table 2). The MCI score was two units higher than that recorded at site 1 upstream, reflective of the similar composition of the two communities. This score was a significant (Stark, 1998) 14 units higher than the median for this site, and the highest (by 6 units) recorded to date at this site (**Error! Reference source not found.**, Table 2). In addition, this MCI score was equal with the predicted MCI score for streams sourced within the National Park at an altitude of 250m asl and 10 units above the predicted score for a site 17.4 km downstream of the Park boundary (Stark and Fowles, 2009). Overall, the MCI and $SQMCI_S$ scores did not indicate any deterioration in the 'good' generic biological health of the community at this site.

Conclusions

This late summer 2014 biomonitoring survey of the Kahouri Stream that receives stormwater from the Contact Energy site on East Road was undertaken during a low flow period, thirty-five days following a minor flood. Results indicated that the stormwater discharges had not had an impact on the macroinvertebrate communities of the stream. The MCI score did not change significantly from site 1 to site 2. A small but insignificant downstream decrease in $SQMCI_s$ score was indicative of the similarity in characteristic community composition at both sites. In addition, the MCI scores at both sites were higher than their respective median MCI scores and were insignificantly different from predicted MCI scores (and at site 2, exceeded the historical maximum) for streams sourced within the National Park at sites with an altitude of 250 to 270 metres and located 15 to 17 km from the National Park boundary. Overall, the scores at both sites were reflective of good preceding physicochemical water quality, with no discernible impact from the Contact Energy site stormwater discharges.

Summary

The Council's standard 'kick-sampling' technique was used at two sites to collect streambed macroinvertebrates from the Kahouri Stream on 25 February 2014 to determine whether or not consented stormwater discharges from the Contact Energy site had had any recent detrimental effect upon the macroinvertebrate communities of the Kahouri stream. Samples were sorted and identified to provide the 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. It may be used in soft-bottomed streams to detect trends over time. The $SQMCI_S$ takes into account taxa abundance as well as

sensitivity to pollution, and may reveal more subtle changes in communities, particularly if non-organic impacts are occurring.

Significant differences in either MCI or $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of discharges being monitored.

This late summer macroinvertebrate survey indicated that the discharge of stormwater from the Contact Energy site had not had any significant detrimental effects on the macroinvertebrate communities of the stream, in comparison between sites, with historical results, and also with predicted MCI scores (for similar sites in ringplain, National Park-sourced streams).

The macroinvertebrate communities of the stream contained a moderately high proportion of 'sensitive' taxa, with some 'highly sensitive' taxa also recorded, one in extreme abundance at both sites. At both sites taxonomic richness (number of taxa) and MCI scores did not differ significantly from the medians of previous surveys although at site 2 the MCI score was the highest recorded to date. There was also an improvement in the $SQMCI_S$ score at both sites, as both recorded scores were significantly higher than respective median scores, principally due to the extreme abundance of the 'highly sensitive' mayfly (*Deleatidium)*.

MCI and $SQMCI_S$ scores indicated that the stream communities were of 'good' generic biological health and typical of communities at sites in ring plain streams that are sourced within the National Park. Overall, the results did not indicate any discernible impact from the Contact Energy site discharges of stormwater.

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Appendix V

Annual reports for 2012-2013 and 2013-2014 by Contact Energy Limited

August 2013

The Chief Executive

Taranaki Regional Council

Private Bag 713

Stratford

Attn: James Kitto

Subject: Stratford Power Station Annual Report for the period 1 July 2012 to 30 June 2013.

Dear Mr. Kitto

We are pleased to report that the 15th year of Stratford Power Station (SPS) operation has maintained a high level of compliance. This summary relates to compliance with resource consents held for the operation of Stratford Power Station and the Resource Management (Measurement and Reporting of Water Takes) Regulations.

Four Taranaki Regional Council (TRC) inspections were carried out during the year. The TRC inspection results have been favourable with no infringement or abatement notices being issued.

On 26 September inter-comparison samples were collected during a site visit for both sites. On 30 January 2013 inter-comparison samples were collected for both sites. On 20 February 2013 inter-comparison samples were collected from both sites.

Inter-comparison samples of the wastewater discharge and Patea River water were taken and analysed by the TRC Laboratory. The results of the samples tested indicated that consent conditions for the plant discharges were being met. Correlation of test results for wastewater analysis between SPS and TRC has been good against all parameters tested.

Please find included a summary of plant operation with regard to consent monitoring for the year in review. Summary reports reflecting the last years inter laboratory testing are also included for wastewater discharge, raw water abstraction, and stack emissions.

We look forward to any feedback from the TRC on improvements or further reporting definitions with regard to the report for the period 1 July 2012 to 30 June 2013.

Yours faithfully

Paul Fougere
Head of Generation - Taranaki

Consent Monitoring Highlights for the period 1 July 2012 – 30 June 2013

Consent 4455-1 Water Take from the Patea River:

Abstraction from the Patea River was within the consent requirements throughout the year with the river flow results being supplied by TRC.

The total volume of water taken from the Patea River during the year was 1,734,426m^3, with an average abstraction rate of 55l/s. The maximum abstraction rate for the year was 134l/s on the 16 February 2013 when the minimum river flow was 1390l/s.

Consent 5848-1 Waste Water Discharge into the Patea River:

Constituents monitored for wastewater discharged during the year remained within consent requirements.

River Temperature:
The river temperature during the year remained below 25°C allowing for continuous site discharge.
Temperature differentials remained within the consent limit of 1.5°C & 2.0°C (5% of time) for the entire year.
River temperature probes were calibrated during the year at three monthly intervals.

The maximum difference between upstream and downstream temperatures occurred on 23 January 2013 at 11:48hrs, with a difference of 0.88°C. At this time the waste water flow from site was 0.13/s, with the river flow at 1.47m/s, upstream temperature of 17.02°C and downstream of 17.91°C.

Discharge Flow:
The maximum recorded combined discharge flow for the year was 53.76l/s, this being well within the discharge consent limit of 78 l/s.
The average combined discharge flow from the site was 17.33l/s for the year.

The total volume of wastewater discharged for the year from site was 504,559m^3. This equates to approximately 29% of the water abstracted for plant use during the year. Most water discharged from site is in the form of evaporated cooling water.

