

Trustpower Limited
Patea Hydroelectric Power Scheme
Monitoring Programme
Annual Report
2014-2015

Technical Report 2015-50

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Executive summary

Trustpower Limited (the Company) operates a hydroelectric power station located on the Patea River on Maben Road, near Hurleyville. Water is impounded behind the 82 m high Patea Dam to form Lake Rotorangi. This water is diverted through the 32 MW power station, the largest in Taranaki. This report for the period July 2014–June 2015 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

The Company holds 10 resource consents, which include a total of 146 conditions setting out the requirements that the Company must satisfy. The Company holds three consents to allow it to dam, take and/or use water, two consents to discharge water into the Patea River, three consents for structures associated with the scheme and two consents to discharge emissions into the air at this site.

During the monitoring period, Trustpower Limited demonstrated an overall good level of environmental performance.

The Council's monitoring programme for the period under review included seven hydrological inspections, three site inspections and one other inspection following flooding. Coincident with two of the hydrological inspections, a flow gauging was performed. In addition, analysis was conducted of generation data, lake level data, Patea River flow and groundwater abstraction data, provided by the Company. The Council also reviewed a number of reports submitted in accordance with consent conditions.

The monitoring showed that overall the scheme was operated well, and within resource consent requirements. The Company coordinated a number of investigations and reports during the reporting period. The bulk of the required monitoring was summarised in the previous report, but two components were delayed, being the dissolved oxygen monitoring and monitoring on the effects of the dam on trout. These two reports are now with the expert panel for review. There was one Unauthorised Incident recording non-compliance in respect of this scheme during the period under review, related to the maintenance of access at three boat ramps. This incident stemmed from a complaint, and the resulting inspection confirmed access was being restricted at the Tangahoe Valley and Glen Nui boat ramps. The Council chose to liaise with the Company, who was forthcoming with a solution. As a result no enforcement action was required.

This report includes a summary of the June 2015 flood event, which was a significant event for this scheme. This flood event caused inundation and damage to the Mangamingi Bridge and the banks of the lower Patea River, but overall management of this flood was largely as required by consent conditions.

During the year, the Company demonstrated a 'good' level of environmental and administrative performance with the resource consents, with the only issue relating to the maintenance of access at the two boat ramps. All other aspects of the scheme were operated with a high level of environmental and administrative performance.

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.

For reference, in the 2014-2015 year, 75% 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 22% demonstrated a good level of environmental performance and compliance with their consents.

This report includes recommendations for the 2015-2016 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 Monitoring Report for the period July 2014-June 2015 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Trustpower Limited (the Company) in relation to the Patea Hydroelectric Power Scheme (HEPS). This scheme is located on the Patea River on Maben Rd, near Hurleyville.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company that relate to abstractions and discharges of water within the Patea catchment, the air discharge permits covering emissions to air from the site, and land use consents to cover the associated structures.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the second combined annual report by the Council for the Company. Monitoring activities undertaken prior to July 2011 were reported in two separate reports, one covering monitoring of Lake Rotorangi, the other covering monitoring of the Patea River downstream of the dam.

1.1.2 Structure of this report

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

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

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

Section 4 presents recommendations to be implemented in the 2015-2016 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

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

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

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the consent holder/s during the period under review, this report also assigns a rating as to each Company's environmental and administrative performance.

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

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

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

Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.
- **Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self reports, or in response to unauthorised incident reports, but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
- Strong odour beyond boundary but no residential properties or other recipient nearby.
- **Improvement required:** Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.
- **Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

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

- **Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.
- **Improvement required:** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.
- **Poor:** Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2014-2015 year, 75% 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 22% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Process description

The Patea HEPS is located on the Patea River, some 43 km upstream of the river mouth (Figure 1). Following the granting of consents in 1978 to construct a hydroelectric power station on the Patea River, work commenced on the 82 m high earth-filled dam. The dam impounds water in the Patea River to create the reservoir known as Lake Rotorangi. Lake Rotorangi is the longest man-made lake in New Zealand, being over 46 km long. It is fairly narrow, and has a surface area of approximately 6 km². The lake has storage of some 6,600 cumec-hours within the 4.5 m operational range, which is small by national standards. The scheme's 32 MW power station is however the largest hydroelectric station in Taranaki.

The original consents for the scheme expired in 2008 and applications for renewal of all consents were received on 19 November 2007. A Council hearing commenced for these consents on 3 June 2009. These consents were granted, but were subsequently appealed on 17 July 2009. This was resolved by the Environment Court, and consents were granted on 17 December 2010.

Under the original consents, the Council undertook a significant amount of monitoring of the environment associated with the dam, including Lake Rotorangi. This monitoring was reported in conjunction with compliance monitoring, with these reports included in the bibliography. These reports also provide some detail on historical matters.

Monitoring of the receiving environment is now required by conditions on the new consents, and as such, is coordinated by the Company, who engaged various consultants over the reported period. The Council was engaged as one of these consultants, to undertake some of the required monitoring. The most significant component of the receiving environment monitoring undertaken prior to consent renewal was the monitoring of Lake Rotorangi. This annual monitoring is still

undertaken by the Council, but now through a State of the Environment monitoring programme. It is essentially undertaken on a cost sharing basis, with the Company funding this monitoring once every three years, in accordance with consent conditions.