Monitoring of both the TCC and SPP waste water discharges is by online analysers. Routine inter-comparison is also performed to verify accurately of testing in the laboratory.
Calibrations and servicing of the wastewater pH meters and chlorine meters was carried out as required throughout the year.

On several occasions while the discharge valves were closing high chlorine values were recorded. The high values mostly occur due to low sample volume which happens when the circulation pump has stopped as a result of a low pit level. Other high chlorine readings are due to instrument calibrations/maintenance and actual high chlorine (sometimes involving potable water). The SPP high chlorine values were due to low sample volume in the analyser and blockages in the analyser. At all times when the high chlorine values are recorded the system is in the process of closing the valve to prohibit discharge, thus keeping SPS with its consent.

Consent 4459-1 & 3939-2 Discharge storm water to Piakau and Kahouri Streams:

Stratford Power Station: -

Storm water discharge remained within consent conditions for the entire year.

The storm water pond overflowed into the neighbouring river on eighteen occasions during the year due to the unusually high rainfall occurrences. These occurred in July, October, November, December 2012, and February and May 2013.

Due to electricity market demand, operation of the site is changing and there are now periods of time where the plant is shut down and not required to generate electricity as part of Contact Energy's thermal generating strategy. With this in mind, verbal approval was given by TRC to allow the storm water pond to overflow into the Kahouri stream to allow the raw water pond to maintain a good water quality for a maximum period of 3-4 days a week when there was no generation at the TCC site.

Storm water overflowed on 2 occasions in November 2012 and 4 occasions in December 2012 to allow refreshing of our raw water pond to improve the water quality.

Consent 4454-1 Discharge to air (TCC):

The maximum hourly Nitrogen Oxides discharge rate from the plant for the year was 314.6 kg/hr, below the limit of 430kg/hr.

The maximum concentration of Nitrogen Oxides emissions for the year was 43.9 ppm on the 10 July 2012 under normal operation. This is well below the consent limit of 50 ppm.
During start up and shut down the plant is permitted to exceed the 50 ppm limit for set periods as per the consent. The maximum emissions during these periods of start up and shutdown were 80.1 ppm on the 26 March 2013.

Total Carbon Dioxide stack emissions were calculated to be 238,507 tonnes for the year and the total Nitrous Oxide emissions from the plant were recorded at 308.79 tonnes for the year.

The cooling tower plume was visible at certain times throughout the year, generally in the morning and at night during the winter months.

Consent 4454-1 Discharge to air (SPP):

The cooling tower plume was visible at certain times throughout the year, generally in the morning and at night during the winter months.

Inter Laboratory Comparisons and site inspections:

During the year SPS was inspected four times and inter laboratory comparisons were carried out on three of these occasions. Results reported between the site Laboratory, on line analysers and the TRC Laboratory were acceptable for all parameters being measured. Inter-comparison sampling occurred on the 26 September 2012, 30 January, and 20 February 2013, see attached table.

General Remarks:

Plant Operation:

The TCC plant was shut down during the following periods for maintenance and commercial reasons:

- 28 September to 3 October 2012
- 5 to 10 October 2012
- 15 to 19 October 2012
- 14 December 2012 to 2 January 2013
- 10 January to 10 February 2013
- 20 February to 25 March 2013 (Maintenance Outage)
- 24 April to 28 April 2013

The Stratford Peaker Plant was shut down for maintenance during the following period: -

- GT21 23 October to 13 December 2012 – GT Repairs
- 1 May to 16 May 2013 – Maintenance Outage

Chemicals:

During the year a project was carried out to trial an acid dosing regime for the SPP cooling tower basin. The purpose of which is to lower the cooling water pH to pH 7.4 which reduces fouling of both gas turbine intercoolers.

ISO Programs:

Stratford Power Station continued to maintain ISO14001 and ISO9001 Certification. The SPS internal audit was carried out on the 31 July 2013 to 1 August 2013 with the external audit scheduled for October 2013.

Environmental Management:

The SPS Environmental Focus Group met twice (October 2012 and February 2013) during the year to discuss and progress environmental opportunities for improvements.

We met with the TRC – James Kitto, on the 19th December 2012, 30th January, 20th February and 25th June 2013.

TCC site was compliant with HSNO requirements during the year. Tank certificates, handler certificates and the site location certificate are all maintained and up to date.

Environmental training for staff was carried out as follows:

- Environmental Awareness Training carried out in February 2013 for 43 staff

Environmental Maintenance was carried out as follows:

- SPP Ops Pit was pumped out and cleaned in November 2012 and April 2013

Environmental Improvements were made to the plant operations as follows:

- The SPP main cooling water acid dosing project was completed in July 2013.

Table 1: Results of Laboratory testing completed by TRC Lab, SPS Lab and site monitors on Waste Water Discharge.

Date	Time	Sample	Test	Units	TRC Lab	SPS Lab	Difference TRC-SPS Lab	Plant Monitor	Difference TRC-Plant Monitor
26/09/2012	0915	SPP Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	
			Total Chlorine	g/m3	<0.01	0.00	0.00	0.011	-0.011
			Conductivity	mS/m	18.0	19.8	-1.8	-	-
			pH		7.1	7.13	-0.03	7.14	-0.04
			Temperature	°C	13.4	-	-	14.7	-1.3
			Turbidity	NTU	1.2	1.10	0.1	-	-
			Ammoniacal Nitrogen	g/m3	0.010	-	-	-	-
			Suspended Solids	g/m3	9	9	0.0	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.006	0.04	-0.034	-	-
			Flow	l/s	-	-		17	-
26/09/2012	0930	TCC Waste Water Discharge	Free Chorine	g/m3	< 0.01	-	-		-
			Total Chlorine	g/m3	< 0.01	0.00	0.00	0.016	-0.016
			Conductivity	mS/m	87.6	97.0	-9.4	-	-
			pH		7.2	7.17	0.03	7.05	0.15
			Temperature	°C	18.5	-	-	18.4	0.1
			Turbidity	NTU	2.1	2.47	-0.37	-	-
			Ammoniacal Nitrogen	g/m3	0.029	-	-	-	-
			Suspended Solids	g/m3	3	1.5	1.5	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.031	-	-	-	-
			Flow	l/s	-	-	-	7.3	-
30/01/2013	1305	SPP Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.00	0.00	0.002	-0.002
			Conductivity	mS/m	32.7	36.0	-3.3	-	-
			pH		7.5	7.44	0.06	7.40	0.1
			Temperature	°C	25.1	-	-	24.8	0.3
			Turbidity	NTU	1.6	1.88	-0.28	-	-
			Ammoniacal Nitrogen	g/m3	0.056	-	-	-	-
			Suspended Solids	g/m3	18	16	2	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.810	2.33	-1.52	-	-
			Flow	l/s	-	-	-	17.2	-
30/01/2013	1315	TCC Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.00	0.00	0.003	-0.003
			Conductivity	mS/m	14.2	15.8	-1.6	-	-
			pH		8.6	8.50	0.1	8.45	0.15
			Temperature	°C	24.4	-	-	25.3	-0.9
			Turbidity	NTU	1.7	2.05	-0.35	-	-
			Ammoniacal Nitrogen	g/m3	0.007	-	-	-	-
			Suspended Solids	g/m3	4	1.0	3	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.013	-	-	-	-
			Flow	l/s	-	-	-	17.9	-

Date	Time	Sample	Test	Units	TRC Lab	SPS Lab	Difference TRC-SPS Lab	Plant Monitor	Difference TRC-Plant Monitor
20/02/2013	0755	TCC Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.00	0.01	0.017	0.007
			Conductivity	mS/m	101	111.0	-10	-	-
			pH		7.1	7.03	0.07	7.13	-0.03
			Temperature	°C	24.7	-	-	25.0	-0.3
			Turbidity	NTU	2.0	2.90	-0.90	-	-
			Ammoniacal Nitrogen	g/m3	0.102	-	-	-	-
			Suspended Solids	g/m3	5	3.5	1.5	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.052	-	-	-	-
			Flow	l/s		-	-	9.65	-
20/02/2013	0825	SPP Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.00	0.01	0.035	-0.035
			Conductivity	mS/m	26.8	29.9	-3.1	-	-
			pH		7.5	7.43	0.07	7.43	0.07
			Temperature	°C	19.9	-	-	20.0	-0.1
			Turbidity	NTU	1.0	1.36	-0.36	-	-
			Ammoniacal Nitrogen	g/m3	0.054	-	-	-	-
			Suspended Solids	g/m3	10	9.5	0.5	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.051	0.24	-0.19	-	-
			Flow	l/s	-	-	-	18.2	-

Table 2: Results of Laboratory testing completed by TRC Lab on Upstream & Downstream Patea River samples.

Date	Time	Test	Units	Upstream Patea River	Downstream Patea River	Difference Downstream – Up stream	% Change
26/09/2012	0950	Conductivity	mS/m	9.5	10.1	-0.6	-6
		Dissolved Phosphate	g/m3	0.024	0.023	0.001	4
		Un-ionised Ammonia	g/m3	0.00222	0.00203	0.00019	9
		Ammonical Nitrogen	g/m3	0.145	0.132	0.013	10
		pH		7.8	7.8	0.0	0
		Suspended Solids	g/m3	<2	<2	0	0
		Temperature	°C	11.0	11.1	0.1	<1
		Turbidity	NTU	0.96	1.2	-0.24	-20
30/01/2013	1225	Conductivity	mS/m	10.1	10.9	0.8	7
		Dissolved Phosphate	g/m3	0.090	0.111	0.021	19
		Un-ionised Ammonia	g/m3	0.00504	0.00408	-0.00096	-23
		Ammonical Nitrogen	g/m3	0.020	0.019	-0.001	-5
		pH		8.8	8.7	-0.1	-1
		Suspended Solids	g/m3	2	3	1	33
		Temperature	°C	20.7	21.1	0.4	2
		Turbidity	NTU	1.5	1.5	0.0	0
20/02/2013	0920	Conductivity	mS/m	9.9	12.2	2.3	19
		Dissolved Phosphate	g/m3	0.067	0.066	-0.001	-1.5
		Un-ionised Ammonia	g/m3	0.00041	0.00056	0.00015	27
		Ammonical Nitrogen	g/m3	0.006	0.010	0.004	40
		pH		8.3	8.2	-0.1	1
		Suspended Solids	g/m3	3	5	2	40
		Temperature	°C	16.3	16.6	0.3	2
		Turbidity	NTU	1.3	1.7	0.4	23

Notes:

1. Wastewater discharge from TCC had a negligible effect on the Patea River. The water quality was improved for some parameters.
2. Conductivity had the most impact on the River.