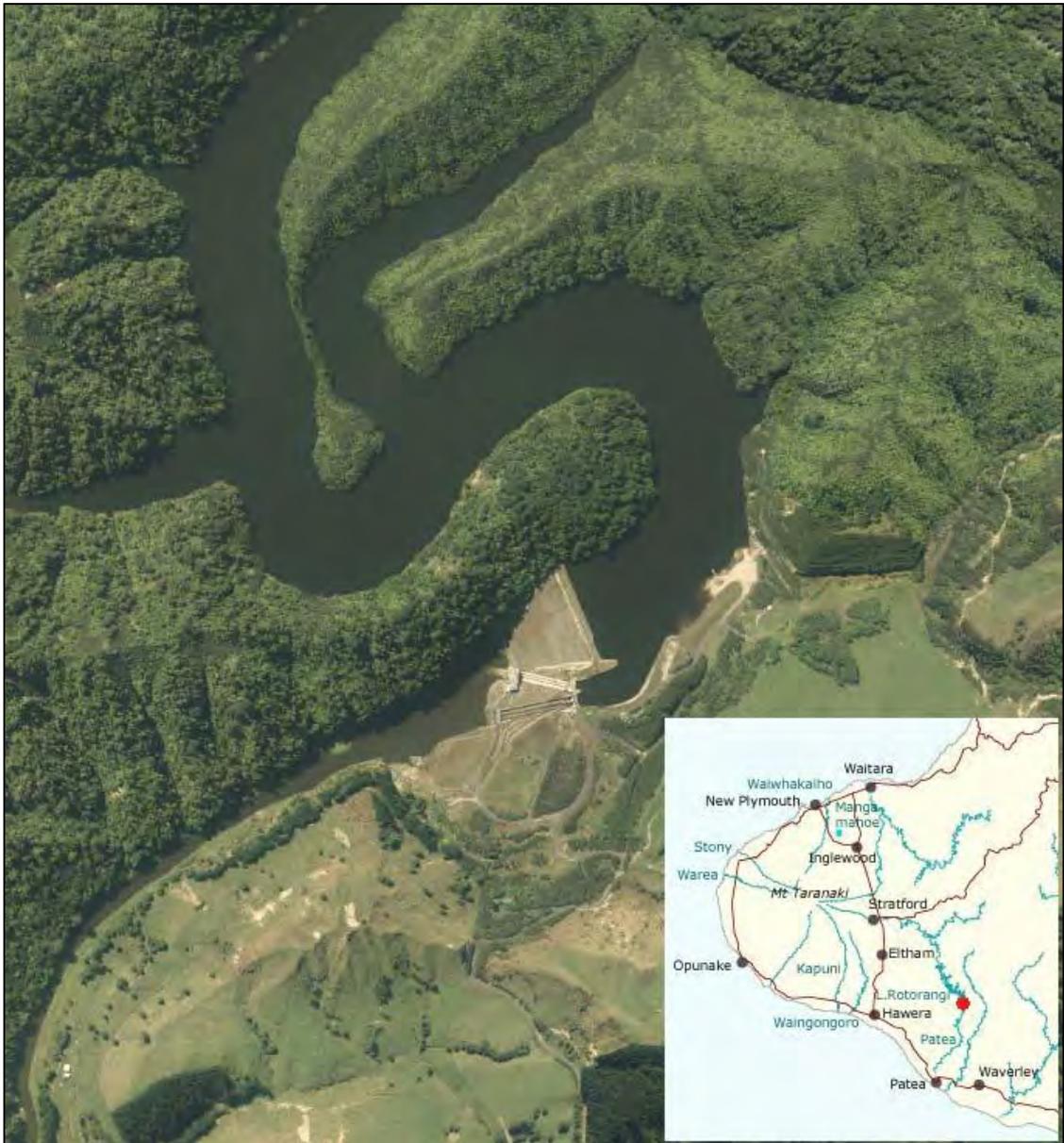


Figure 1 The Patea Dam. The red dot in the inset identifies its location within Taranaki.

1.3 Resource consents

1.3.1 Water abstraction 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.

Trustpower holds water permit **0489-2** to cover the damming and diversion of the Patea River from Lake Rotorangi through the intake and spillways. This permit was issued by the Council on 25 June 2009 under Section 87(e) of the RMA, and following appeal, commenced on 17 December 2010. Trustpower applied to for a variation to this consent, which was granted on 27 March 2012. It is due to expire on 1 June 2040. This permit includes 63 special conditions, which includes numerous monitoring requirements and associated conditions.

Condition 1 limits the rate of water that can be diverted, while conditions 2 and 3 clarify how this allocation of water does or does not affect the current and future allocation of water upstream of the dam.

Conditions 4 to 8 define the minimum flow that is to be maintained in the Patea River downstream of the dam, and allows for a lower minimum flow when less than normal rainfall reduces inflows.

Conditions 9 to 12 define the minimum and maximum allowable lake levels for winter and summer periods, specify the required spillway gate settings during a high lake level, and allows for some flexibility in lake levels to allow for a short term electricity shortage. When such a shortage occurs, the consent holder is required to notify Council, and provide an explanation.

Condition 13 requires the consent holder to provide a real time estimate of the level of Lake Rotorangi on the internet, while condition 14 requires the installation of staff gauges at three locations.

Condition 15 requires that in consultation with the Hawera Water Ski Club and Mangamingi Residents, a survey be undertaken to identify any hazards to water skiing, and in reporting this survey provide recommendations on how to avoid remedy or mitigate these hazards. Condition 16 then requires the publication of a full set of maps identifying these hazards to be erected at various locations and distributed to various parties.

Condition 17 requires the consent holder to construct and maintain a floating pontoon to allow improved access for boating at Pukekino Landing while condition 18 requires the electronic recording of the water level of Lake Rotorangi, and the provision of records to Council.

Conditions 19 to 23 relate to the provision of upstream and downstream fish passage facilities, with these facilities to be constructed, managed and maintained in the manner described in the associated report, required by condition 20.

Conditions 24 to 28 describe the requirements for developing a monitoring plan, including any revision of this plan. This plan is to detail the methods to be used when undertaking the receiving environment monitoring required by this consent.

Condition 29 requires the annual monitoring and reporting of the number of each fish species transferred upstream of the dam, and of the success of each spillway opening event for the downstream passage of adult eels, while conditions 30 and 31 requires the monitoring of upstream fish populations, and the reporting of the overall impact of the

fish transfer programme, including making recommendations on future management of this transfer programme.

Condition 32 requires monitoring of the ecology of the Patea River downstream of the dam, including the varial zone.

Conditions 33 to 35 requires the monitoring and reporting of the effects of the dam on trout downstream of the dam, and includes consideration of a trout restocking programme, which in itself would need to be monitored.

Conditions 36 and 37 requires monitoring and reporting of the extent, frequency, causes and effects of discharges of de-oxygenated water into the river below the Patea Dam. The report is to include recommendations for mitigating any effects or undertaking further investigations.

Condition 38 requires a one off investigation to determine the potential for fish stranding in the lower river, related to rapid reductions in water level.

Conditions 39 and 40 relate to the monitoring and reporting of sedimentation within Lake Rotorangi, and related to this is condition 41, which requires the consent holder to report on the risk to the Mangamingi Bridge from increased flooding as a result of this sedimentation, with the installation of safety devices also required.

Condition 42 requires an ecological and water quality survey of Lake Rotorangi to be undertaken every three years. This essentially requires Trustpower to fund one third of Councils annual State of the Environment monitoring of Lake Rotorangi.

Conditions 43 to 54 set out the framework for establishing an expert panel, define the role of this panel and how their input will be managed, sets out how their recommendations will be (or not) implemented, and requires stakeholder consultation as a part of this process. Related to this is the requirement for a stakeholders meeting, as required by condition 55.

Conditions 56 and 57 require the maintenance of three boat ramps, and allow for temporary access restrictions.

Signs, alerting users of Lake Rotorangi and the Patea River to fluctuations in flows and water levels floating log debris are to be erected at various locations, as per condition 58, and condition 59 requires maintenance of floating booms to safeguard lake users, and to keep floating debris away from the penstocks.

Conditions 60 to 62 require the consent holder to provide water for an annual jet boat race event in the lower Patea River, where this water is available.

Condition 63 is a review provision.

Trustpower also holds water permit **0491-2** to cover the taking and use of water from Lake Rotorangi for generation. This permit was issued by the Council on 25 June 2009 under Section 87(e) of the RMA, and following appeal, commenced on 17 December 2010. It is due to expire on 1 June 2040.

Condition 1 limits the rate of water that can be diverted, while conditions 2 and 3 clarify how this allocation of water does or does not affect the current and future allocation of water upstream of the dam.

Conditions 4 to 8 define the minimum flow that is to be maintained in the Patea River downstream of the dam, and allows for a lower minimum flow when less than normal rainfall reduces inflows.

Special condition 9 requires a report be submitted that considers a range of options for avoiding adult eel entrapment at the intake, and recommends a one of the options for implementation. Condition 10 requires implementation of this option.

Condition 11 requires the recording of flow in the Patea River at McColl's Quarry, with records to be provided to Council.

Condition 12 requires all water taken, except that taken for cooling purposes, to be discharged back to the river immediately below the dam.

Condition 13 is a review provision.

Trustpower also holds water permit **7192-1** to cover the taking and use of groundwater for domestic use. This permit was issued on 30 June 2009 under Section 87(d) of the RMA. It is due to expire on 1 June 2040.

Condition 1 requires that the activity be undertaken in accordance with the application, while condition 2 limits the daily volume that is to be taken.