Stratford Power Station - Yearly Data to TRC

01-Jul-2012 ◄ Start Date

01-Jul-2013 ◄ End Date

	Water Take				Wastewater Discharge															River Temperatures					Discharges to Air						
	Min. River Flow for the day	Max. Abstraction	Ave. Abstraction	Total Volume taken for the month	SPP + TCC Total Monthly discharge	SPP & TCC Max flowrate discharge	SPP & TCC Ave flowrate discharge	SPP Max Cl2	SPP Ave Cl2	SPP Max pH	SPP min pH	TCC Max Cl2	TCC Ave Cl2	TCC Max pH	TCC min pH	SPP Temp Max	SPP Temp Ave	TCC Temp Max	TCC Temp Ave	Temp Ave Downstream	Temp Ave Upstream	Temp Diff Ave	Temp Max Downstream	Temp Diff Max	TCC Nox conentration Ave	TCC Nox concentration max	TCC Nox Max Hourly Total	TCC Nox Max g/sec	TCC Nox Total in a month	TCC CO concentration Ave	TCC CO2 Ave	SPP Estimated CO2 Emmission
	m3/s	m3/s ave. over 15mins	m3/s ave.	m3	m3	l/s (ave over 15mins)	l/s	ppm	ppm	pH	pH	ppm	ppm	pH	pH	°C	°C	°C	°C	°C	°C	°C	°C	°C	ppm	ppm	kg	g/sec	kg	ppm	t/hr	tonnes
01-Jul-2012	2.73	0.093	0.066	176659.6	42828.8	38.042	16.497	0.050	0.007	7.77	6.51	0.047	0.003	8.25	6.08	18.16	11.95	23.19	20.33	8.80	8.81	0.00	11.31	0.21	17.82	43.90	100.09	27.80	45916.9	41.3	115.5	19824.0
01-Aug-2012	3.27	0.130	0.075	201560.3	49062.1	39.135	18.714	0.880	0.014	7.81	6.58	0.058	0.008	7.68	6.70	18.89	13.60	22.30	20.58	9.48	9.47	0.01	11.16	0.17	19.52	29.03	96.80	26.89	51831.8	38.4	119.7	25049.0
01-Sep-2012	2.85	0.111	0.051	131461.4	31869.6	43.731	12.492	0.669	0.016	9.00	6.60	0.045	0.013	8.73	6.63	15.21	11.88	22.77	19.12	9.82	9.81	0.01	13.39	0.23	16.01	79.97	92.89	25.80	31334.3	129.9	86.6	5731.2
01-Oct-2012	2.42	0.129	0.042	111731.3	36676.3	44.702	15.311	1.183	0.011	8.37	6.73	0.046	0.014	8.94	6.14	18.29	15.56	23.86	17.98	11.09	11.05	0.04	15.28	0.23	9.39	80.00	92.52	25.70	19014.6	69.7	54.7	16139.4
01-Nov-2012	1.32	0.127	0.070	180322.2	38195.1	40.982	15.118	0.755	0.024	8.09	6.79	0.047	0.013	8.96	6.07	20.76	17.16	26.89	22.16	12.90	12.77	0.13	18.62	0.48	16.89	27.45	100.24	27.84	38239.0	55.2	105.8	13885.9
01-Dec-2012	1.18	0.131	0.050	134128.7	60227.0	53.764	22.889	0.767	0.015	8.45	6.83	0.062	0.007	8.96	6.58	28.99	20.77	26.70	22.35	15.82	15.64	0.18	21.13	0.51	7.02	79.97	104.59	29.05	16094.8	25.5	43.5	23692.6
01-Jan-2013	1.11	0.131	0.034	90120.0	42694.3	49.854	20.468	0.051	0.014	8.90	6.46	0.628	0.005	8.91	6.67	25.20	21.55	38.17	22.34	16.74	16.57	0.17	21.65	0.88	4.14	79.97	99.05	27.51	8446.2	40.4	25.1	19838.5
01-Feb-2013	0.85	0.134	0.042	102354.0	34402.5	46.234	18.779	1.125	0.008	7.62	6.92	0.045	0.008	8.16	6.76	24.77	20.84	27.42	24.56	16.27	16.08	0.19	21.54	0.55	4.26	79.97	102.93	28.59	9553.1	14.8	41.4	24262.3
01-Mar-2013	0.69	0.103	0.044	116678.2	48833.6	45.897	19.414	0.639	0.010	7.79	6.41	0.042	0.003	8.21	6.60	24.70	21.51	25.80	23.37	15.37	15.04	0.33	19.09	0.83	2.72	80.10	125.63	34.90	5813.0	21.5	22.1	46992.5
01-Apr-2013	0.84	0.128	0.071	185078.9	50491.8	39.507	20.891	1.058	0.024	7.49	7.26	0.050	0.006	8.14	6.81	26.46	17.89	26.89	23.35	12.87	12.72	0.15	17.02	0.82	11.32	80.03	106.06	29.46	28378.0	41.0	103.0	22851.3
01-May-2013	1.91	0.093	0.058	154412.8	34639.0	36.236	13.194	0.778	0.018	10.13	2.75	0.130	0.007	8.92	6.03	15.00	12.63	23.41	20.13	10.92	10.90	0.02	13.70	0.40	10.81	79.97	86.12	23.92	26817.4	85.9	108.1	6811.0
01-Jun-2013	3.18	0.127	0.058	149918.4	34638.2	44.609	14.245	0.830	0.015	8.19	7.01	0.043	0.005	7.83	6.50	15.60	12.86	39.64	19.10	9.82	9.82	0.00	11.87	0.15	11.16	43.53	75.24	20.90	27329.0	100.2	107.8	13429.2
01-Jul-2013																																
Yearly Average:	4.548		0.055	144535	42047		17.33		0.01	8.30			0.01	7.31			16.52		21.28	12.49	12.39	0.10			10.92		98.51		25731	55.32	77.77	
Yearly Maximum:	141.500	0.134		201560	60227	53.76		1.18		10.13		0.63		8.96		28.99		39.64			21.45		21.65	0.88		80.10	125.63	34.90		407.88	199.16	
Yearly Minimum	0.695			90120							2.75				6.03						-9.71	0.00	-10.32									
Yearly Total:				1734426	504559																								308768		681780.6	238507.0

Maximum Nox Instantanious Value ► 25-Mar-13 08:39:59 314.6 kg/h

Maximum Upstream River Temperature ► 03-Feb-13 17:48:07 21.45 °C

Maximum Downstream River Temperature ► 31-Jan-13 17:25:22 21.58 °C

			@ Waste Water Flow	@ River Flow	@ Upstr. Temp.	@ Dnstr. Temp.
Maximum River Diff Temperature ►	23-Jan-13 11:48:52	0.88 °C	0.13 l/s	1.47 m3/s	17.02 °C	17.91 °C

8 August 2014

The Chief Executive

Taranaki Regional Council

Private Bag 713

Stratford

Attn: James Kitto

Subject: Stratford Power Station Annual Report for the period 1 July 2013 to 30 June 2014.

Dear Mr. Kitto

We are pleased to report that the 16th year of Stratford Power Station (SPS) operation, we believe, has maintained a high level of compliance. This summary relates to compliance with Resource Consents held for the operation of Stratford Power Station and the Resource Management (Measurement and Reporting of Water Takes) Regulations for the period 1 July 2013 to 30 June 2014.

Please find included a summary of plant operation with regard to consent monitoring and relevant operational changes for the year in review. Summary reports reflecting the last years inter laboratory testing are also included for wastewater discharge, raw water abstraction, and stack emissions.

We look forward to any feedback from the TRC on improvements or further reporting definitions with regard to the reporting period.

Yours faithfully

Paul Fougere

Head of Generation - Taranaki

Consent Monitoring Highlights for the period 1 July 2013 – 30 June 2014

Consent 4455-1 Water Take from the Patea River:

Abstraction from the Patea River was within the consent requirements throughout the year with the river flow results being supplied by TRC.

The total volume of water taken from the Patea River during the year was 931,567m^3, with an average abstraction rate of 29 l/s. The maximum abstraction rate for the year was 135 l/s on the 29 November 2013 when the minimum river flow was 1500l/s.