Condition 3 requires the installation of a water meter on the bore, and condition 4 requires the taking of records, with these records to be provided to Council.

Condition 5 states that the consent shall lapse if not exercised prior to 30 June 2014, while condition 6 is a review provision.

Copies of these consents are appended to this report.

1.3.2 Water discharge permit

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

The Company holds water discharge permit **7190-1** to cover the discharge of water from the Patea power house and spillway to the Patea River, for hydroelectric power generation. This permit was issued by the Council on 25 June 2009 under Section 87(e) of the RMA, and following appeal, commenced on 17 December 2010. It is due to expire on 1 June 2040.

Conditions 1 to 3 require the monitoring and reporting of the Patea River downstream of the dam, in order to assess the extent of erosion that is or is not occurring.

Condition 4 requires that the Patea Dam and associated components and structures are maintained to the standards recommended in the operative New Zealand Society of Large Dams, Dam Safety Guidelines (2000).

Conditions 5 to 7 require the consent holder to provide an Emergency Management Plan to the Taranaki Civil Defence Emergency Management Group, and numerous other parties, with the plan to be reviewed annually.

Condition 8 requires the measurement and recording of the rate of discharge from the Patea Powerhouse and main service spillway, with the records to be provided to Council.

Conditions 9 to 13 define the minimum flow that is to be maintained in the Patea River downstream of the dam, and allows for a lower minimum flow when less than normal rainfall reduces inflows.

Condition 14 requires the consent holder to make an annual payment to the Taranaki Tree Trust for the purpose of providing riparian management in the lower Patea River catchment.

Conditions 15 and 16 set out the allowable rise or recession rates for discharges of greater than 95 cumecs, with reference to the inflows at the time.

Condition 17 states that the consent holder shall financially contribute to the maintenance of the Patea River at Skinner Road and Mangaehu Stream at Bridge hydrographic stations.

Condition 18 is a review provision.

Trustpower also holds water discharge permit **7191-1** to cover the discharge of water from the scheme's auxiliary and emergency spillways to the Patea River. This permit was issued by the Council on 25 June 2009 under Section 87(e) of the RMA, and following appeal, commenced on 17 December 2010. It is due to expire on 1 June 2040.

Conditions 1 to 3 require the monitoring and reporting of the Patea River downstream of the dam, in order to assess the extent of erosion that is or is not occurring.

Conditions 4 and 5 set out the allowable rise or recession rates for discharges of greater than 95 cumecs, with reference to the inflows at the time.

Condition 6 is a review provision.

1.3.3 Air discharge permit

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

The Company holds air discharge permit **7193-1** to cover the discharge of contaminants to air during abrasive blasting processes, when maintaining the Patea HEPS. This

permit was issued by the Council on 30 June 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2020.

Condition 1 requires the consent holder to adopt the best practicable option, and condition 2 prohibits any offensive or objectionable discharge beyond the boundary of the property.

Condition 3 requires work areas to be cleared of accumulated blasting material at the end of each day, and condition 4 limits the silica and dust content of the sand.

Condition 5 requires that all operators are to be familiar with this consent, condition 6 limits the effects of the discharge on any receiving surface watercourse and condition 7 requires the items or premises to be blasted to be covered as completely as practicable.

Condition 8 requires Council to be notified if abrasive blasting or surface coating is to take place within 100 m of a watercourse, and for the consent holder to confirm that there will be no additional measures required in such a case.

Condition 9 limits the suspended particulate matter levels and dust deposition rates beyond the property boundary.

Condition 10 states that the consent shall lapse if not exercised prior to 30 June 2014, while condition 11 is a review provision.

The Company also holds air discharge permit **7194-1** to cover the discharge of contaminants to air during the burning of driftwood captured by the log boom. This permit was issued by the Council on 30 June 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Condition 1 requires the consent holder to adopt the best practicable option, and condition 2 requires the consent holder to have due regard to the direction and strength of the wind over the duration of the burning.

Condition 3 prohibits any offensive, objectionable or toxic levels of smoke or odour beyond the boundary of the property.

Condition 4 states that the activity is to undertaken in accordance with the application, and condition 5 requires that the burning is to be supervised at all times.

Condition 6 requires that the consent holder notify Council each time the burning occurs, and condition 7 requires that a record of each burning event is maintained.

Condition 8 states that the consent shall lapse if not exercised prior to 30 June 2014, while condition 9 is a review provision.

Copies of these consents are appended to this report.

1.3.4 Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any

structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

The Company holds land use permit **0488-2** to cover the use of the Patea Dam and associated infrastructure. This permit was issued by the Council on 25 June 2009 under Section 87(e) of the RMA, and following appeal, commenced on 17 December 2010. It is due to expire on 1 June 2040.

Condition 1 requires that the Patea Dam and associated components and structures are maintained to the standards recommended in the operative New Zealand Society of Large Dams, Dam Safety Guidelines (2000).

Conditions 2 to 4 require the consent holder to provide an Emergency Management Plan to the Taranaki Civil Defence Emergency Management Group, and numerous other parties, with the plan to be reviewed annually.

Condition 5 is a review provision.

The Company also holds land use permit **7188-1** to cover the maintenance, repair, alter and reconstruct various structures. This permit was issued by the Council on 25 June 2009 under Section 87(e) of the RMA, and following appeal, commenced on 17 December 2010. It is due to expire on 1 June 2040.

Condition 1 limits the circumstances where maintenance can be undertaken, and condition 2 states that no contaminant shall be released to the river or lake beyond the area being worked, and prohibits the refuelling of equipment on the river or lake bed.

Condition 3 limits the allowable decrease in visual clarity caused by any works, and condition 4 requires that all material removed from the structure and surplus construction materials be removed from the river or lake bed.

Condition 5 states that dewatering of any work site will be for the minimum time necessary and includes a notification requirement, and condition 6 requires the area of disturbance to be minimised.

Condition 7 is a review provision.

The Company also holds land use permit **7773-1** to cover placement and use of a floating pontoon in Lake Rotorangi. This permit was issued by the Council on 26 January 2011 under Section 87(e) of the RMA. It is due to expire on 1 June 2028.

Condition 1 requires the structure to be constructed in accordance with the plan provided to Council, and condition 2 requires the Council be notified prior to installation.

Conditions 3 and 4 require the area of disturbance to be minimised while taking all reasonable steps to minimise sediment issues.

Condition 5 requires the structure to be removed when no longer required, and condition 6 relates to the potential discovery of archaeological remains during installation.

Condition 7 states that the consent shall lapse if not exercised prior to 30 June 2014, while condition 8 is a review provision.

Copies of these consents are appended to this report.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets out obligations upon the 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 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 Patea HEPS site consisted of four primary components.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

The Patea HEPS was visited eleven times during the monitoring period, including seven hydrological inspections, three site inspections and one other inspection following flooding. 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.

1.4.4 Chemical sampling

Although the monitoring programme included provisional water quality monitoring, no activities were undertaken on site that required this monitoring. This also applied to the emissions from the site and the ambient air quality in the neighbourhood related to the abrasive blasting consent, which was not exercised.

1.4.5 Data review

The consents held for the Patea HEPS included numerous requirements relating to the monitoring of potential effects from the scheme, lower river ecology and fish passage provision and success. A number of these reports were received during the reported period, which were reviewed and, where appropriate, certified by the Council.