Consent 5848-1 Waste Water Discharge into the Patea River:

Constituents monitored for wastewater discharged during the year remained within consent requirements.

River Temperature:

- During the year the river temperature remained below 25°C allowing for continuous site discharge.
- Temperature differentials remained within the consent limit of 1.5°C & 2.0°C (5% of time) for the entire year.
- River temperature probes were calibrated during the year at three monthly intervals.

The maximum difference between upstream and downstream temperatures occurred on 4 March 2014 at 07:54hrs, with a difference of 1.35°C. At this time the waste water flow from site was 0.22 l/s, with the river flow at 0.71m^3/s, upstream temperature of 10.99°C and downstream of 11.42°C.

Discharge Flow:

The maximum recorded combined discharge flow for the year was 63.28 l/s, this being within the discharge consent limit of 78 l/s.

The average combined discharge flow from the site was 16.32 l/s for the year.

The total volume of wastewater discharged for the year from site was 417,779m^3. This equates to approximately 45% of the water abstracted for plant use during the year.

Monitoring of both the TCC and SPP waste water discharges is by online analysers. Routine inter-comparison is also performed to verify accuracy of testing in the laboratory.
Calibration and servicing of the wastewater pH meters and chlorine meters was carried out as required throughout the year.

High chlorine values were recorded on several occasions while the waste water discharge valves were closing. These high values occur due to low sample volume, which occurs when the circulation pump has been stopped as a result of a low water level in the waste water pit.

When the high chlorine values are recorded, the control system is in the process of closing the outlet valve to prohibit discharge, thus keeping SPS within its consent limits.

Consent 4459-1 & 3939-2 Discharge storm water to Piakau and Kahouri Streams:

Stratford Power Station: -

Storm water discharge remained within consent conditions for the entire year.

The storm water pond overflowed into the neighbouring river on twenty five occasions during the year due to high rainfall occurrences. These occurred in August, September, October, November, and December 2013, January, February, April and June 2014.

Consent 4454-1 Discharge to air (TCC):

The maximum hourly Nitrogen Oxides discharge rate from the plant for the reporting year was 105.4 kg/hr, which is below the consent limit of 430 kg/hr.

Under normal operation, the maximum concentration of Nitrogen Oxide emissions for the year was 36.45 ppm on the 23 March 2014. This is well below the consent limit of 50 ppm.
During start up and shut down, the plant is permitted to exceed the 50 ppm limit for set periods as per the consent. The maximum emissions during these periods of start up and shutdown were 80.28 ppm on the 5 March 2014.

Total Carbon Dioxide stack emissions were calculated to be 144,942 tonnes for the year and the total Nitrous Oxide emissions from the plant were recorded at 798 tonnes for the year.

The cooling tower plume was visible at certain times throughout the year, generally in the morning and at night during the winter months.

Consent 4454-1 Discharge to air (SPP):

The cooling tower plume was visible at certain times during the year, generally in the morning and at night during winter months, and as a result of low ambient temperatures.

Inter Laboratory Comparisons and site inspections:

During the year, SPS was inspected on three occasions with inter laboratory comparisons samples taken. Results reported between the site Laboratory, on line analysers and the TRC Laboratory were acceptable for all parameters being measured.

Inter-comparison sampling occurred on the 18 December 2013, 19 February & 21 May 2014, see attached tables 1 & 2.

General Remarks:

Plant Operation:

The TCC plant was shut down during the following periods for maintenance and commercial reasons:

- 4 – 13 July 2013
- 24 August - 8 September 2013
- 12 - 21 September 2013
- 28 September – 27 October 2013
- 29 October – 2 November 2013
- 30 November – 27 February 2014
- 1 – 4, 15 – 17, 29 - 30 March 2014
- 18 April – 20 June 2014
- 27 – 28 June 2014

The Stratford Peaker Plant was shut down for maintenance during the following periods: -

GT21

- 2 October – 3 October 2013
- 4 November – 12 December 2013
- 22 – 26 January 2014
- 27 February – 2 March 2014
- 4 – 13 April 2014
- 28 June – 2 July 2014

GT22

- 2 October – 3 October 2013
- 6 August – 17 September 2013
- 5 November – 4 December 2013
- 22 January – 26 January 2014
- 27 February – 2 March 2014

Chemicals:

In August 2013, the SPP cooling tower basin acid dosing system was implemented following successful testing. The acid dosing system lowers cooling water pH to pH 7.4 which reduces fouling of both gas turbine intercoolers. Implementation of the system has also reduced the amount of overall chemical dosing in to the cooling tower basin.

ISO Programs:

Stratford Power Station continued to maintain ISO14001 and ISO9001 Certification. An internal audit was carried out on 31 July 2013 to 1 August 2013, and an external audit was carried out by Telarc on 25 September 2013 with no non conformances or findings.

Environmental Management:

In April 2014, Lauren Neal was appointed to succeed Sarah Magor as the Environmental Advisor for Stratford Power Station. Sarah Magor will continue to be the Environmental Advisor for the Ahuroa Gas Storage facility.

The SPS Environmental Focus Group met twice (September 2013 and April 2014) during the year to discuss and progress environmental opportunities for improvements.

Table 1: Results of Laboratory testing completed by TRC Lab, SPS Lab and site monitors on Waste Water Discharge.