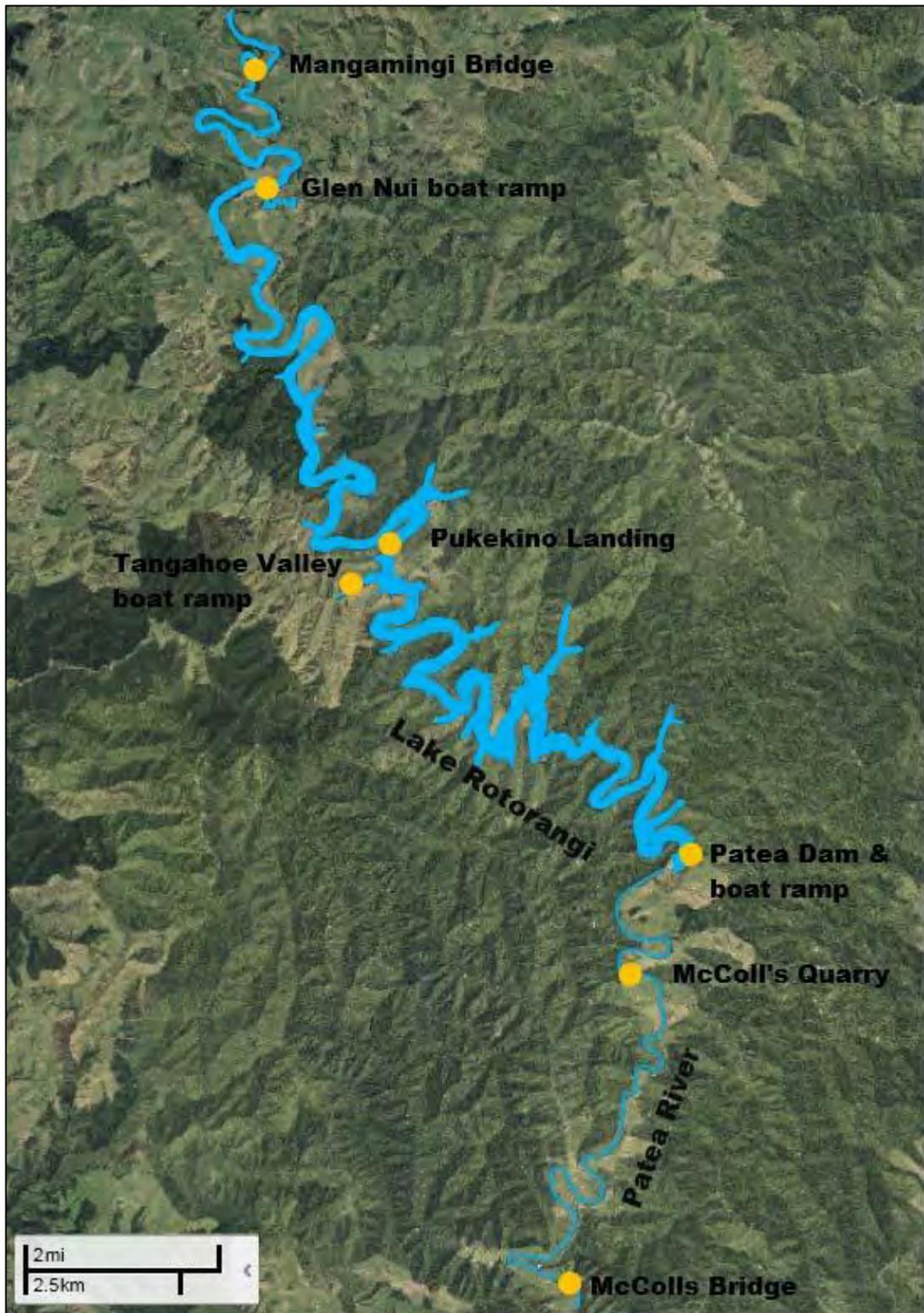


Figure 2 Lake Rotorangi, Patea Dam and the lower Patea River

2. Results

2.1 Water

2.1.1 Inspections

The principle purpose of the frequent hydrological inspections was to check the accuracy of the McColl's Quarry recorder. This was added to the monitoring programme, as per the recommendation in the previous monitoring report (TRC, 2015). Four of the seven hydrological inspections undertaken found that the recorder was within the accuracy agreed upon¹. The remaining three inspections found that the staff gauge was damaged, and no calibration reading could be taken. Coincident with two of these hydrological inspections, a flow gauging was performed. The gauging undertaken on 15 October 2014 recorded a flow of 17,439 L/s, while the gauging undertaken on 17 March 2015 recorded a flow of 9,058 L/s. Both recordings were well in excess of the minimum flow of 2.1 m³/s (2,100 L/s), and all results were made available to Trustpower for maintenance of the rating curve for this site.

The site inspections visited various aspects of the scheme, including the boat ramps on the lake, the dam itself, and various locations where signs were required, including the Patea estuary boat ramp.

The first inspection was undertaken following notification from a member of the public regarding restricted access at the Tangahoe Valley Boat ramp. This inspection, performed on 15 October 2014, found that due to sedimentation at this boat ramp, access at the Tangahoe Valley Boat ramp was restricted when the lake level was low (Photo 1). On this day the Glen Nui boat ramp was also inspected. Although maintenance was being undertaken at this time, it was clear during this inspection that access at this ramp is also restricted during low lake levels (Photo 2). The crew undertaking maintenance at the Glen Nui boat ramp advised that they were also contracted to create a new boat ramp at the Tangahoe Valley access way, to begin once the Glen Nui maintenance was complete. This situation is discussed in more detail in section 2.4.

The next inspection, completed on 10 February 2015, found a low flow in the lower Patea River. It was clear that due to the dry weather, inflows to the lake were low, and the generation was only occurring in order to maintain the residual flow. At the dam there had been recent works undertaken to raise the crest of the dam in areas, as it had been slightly convex.



Photo 1 The Tangahoe Valley boat ramp during a low lake level, 15 October 2014

¹ Discussion with Trustpower regarding compliance assessment – 5% error. Document # 1389716.



Photo 2 The Glen Nui boat ramp during a low lake level, 15 October 2015. The yellow line approximates the edge of the concrete ramp.

The area where the fill material was quarried was stable and grassed. The adult eel conveyance system appeared partly installed, and there was a moderately sized pile of wood awaiting burning near the log boom.

The final inspection, undertaken on 9 June 2015, found that Lake Rotorangi was high and dirty. The eel bypass system was installed and operating. Signage at the Patea Dam boat ramp, Pukekino Landing and Patea estuary was all intact, while one of the two signs at McColl's bridge had experienced some damage. There was a new boat ramp created at the Tangahoe Valley access point, although it was yet to be concreted.

On 20 June 2015 the eastern hill county of Taranaki experienced a significant rain event, which resulted in very high flows in the rivers draining this area. This included the Mangaehu River, and as a result there was a significant flood event in the Patea River. How the scheme dealt with this flood event is discussed in section 2.4.

2.1.2 Provision of company data

The Company provides data on discharge rates, abstraction rates and lake levels on a monthly basis. This data is summarised below.