Date	Time	Sample	Test	Units	TRC Lab	SPS Lab	Difference TRC-SPS Lab	Plant Monitor	Difference TRC-Plant Monitor
18/12/2013	0915	SPP Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	
			Total Chlorine	g/m3	<0.01	0.01	0.01	0.010	-0.01
			Conductivity	mS/m	40.2	44.0	3.8	-	-
			pH		6.7	6.98	0.28	6.88	-0.18
			Temperature	°C	21.3	-	-	19.3	2.0
			Turbidity	NTU	2.1	2.33	0.23	-	-
			Ammoniacal Nitrogen	g/m3	0.044	-	-	-	-
			Suspended Solids	g/m3	16	-		-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.6	2.03	1.43	-	-
			Flow	l/s	-	-	-	25	-
18/12/2013	0955	TCC Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	0.01	0.00	0.01	0.004	0.006
			Conductivity	mS/m	11.9	14.3	2.4	-	-
			pH		8.0	7.96	0.04	8.16	-0..16
			Temperature	°C	20.4	-	-	21.3	-0.9
			Turbidity	NTU	1.2	1.56	0.36	-	-
			Ammoniacal Nitrogen	g/m3	0.022	-	-	-	-
			Suspended Solids	g/m3	2	-	-	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.015	-	-	-	-
			Flow	l/s	-	-	-	15.3	-
19/02/2014	1130	SPP Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.03	0.03	0.024	-0.024
			Conductivity	mS/m	38.7	42.7	4	-	-
			pH		7.2	7.44	0.24	7.15	0.05
			Temperature	°C	21.9	-	-	23.7	-1.8
			Turbidity	NTU	1.6	1.29	0.31	-	-
			Ammoniacal Nitrogen	g/m3	0.078	-	-	-	-
			Suspended Solids	g/m3	10	-	-	-	-
			Oil & Grease	g/m3	1.2	-	-	-	-
			Dissolved Phosphate	g/m3	0.978	0.74	0.238	-	-
			Flow	l/s	-	-	-	16.4	-
19/02/2014	1145	TCC Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.03	0.03	0.023	-0.023
			Conductivity	mS/m	45.4	50.6	5.2	-	-
			pH		7.6	7.56	0.04	7.48	0.12
			Temperature	°C	21.3	-	-	21.6	-0.3
			Turbidity	NTU	1.5	1.81	0.31	-	-
			Ammoniacal Nitrogen	g/m3	0.162	-	-	-	-
			Suspended Solids	g/m3	<2	-	-	-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.044	-	-	-	-
			Flow	l/s	-	-	-	22.2	-

Date	Time	Sample	Test	Units	TRC Lab	SPS Lab	Difference TRC-SPS Lab	Plant Monitor	Difference TRC-Plant Monitor
21/05/2014	1110	SPP Waste Water Discharge	Free Chorine	g/m3	0.01	-	-	-	-
			Total Chlorine	g/m3	0.02	0.01	0.01	0.01	0.00
			Conductivity	mS/m	38.4	43.1	-4.7	-	-
			pH		6.7	6.72	-0.02	6.76	-0.04
			Temperature	°C	14.5	-	-	16.6	-2.1
			Turbidity	NTU	2.9	2.43	0.47	-	-
			Ammoniacal Nitrogen	g/m3	0.015	-	-	-	-
			Suspended Solids	g/m3	10	-	-	-	-
			Oil & Grease	g/m3	<0 5	-	-	-	-
			Dissolved Phosphate	g/m3	1.05	3.21	-2.16	-	-
			Flow	l/s	-	-	-	16.2	-
21/05/2014	1130	TCC Waste Water Discharge	Free Chorine	g/m3	<0.01	-	-	-	-
			Total Chlorine	g/m3	<0.01	0.00	0	0.00	0.00
			Conductivity	mS/m	12.9	14.6	-1.7	-	-
			pH		7.5	7.72	-0.22	7.59	0.13
			Temperature	°C	13.3	-	-	13.4	-0.1
			Turbidity	NTU	0.83	0.98	-0.15	-	-
			Ammoniacal Nitrogen	g/m3	0.017	-	-	-	-
			Suspended Solids	g/m3	<2	-		-	-
			Oil & Grease	g/m3	<0.5	-	-	-	-
			Dissolved Phosphate	g/m3	0.021	-	-	-	-
			Flow	l/s	-	-	-	6.5	-

Table 2: Results of Laboratory testing completed by TRC Lab on Upstream & Downstream Patea River samples.

Date	Time	Test	Units	Upstream Patea River	Downstream Patea River	Difference Downstream – Up stream	% Change
18/12/13	0950	Conductivity	mS/m	9.7	10.2	0.5	5
		Dissolved Phosphate	g/m3	0.059	0.068	0.009	15
		Un-ionised Ammonia	g/m3	0.00103	0.00122	0.00019	18
		Ammonical Nitrogen	g/m3	0.081	0.074	-0.007	9
		pH		7.6	7.7	0.1	1
		Suspended Solids	g/m3	<2	<2	0	0
		Temperature	°C	14.7	15.1	0.4	3
		Turbidity	NTU	1.0	1.0	0	0
19/02/14	0950	Conductivity	mS/m	10.2	10.1	-0.1	1
		Dissolved Phosphate	g/m3	0.068	0.095	0.027	40
		Un-ionised Ammonia	g/m3	0.00182	0.00130	-0.00052	29
		Ammonical Nitrogen	g/m3	0.037	0.026	-0.011	29
		pH		8.1	8.1	0	0
		Suspended Solids	g/m3	2.8	2.3	-0.5	18
		Temperature	°C	17.8	18.0	0.2	1
		Turbidity	NTU	3	4	1	33
21/05/2014	1155	Conductivity	mS/m	9.7	10.1	0.4	4
		Dissolved Phosphate	g/m3	0.078	0.095	0.017	6
		Un-ionised Ammonia	g/m3	0.00224	0.00206	-0.00164	<1
		Ammonical Nitrogen	g/m3	0.148	0.134	-0.014	13
		pH		7.8	7.8	0	0
		Suspended Solids	g/m3	2	2	0	0
		Temperature	°C	10.9	11.1	0.2	<1
		Turbidity	NTU	1.3	1.3	0	0

Notes:

1. Wastewater discharge from TCC had a negligible effect on the Patea River. The water quality was improved for some parameters.
2. Conductivity had the most impact on the River.