Tailrace rise and recession rates

Special conditions of consents 7190-1 and 7191-1 set the limits on flow rise and recession rates into the lower Patea River by defining the relationship between flows in the Patea River above the lake and dam outflows. When the data is processed, a minimum and maximum flow is calculated, and compliance is determined by checking whether the flow released was between these two figures. The algorithm used to calculate the minimum and maximum flow uses flow data to work out the allowable rate of rise or recession. It is important therefore that when comparing the actual flow with these minimum/maximum flows that the same data record is used as was used in calculating the minimum/maximum flows. Trustpower record flow downstream of the dam in two ways. They record the water level in the tailrace, and this is converted to a flow using a rating curve, called the 'tailrace flow'. They also record the rate of

generation, which is converted to flow, and this is added to the recorded spillway flow, also giving a figure for total flow downstream of the station. This is referred to as the 'total station outflow'.

Up until June 2015, the Council used the tailrace flow to calculate the allowable rise or recession rates. However, during the flood event that occurred in June 2015, flow in the Patea River exceeded the range of the tailrace recorder, and as result the Council used total station outflow to assess compliance. Through this process it was realised that this is the most appropriate flow for assessing compliance (as opposed to the tailrace flow). Therefore in the 2015-2016 period, compliance is being assessed using the total station outflow.

During the 2014-2015 period, there were no significant breaches but there were a number of minor breaches of special condition 15 of consent 7190-1 and special condition 4 of consent 7191-1. These breaches are summarised in Table 1.

Table 1 Summary of occasions when flow rise and recession rates were not in line with consent conditions, July 2014 to July 2015

Date	Time	Average tailrace rise or recession rate m ³ /s/hr over this time	Treated as a breach?	Comment(s)
3 August 2014*	0200-0300	46.2	No	Minor
	0400-0515	154.6		Minor
7 November 2014*	0245-0445	38.2	No	Minor
20 May 2015*	0530-0630	68.4	No	Minor
20 June 2015**	1630-1830	94.7	No	Minor and associated with a severe flood event
21 June 2015**	1315-1345	-281.6	No	
	1845-1945	-15.8		
	2000-2300	-10.3		
21-22 June 2015**	2315-0215	-11.2	No	
22 June 2015**	0300-0330	-11.2	No	
	0345-0600	-7.8		

*Assessed using tailrace flow

** Assessed using total station flow

Residual flow compliance

Consent 0489-2 includes a residual flow requirement. This requirement reads as follows:

"...the exercise of this consent shall not cause the flow in the Patea River, as measured at the McColl's quarry' measuring site to be less than 2.1 cubic metres per second (as an hourly average)"

Due to the variable nature of the flow in the lower Patea River, it is difficult to coordinate gaugings with low flows. Therefore the principal means of determining compliance with this condition is to assess the flow data provided by the Company. It should be noted that all flow recording equipment is allowed a 5% margin of error, and as such, the recorded flow would need to be below 1.995 cumecs to be considered non-compliant. The flow records submitted to Council show that compliance has been good, with only one day seeing a flow of less than 2.1 cumecs at the recording site. This occurred on 17 March 2015, during a very dry period, when the residual flow was provided by generating for short periods of time. This resulted in a fluctuating flow in the lower river, and at 5.30am and 1.55pm the flow ebbed below 2.1 cumecs, although only the second occasion dropped below 1.995 cumecs (Figure 3). Neither of these occasions occurred for an extended period of time, and as a result the hourly average

remained above 2.1 cumecs. This means that this condition was complied with at all times during the 2014-2015 period. Although Trustpower had indicated to Council that they would need to invoke condition 5 of consent 0489-2 due to the low flows, this did not actually occur. Special condition 5 allows flow to be reduced to below 2.1 cumecs following unusually long periods of less than normal rainfall.

The McColl's Quarry recorder was destroyed by the June 20 flood, and as a result no residual flow data is available for this site for the last 10 days of this reported period. A check of the McColl's bridge flow data shows that the lowest flow recorded over this time was 4.99 cumecs, compared with 3.31 cumecs recorded on 17 March 2015. This suggests that the minimum flow was provided as required over this time.

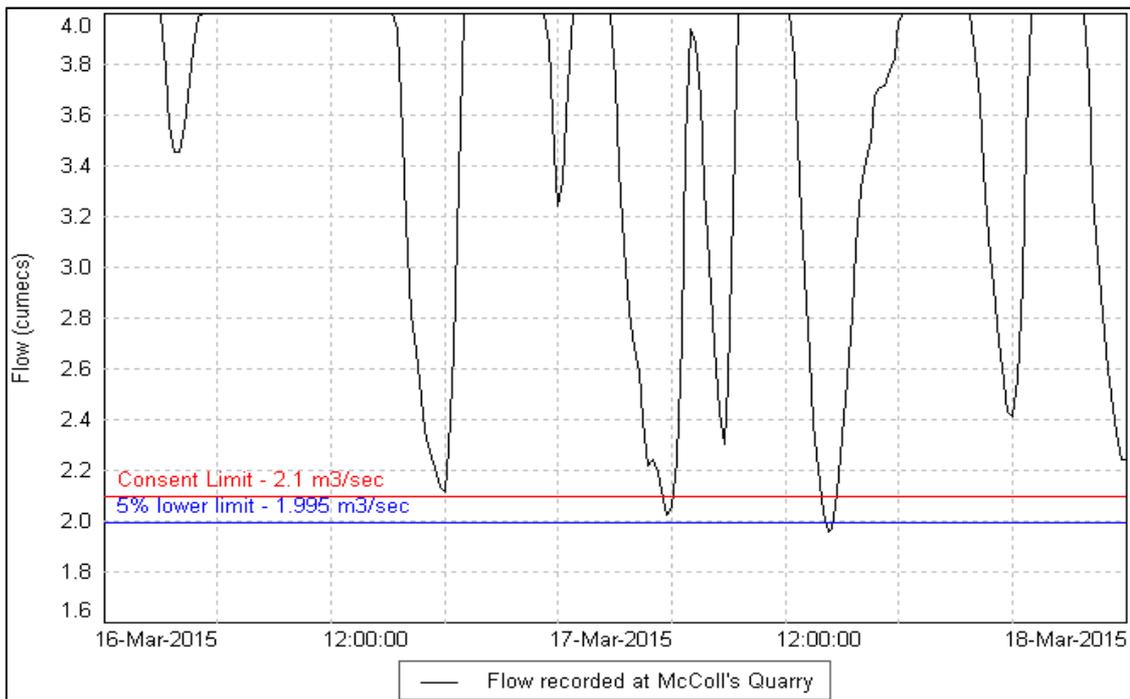


Figure 3 Recorded flow in the Patea River at McColl's Quarry, between 16 March 2015 and 18 March 2015

Lake Level Management

Consent 0489-2 sets the maximum and minimum allowable lake levels, having some regard for season, although some flexibility is allowed.

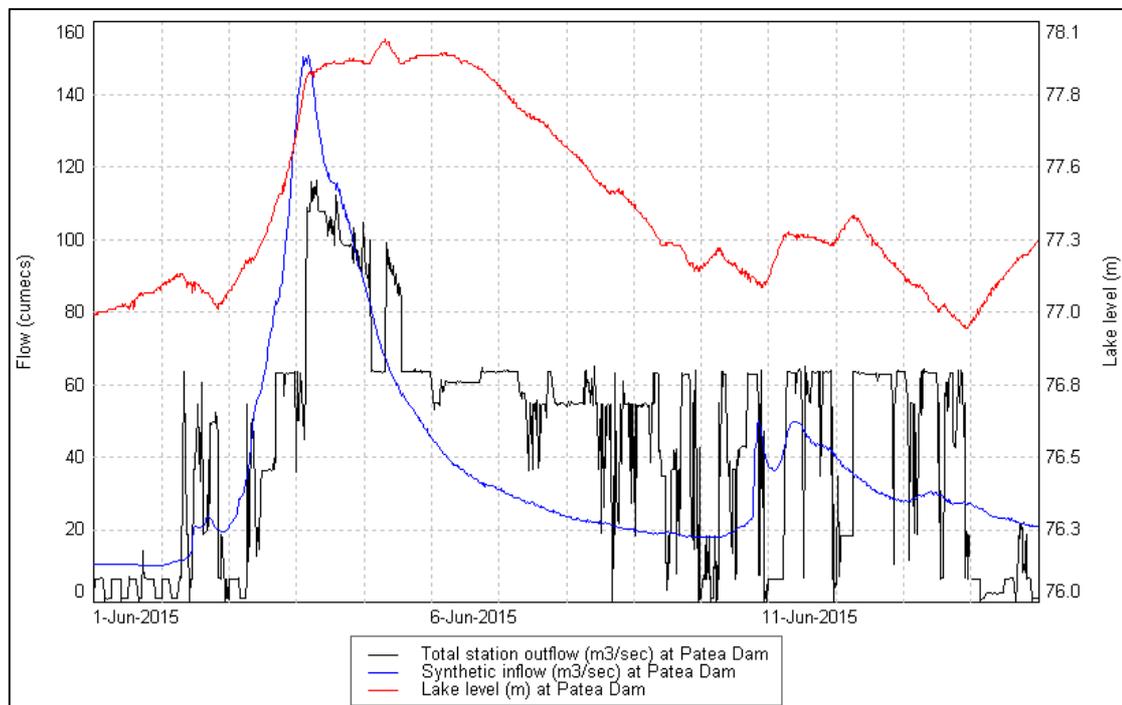
During the summer period (15 December to 15 April), the lake level is not to drop below 76 m for a total of 264 hours, and it is not to drop below 75 m at all. In winter (16 April to 14 December), the lake level is not to drop below 76 m on more than 125 days, and below 75 m on more than 40 days.

Table 2 presents a summary of lake levels for the reported period, and shows that lake levels were maintained in accordance with this consent condition.

Table 2 Number of days that lake level was below set levels in relation to consent conditions

Season (allowable number of hours/days per season when lake level is less than _m)	Lake level	2011-14	2014-15
Summer 15 December – 15 April (<76 m for no more than 264 hours, not less than 75 m)	<76 m	0	0
	<75 m	0	0
Winter 16 April – 14 December (<76 m on no more than 125 days, <75 m on no more than 40 days)	<76 m	107	41
	<75 m	0	2

Figure 4 shows how the lake level changes with changing in-flows, and change in generation rates and spillway flows. It is clear that the lake can fill relatively quickly when a flood occurs in the headwaters, reflecting the relatively small amount of storage in Lake Rotorangi.

**Figure 4** The relationship between lake levels, inflows and tailrace flows (generation flow plus spill-flow)

Groundwater abstraction

Consent 7192-1 limits the daily groundwater volume that is to be taken for domestic water supply at the Patea Dam, and requires records be taken of this abstraction. These records, provided as monthly totals, were analysed to provide an average daily abstracted volume. Figure 5 summarises the data provided to Council. This data indicates that at no time did the average abstraction volume exceed the limit of 12.5 m³/day. The high rate of take recorded in July and August 2014 related to a leak in the line, which took some time to be detected.

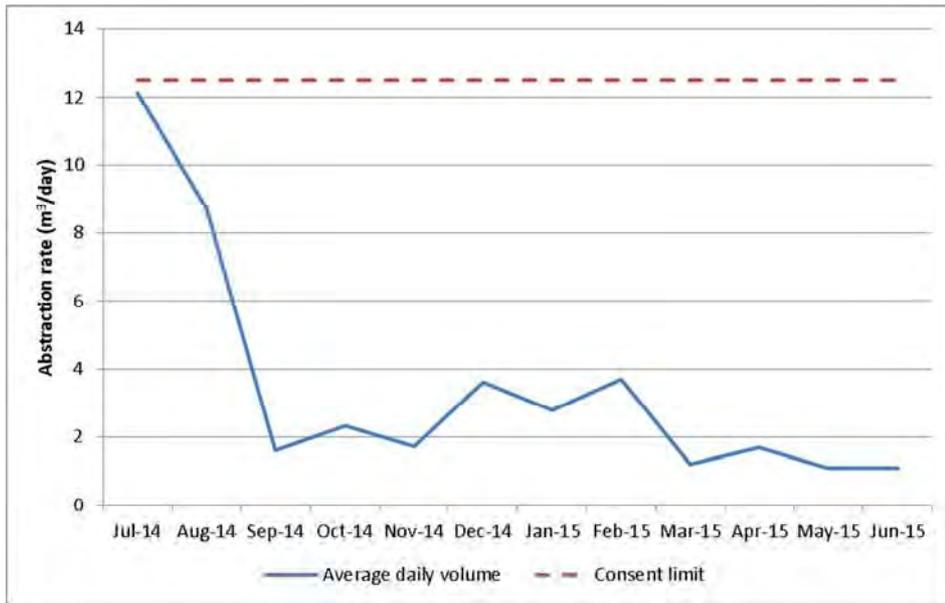


Figure 5 Average daily groundwater volume taken during the 2014-2015 period.

Spillway gates

Special condition 10 of consent 0489-2 specifies how the spillway gates are to respond to a changing lake level. These gates are to progressively open or close so that they are completely closed when the lake level is at 78 metres, and completely open when it is at 78.5 metres. There were three occasions during the year when this condition was not strictly adhered to. The first occurred on 7 November when a small flood entered the lake. The programmable logic controller (PLC), which is the automatic controller for the station, began spilling water in order to manage the lake level. However, because a transducer had failed, the gate position signal continued to be logged as being 'closed'. As a result, the PLC continued to command this spillway gate to open. This resulted in the gate being opened to 93%. The PLC contains a number of alarm mechanisms, and it was through these alarms that Trustpower staff became aware of the issue. On-site staff were contacted, and they took manual control of the spillway gates. A full explanation was provided by the Company², and as this incident was as a result of equipment failure the Council opted not to take any action. The change in lake level and flow in the lower river during this event is shown in Figure 6.