Stratford Power Station - Yearly Data to TRC

01-Jul-2013 ◄ Start Date
01-Jul-2014 ◄ End Date

	Water Take				Wastewater Discharge															River Temperatures					Discharges to Air							
	Min. River Flow for the day	Max. Abstraction	Ave. Abstraction	Total Volume taken for the month	SPP + TCC Total Monthly discharge	SPP & TCC Max flowrate discharge	SPP & TCC Ave flowrate discharge	SPP Max Cl2	SPP Ave Cl2	SPP Max pH	SPP min pH	TCC Max Cl2	TCC Ave Cl2	TCC Max pH	TCC min pH	SPP Temp Max	SPP Temp Ave	TCC Temp Max	TCC Temp Ave	Temp Ave Downstream	Temp Ave Upstream	Temp Diff Ave	Temp Max Downstream	Temp Diff Max	TCC Nox conentration Ave	TCC Nox concentration max	TCC Nox Max Hourly Total	TCC Nox Max g/sec	TCC Nox Total in a month	TCC CO concentration Ave	TCC CO2 Ave	SPP Estimated CO2 Emmission
	m3/s	m3/s ave. over 15mins	m3/s ave.	m3	m3	l/s (ave over 15mins)	l/s	ppm	ppm	pH	pH	ppm	ppm	pH	pH	°C	°C	°C	°C	°C	°C	°C	°C	°C	ppm	ppm	kg	g/sec	kg	ppm	t/hr	tonnes
01-Jul-2013	2.20	0.128	0.041	109021.0	27599.5	0.000	12.646	0.858	0.010	8.32	-3.50	0.083	0.007	8.10	6.91	16.97	12.58	21.69	17.26	8.64	8.63	0.01	10.85	0.27	6.28	79.97	97.43	27.06	14409.0	101.9	64.7	13313.1
01-Aug-2013	1.77	0.128	0.041	110618.7	27643.3	0.000	12.802	0.049	0.017	7.62	6.71	0.050	0.008	7.54	6.56	16.70	13.11	21.19	18.96	9.78	9.78	0.01	11.33	0.29	6.95	79.97	80.67	22.41	16531.5	115.8	71.0	10848.3
01-Sep-2013	2.46	0.094	0.016	40585.8	14566.2	0.000	11.938	0.097	0.008	7.87	6.50	0.171	0.007	7.96	6.52	15.77	13.90	21.48	18.02	10.21	10.07	0.14	13.23	0.29	2.11	80.25	99.59	27.67	4031.0	49.4	23.8	9129.9
01-Oct-2013	3.20	0.091	0.009	24750.9	31231.5	0.000	19.715	0.041	0.007	8.10	6.69	0.402	0.009	7.98	6.72	18.94	16.08	17.17	16.08	11.82	11.62	0.20	14.49	0.36	0.17	79.97	105.41	29.28	165.4	1.7	0.3	6185.6
01-Nov-2013	1.50	0.135	0.049	126803.2	28972.1	0.000	13.425	0.066	0.006	8.40	6.83	0.072	0.005	8.92	6.09	21.54	18.27	25.41	21.03	13.84	13.59	0.25	18.23	0.55	5.99	80.00	93.64	26.01	13442.0	135.7	79.8	1474.9
01-Dec-2013	1.49	0.135	0.026	70304.2	63277.8	0.000	24.609	0.049	0.011	8.49	6.51	0.090	0.002	8.87	6.84	24.30	21.17	23.39	20.42	14.90	14.61	0.29	18.14	0.61	-0.02	-0.02	0.00	0.00	0.0	0.0	0.0	13045.0
01-Jan-2014	1.45	0.090	0.025	67130.4	60749.7	0.000	24.473	0.052	0.011	8.50	6.18	0.063	0.007	8.94	7.10	25.51	21.85	22.09	20.31	14.99	14.83	0.16	19.03	1.12	-0.02	-0.02	0.00	0.00	0.0	0.0	0.0	20143.8
01-Feb-2014	0.65	0.081	0.019	46998.4	26807.5	0.000	19.239	0.063	0.008	7.61	6.51	0.053	-0.006	8.96	7.46	24.63	22.29	23.98	22.49	16.31	16.16	0.15	21.35	0.71	0.23	79.97	87.85	24.40	184.1	0.0	0.1	21865.9
01-Mar-2014	0.49	0.090	0.051	135727.6	39739.0	0.000	17.614	0.322	0.009	7.88	6.62	0.061	0.006	8.86	6.90	24.57	20.60	27.09	23.01	14.59	14.30	0.29	17.80	1.35	5.64	80.28	94.12	26.14	12655.0	84.7	65.0	19089.5
01-Apr-2014	0.46	0.094	0.048	123773.1	39299.7	0.000	15.639	0.114	0.008	7.66	6.60	0.041	0.011	8.30	6.90	22.45	18.92	25.59	20.58	13.37	13.20	0.17	17.19	1.07	5.80	80.03	70.31	19.53	15261.0	17.0	69.0	14837.0
01-May-2014	2.22	0.088	0.009	23740.1	24651.4	0.000	9.949	0.050	0.014	7.49	6.50	0.070	0.005	8.16	6.47	19.40	15.47	15.97	13.79	10.88	10.88	0.00	13.79	1.15	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9259.5
01-Jun-2014	2.05	0.100	0.020	52113.1	33241.3	0.000	13.764	0.111	-0.002	7.78	6.89	0.081	0.010	7.99	6.66	13.31	12.14	21.08	12.63	10.09	10.10	0.00	11.72	1.12	1.32	79.97	94.45	26.24	3127.9	12.1	19.2	5750.0
01-Jul-2014																																
Yearly Average:	4.694		0.029	77631	34815		16.32		0.01	7.31			0.01	7.60			17.20		18.71	12.45	12.31	0.14			2.87		68.62		6651	43.19	32.75	
Yearly Maximum:	101.739	0.135		135728	63278	0.00		0.86		8.50		0.40		8.96		25.51		27.09			21.19		21.35	1.35		80.28	105.41	29.28		411.88	150.72	
Yearly Minimum	0.460			23740							-3.50				6.09						5.85	0.00	0.85									
Yearly Total:				931567	417779																								79807		287848.8	144942.5

Maximum Nox Instantanious Value ► 05-Mar-14 16:33:02 239.1 kg/h
Maximum Upstream River Temperature ► 20-Feb-14 16:57:30 21.19 °C
Maximum Downstream River Temperature ► 21-Feb-14 16:18:45 21.28 °C

			@ Waste Water Flow	@ River Flow	@ Upstr. Temp.	@ Dnstr. Temp.
Maximum River Diff Temperature ►	04-Mar-14 07:54:15	1.35 °C	22.00 l/s	0.71 m3/s	10.99 °C	11.42 °C

Appendix VI

Air emissions report
by Contact Energy Limited

Pursuant to condition 8 on consent 4454-1

Taranaki Combined Cycle Power Station

Consent 4454-1

Compliance Report Pursuant to Condition 8 of Consent 4454-1 - to discharge contaminates to air from the Taranaki Combined Cycle Power Station.