² Trustpower – Patea HEPS – 7th Nov 2014 Spill Event Details. Document#1453178

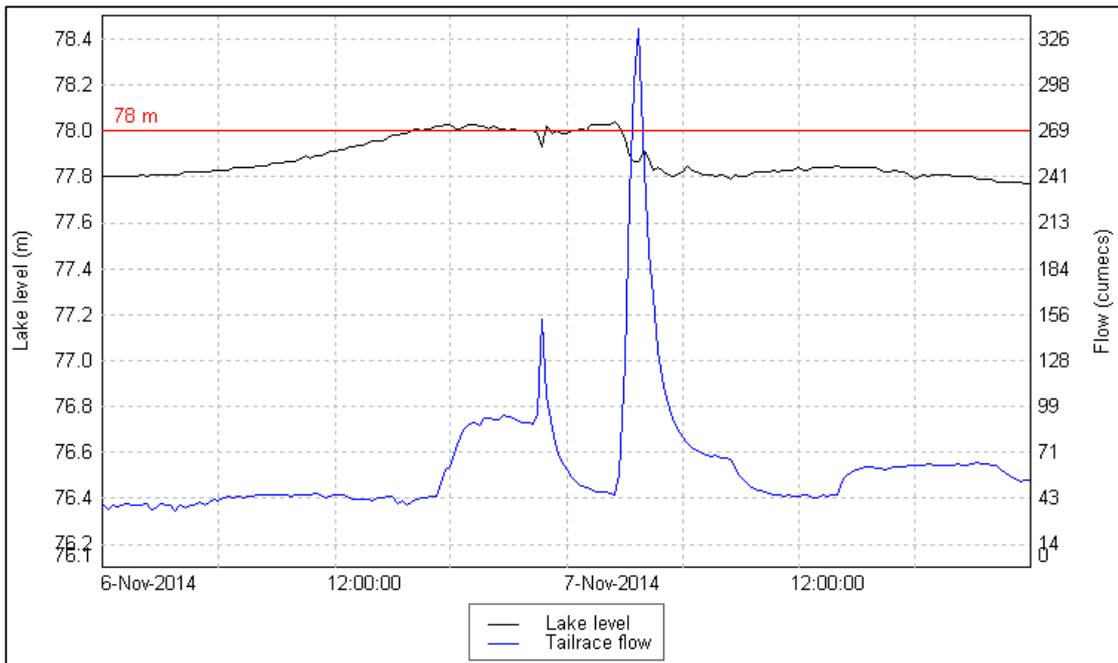


Figure 6 Lake level and tailrace flow from 6 November to 8 November 2014

The second event occurred on 20 May 2015. On this occasion, the PLC received erroneous flow data, which indicated that the Patea River upstream of the lake was experiencing a significant flood. As a result, the PLC opened the spillway gates, in anticipation of this flood entering the lake. Trustpower operators recognised that there was an issue, and after undertaking the necessary checks to confirm that the Skinner Road data was erroneous, they manually closed the spillway gates. Although the cause of the erroneous data could not be identified, this incident was also attributed to equipment failure, and as such the Council did not undertake any follow up action.

The final event occurred following the large flood of 20 June 2015. At this time Trustpower needed to lower the level of the lake to facilitate safe access to the logs and debris collected at the log boom, which needed to be removed as more logs and debris were coming down the lake. This additional spilling was controlled to keep flows at less than 95 cumecs, and was done in consultation with the Council.

2.1.3 Results of receiving environment monitoring

The Council did not undertake any receiving environment monitoring in the reported period. The receiving environment monitoring undertaken prior to the scheme gaining new consents is now undertaken in a separate programme, or by the consent holder as a requirement of consent. In addition, there were no works undertaken during the reported period that could have disturbed water quality to the extent where additional monitoring was required.

During the reported period, the Company were required to undertake and report on a number of monitoring projects. These are summarised in Table 3.

Table 3 Reports required to be submitted to Council by Trustpower over the reported period

Consent	Condition(s)	Requirement	Detail	Comments/TRC reference
0489-2	29	Fish transfers	Detail the work undertaken, and success of upstream fish transfer and spillway opening for downstream eel migration	Currently with expert panel for review
	32	Downstream ecology	Identify and quantify the ecology of the lower Patea River, including the varial zone. Two reports to be submitted in reported period	Currently with expert panel for review
	33	Effects on trout	Investigate the effects of the Patea Dam and hydroelectric power scheme on trout downstream of the dam. Three reports required in reported period.	Currently with expert panel for review
	36 & 37	Dissolved oxygen investigation	Investigate and report on the extent, frequency, causes and effects of discharges of de-oxygenated water in to the river below the Patea Dam	Currently with expert panel for review.
	39 & 40	Lake sedimentation	Monitor and report on sedimentation of Lake Rotorangi	2014-2015 Doc#1502456
	42	Lake eutrophication	Carry out an ecological and water quality survey of Lake Rotorangi every three years	Report in preparation
7190-1 & 7191-1	1	Patea River erosion	Monitor the lower Patea River for erosion, including an annual visual inspection and photographic survey of the lower river, and a biennial cross section survey – three reports required in report period	2014-2015 Doc#1490809

Other than the annual reporting requirements, reports that are to be submitted to the Council in the following years are as follows:

- Upstream fish populations – six year follow up; and
- Mangamingi Bridge flood risk.

It is possible that additional reports will be required once the dissolved oxygen and trout reports are finalised, and any of these reports may include recommendations for further monitoring.

Upstream and Downstream fish migration provision

The Company has already provided details of how fish are to be transferred upstream, and how adult eels are to be transferred downstream (TRC, 2015). In addition, the transfer of juvenile lamprey into the headwaters has not yet been required, as this is not currently considered a practical requirement. The adult eel conveyance system was installed in the 2014-2015 period, but was commissioned after the majority of migrating eels had passed through, and so only one eel has been transferred using this system so far.

Monitoring of upstream and downstream fish migration

This report was presented to the Council on 2 November 2015 and Table 4 presents a summary of all fish transferred upstream of the dam since the 2011-2012 period. This shows that overall there have been good numbers of koaro and banded kokopu transferred, although numbers were much lower in the 2014-2015 period. Eels continued to be the most predominant catch, with shortfin eel the most abundant species transferred, which is typical. In the 2015-2016 period, fish will be transferred to an additional release location, to ensure that banded kokopu are released in a location more reflective of their expected pre-dam distribution.

Table 4 Summary of fish transferred into the Patea River catchment headwaters

Species	2011-12	2012-13	2013-14	2014-15	Total
Koaro	400	386	34	19	839
Banded kokopu	1,327	1,362	385	42	3,116
Unidentified climbing whitebait	182	0	7	41	230
Longfin eel	8,613	50,766	23,471	23,400	106,250
Shortfin eel	84,639	183,711	169,599	237,174	675,123
Unidentified elvers	45	0	0	0	45

In terms of the transfer of adult eels over the spillway, the numbers are variable between years. This in part reflects the variable nature of the adult eel migration, and difficulty in predicting its occurrence. In the 2014-2015 period, 613 eels were passed down the spillway, and one eel was passed down through the new eel diverter. This compares to 59 eels transferred in the 2011-2012 period, 594 in the 2012-2013 period and 1,884 in the 2013-2014 period. It is likely the small number of eels recorded in the 2011-2012 period was related to limited monitoring of the transfer.

It is anticipated that the next monitoring report will include monitoring of the new eel diverter, using the methodology detailed in component 3 of the aquatic monitoring plan.

Downstream ecology

One ecological survey was undertaken in the lower Patea River during the reported period. Unfortunately due to the extended period of dry weather that preceded this survey, there was effectively no varial zone, and as such the macroinvertebrate sampling of the varial zone could not be conducted. It was decided to delay the macroinvertebrate component until the following year. The report detailing that work which was completed is currently with the expert panel for review. It is anticipated that the full results will be discussed in the next (2015-2016) monitoring report.

Lake eutrophication

The report discussing the lake eutrophication survey is currently being prepared. It is anticipated a summary of this report will be included in the next (2015-2016) monitoring report.

Lower river erosion monitoring

Consents 7190-1 and 7191-1 require that the lower Patea River be inspected annually and that this inspection is to be accompanied by a photographic survey, in order to document any erosion. In addition, a biennial channel cross-section survey of 13 sites was required, although the frequency of this survey would change to every five years if two consecutive surveys found no significant change in cross section shape.