August 2009

1. Introduction

Condition 8 requires:

THAT the consent holder shall provide to the Council within two years from the commencement of commissioning of the Station and again at four years from the commencement of commissioning of the Station and every 6 years thereafter, a written report:

a. reviewing any technological advances in reduction or mitigation of emissions, especially but not exclusively in respect of the cooling tower plume and of carbon dioxide, how these might be applicable and/or implemented at the power station, and the costs and benefits of these advances; and

b. detailing an inventory of emissions from the site of such contaminates as the General manager may from time to time specify following consultation with the consent holder; and

c. detailing any measures that have been taken by the consent holder to improve the energy efficiency of the Station; and

d. addressing any other issue relevant to the minimization or mitigation of emissions from the site that the General manager considers should be included; and

e. detailing carbon dioxide emissions from the site.

2. Reporting Time-frames

The Station was commissioned in 1998, thus Condition 8 requires reports in 2000, 2002 and every 6 years thereafter. The two and four year from commissioning reports have been forwarded to the Taranaki Regional Council (TRC).

This report is the first six year report (2008).

3. Technological Advances

Technological advances to plant such as the Taranaki combined cycle to reduce or mitigate carbon dioxide emissions are limited to detail developments as this plant already incorporates many of the features of the latest technology, such as EV burners and sequential combustion. The detail changes would generally result in small improvements in efficiency and output. Improvements to efficiency directly reduce carbon dioxide emissions whilst improvements to output improve the electricity sector's carbon dioxide emissions by displacing emissions from plant that has a higher emission factor.

The technology relating to the mitigation of carbon dioxide is continually developing with the most notable advances being related to alternative electricity generating plant, although there are other developments that result in making heat available directly from renewable sources in a useful form. However, most of the alternative electricity generating forms are still not economically competitive with the current TCC CCGT technology. Contact is pursuing the development of so called renewable electricity generating technologies such as geothermal and wind plant and these will be brought into the market when consents have been gained and the projects are economically viable.

Any technological advances intended to be implemented at the existing station would need to be sanctioned by the manufacturer so that plant guarantees would be retained.

The most recent developments have been related to compressor improvements.

Cooling towers such as used at TCC have gone through improvements to enhance operation. These improvements have been to seal up any air passages that would allow the air to bypass the plume coils and improve efficiency or to reduce the size and increase the number of droplets and thus the exposed droplet surface area so as to increase the heat rejection.

4. Inventory of Emissions

The General Manager has not detailed any contaminates from the site of which he needs an inventory of emissions.

5. Energy Efficiency Improvements.

During an outage in early 2008 the TCC main turbine refurbishment and compressor blade upgrade resulted in an output increase of 24MW and efficiency improvement of 0.76%.

The cooling tower at TCC has gone through improvements to enhance its operation. These improvements have been to seal up any air passages that would allow the air to bypass the plume coils and improve efficiency.

6. Other issues as requested by General Manager

The General Manager has not advised of any other issue relevant to the minimisation or mitigation of emissions from the site that he considers should be included in this report.

However, as Contact noted in the 2007 report for Condition 5 of Consent 5846-1, the following other aspects of Contact's operations impact upon its overall efficiency in the production of electricity.

Contact Energy has a policy of continuous assessment of means to improve the thermodynamic performance of all thermal stations it owns, since this makes economic sense and is consistent with the RMA precept of sustainable use of resources. These are generally small and can be difficult to quantify but do result in a reduction in Contact's greenhouse gas emissions. These have included:

- ***Otahuhu A Gas Turbines:*** These units are no longer used for emergency generation but a contract has been signed with Transpower to provide for the use of the Otahuhu A units 1 and 2 for synchronous compensation. Synchronous compensation results in improved power factor in long transmission lines and that results in fewer losses. The magnitude of this loss reduction and the consequent reduction in greenhouse gas emissions is difficult to quantify.

- ***Wairakei Binary Plant***: Contact has commissioned a 14MW Binary Plant at Wairakei. This plant displaces up to 66,200 tonnes of CO_2 per year.

- ***Ohaaki Geothermal Plant***: Three new production wells have been commissioned. The extra electricity able to be generated from these wells will have the potential to displace electricity generated at thermal stations that could save up to 58,000 tonnes of CO_2 per year. However, this is negated to a large extent by the high greenhouse gas content of the steam from the new wells.

- ***Te Rapa Co-generation Plant***: An upgrade of the components in the gas turbine hot gas flow path has improved the output resulting in the displacement of around 11,000 tCO_2 per year.

- ***Otahuhu B***: As well as the work noted in the 2007 report for Condition 5 of Consent 5846-1 Contact carried out a major inspection and overhaul of this CCGT plant in November/December 2008. As well as the normal maintenance work, the work included:
  - Firing Temperature Increase Upgrade – this included changing the burners to Reduced Swirl types and the combustion chamber tile holders were changed to impingement cooled types. The changes to the combustion tiles reduced cooling air requirements and both changes had the overall effect of reducing CO and NOx emissions.

- Hydraulic clearance optimisation (HCO) that alters compressor blade tip clearances to minimise leakage flows.
- Whilst not tested rigorously a performance test showed that due to the upgrades, the output increased by 10.25 MW and the LHV efficiency improved by 0.61%.

7. *Carbon Dioxide Emissions.*

In October 2002, since the last Condition 8 report, the Government gave approval for the TRC to proceed with the process of removing the original condition that required mitigation for greenhouse gases emitted greater than would have been emitted had the power station not been built and operated. Consequent to an application from the then Consent holder, Stratford Power Limited, the conditions concerned were removed. Since then Contact has not had an obligation in its consent to annually report carbon dioxide emissions.

However, a report including details of carbon dioxide gas emissions has been submitted annually to the TRC. In summary, these reports have noted:

Year ending 30 June	**CO2 Emissions Mtonne**	**Year ending 30 June**	**CO2 Emissions Mtonne**
2002	0.969	2006	1.066
2003	0.911	2007	0.801
2004	0.718	2008	0.802
2005	0.627	2009[1]	0.809[2]

[1] 2009 figures not yet reported to TRC.

[2] This is calculated from fuel flows and includes estimates of N_2O and CH_4 discharges all as obtained from tables 4.6 & 4.7 of http://www.med.govt.nz/upload/68779/Energy%20Greenhouse%20Gas%20Emissions%202009.pdf using the gross CV