This work was completed in February 2015, and the cross sections found no significant change in cross section shape. As a result the survey frequency has now changed to every five years. It is possible that the flood of June 2015 has affected the lower river cross sections, and as such it is likely that the next survey, scheduled for completion in

2019-2020, will record a change in cross section shape. This may see the frequency return to being biennial.

Effects on trout

The monitoring of trout downstream of the dam was completed in the 2012-2013 period. However, there were delays in completing the reporting component, as there were some misunderstandings relating to the purpose of this monitoring. However, these misunderstandings have now been clarified, and a report is currently with the expert panel for review.

The results indicate that trout spawning in the lower Patea River is not sufficiently successful to mitigate for the barrier to juvenile trout passage posed by the Patea Dam and Lake Rotorangi. Therefore, it appears stocking of the Patea River downstream of the dam is appropriate, and it is anticipated that the Company will provide the Council with a proposed timeframe for stocking and the associated monitoring when the report is presented to the Council for certification. The monitoring component is already described in the Aquatic Monitoring Plan.

Dissolved oxygen monitoring

A final report discussing the dissolved oxygen monitoring of the Patea River downstream of the dam was required to have been presented to the Council for certification within 36 months of the consent being granted. This report has been delayed due to a number of factors, including problems with equipment maintenance. However, it is understood that this final report is with the expert panel for review, and it is anticipated that a resolution will be met in the 2015-2016 period. It is possible that this resolution will include recommendations for further monitoring.

2.2 Riparian planting

As per special condition 14 of consent 7190, the consent holder makes an annual donation to the Taranaki Tree Trust. This is to mitigate the effects of downstream erosion by contributing to riparian management in the lower Patea River catchment. When consent was granted, the payment was set at \$7,500, but is expected to be inflation adjusted in subsequent years.

At the time of compiling this report, three landholders in the lower Patea catchment had applied to be subsidised 50% of the cost of plants planted within the catchment for riparian protection in the 2014-2015 period. To date, Trustpower have provided just over \$38,000 towards subsidising riparian planting in this catchment, of which just under \$4,000 remains available.

2.3 Stakeholders meetings

One stakeholder meeting was held during the reported period, on 18 March 2015. Stakeholders who attended this meeting included representatives from Ngati Ruanui, Fish and Game and TRC.

This meeting essentially served to keep the stakeholders up to date with the significant amount of monitoring undertaken, while also keeping them abreast of any compliance

issues that may have arisen. These meetings also gave the stakeholders the opportunity to ask questions, and to discuss the monitoring requirements in depth.

2.4 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual 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 Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Incident Register (IR) 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 2014-2015 period, the Council was required to undertake two additional investigations, and to record an incident in relation to one of these investigations, in association with the Company's conditions in resource consents or provisions in Regional Plans.

On 11 October 2014, the Council received a complaint about the Tangahoe Valley boat ramp being inaccessible. An inspection confirmed this access restriction and found that access at the Glen Nui boat ramp was also inaccessible (see section 2.1.1). On the day of inspection, the lake level was as low as 75.21 m, and as a result it was found that the scheme was non-compliant with condition 56 of consent 0489-2, which requires the following:

The consent holder shall maintain the boat ramps at the locations listed below so that they are usable at all lake levels between RL 74 m and RL 78 m:

- (a) The Glen Nui Ramp 1;
- (b) The Tangahoe Valley Ramp; and
- (c) The Boat Ramp located at the Patea Dam.

If maintenance of any boat ramp proves to be impracticable it shall be replaced.

In the course of investigating this, it became apparent that the Company had lowered the lake level with the express purpose of maintaining the Tangahoe Valley and Glen Nui boat ramps to improve access. Unfortunately there had been a breakdown in communication with an affected landowner, who was significantly disadvantaged by

this restricted access at this time. Through further correspondence and a meeting between Company and Regional Council officers, the following was agreed:

- Strict compliance with condition 56 is not required, provided the lake level is managed to maintain access at these boat ramps;
- If maintenance necessitates lowering of the lake level to a point where access is restricted at any boat ramp, the Company will need to ask for dispensation for this access restriction;
- As a part of this dispensation process, the Company will need to notify all three landowner/occupiers on the left bank, include notification of maintenance activities affecting the boat ramp access on their website, erect physical signage up at locations prior to getting to the boat ramps and at the boat ramps;
- The Company will investigate a resolution, including a new ramp to be created at the Tangahoe Valley location, and the possibility of a variation to the consent; and
- The Council will not take enforcement action as an agreement has been reached with the Company, recognising that they were essentially trying to do meet the intention of their consent conditions.

It can be confirmed that works were undertaken to improve access at the Glen Nui boat ramp and to concrete the new boat ramp at Tangahoe Valley, with these works being completed in August 2015.

The second investigation related to the flood event that occurred in late June 2015. On 19 and 20 June 2015 Taranaki experienced a severe weather event. Over this time, most rainfall recorders monitoring by Council recorded over half of their average June rainfall and a number of rivers recorded record flows, especially those draining the eastern hill country³. The largest tributary of the Patea River, the Mangaehu River, drains the eastern hill country, and this river recorded the second highest flow on record³. As a result, the level of Lake Rotorangi rose quickly, despite the spillway gates being completely open. This event caused flooding around the top of the lake, with the Mangamingi Bridge inundated (Photo 3), and also downstream of the dam (Photo 4), with water reaching the support struts of McColl's Bridge. Due to damage to the recording equipment at McColl's bridge, the flood peak had to be estimated, and it appears that the Patea River at McColl's bridge reached a flow of approximately 1,300 m³/s.

This investigation had two components. The first component involved assessing Trustpower's data to ensure they took all practical steps to minimise flooding and the associated damage, while the second component was intended to document the impacts of the flood.

The data provided by the Company indicates that the spillway gates began to open prior to the lake reaching 78 m. However, due to the amount of water entering the lake from upstream, the lake continued to rise. In response, the spillway gates were gradually opened to the point where they were no longer restricting flow (Photo 5), but despite this, the lake still continued to rise. The lake eventually peaked at 78.71 m.

³ Taranaki Regional Council Monthly Rainfall and River Report for June 2015. Document#1532924



Photo 3 The Mangamingi Bridge, June 2015. Source: Tim Hardwick-Smith.

In terms of the rise and recession rates, Figure 7 shows that the release of flows from the station were largely in line with the rise or recession rate restrictions defined in the consents. There were only a small number of breaches and these are almost all related to short term but sharp fluctuations in spill flow. These fluctuations had little influence on flow in the lower river (Figure 8). However, the rate of recession was still too quick for some of the river banks downstream of the station, as confirmed during an inspection undertaken on 7 July 2015. This inspection found that there had been significant slumping of the banks, with large areas of farmland impacted and damage to the ford at McColl's quarry (Photo 6). This slumping also caused the loss of the McColl's quarry flow recorder (Photo 7). It is thought that during high flows the high water provides some support to the banks, but also causes them to become waterlogged. However, as the water subsides, the support provided by the water also subsides, leaving behind water logged banks that are heavy and somewhat like a fluid, causing the slumping.



Photo 4 The Patea River, upstream of McColl's Bridge, June 2015⁴



Photo 5 The Patea Dam spillway gates during the June 2015 flood event⁴. Note the spillway gates are open to the point of not restricting flow.

⁴ Photo sourced from Patea Dam Lake Rotorangi Camp site facebook page.



Figure 7 Total station outflow from 21 June to 23 June 2015, compared with maximum and minimum allowable flow. The arrows mark the times affected by short-term fluctuations in spill flow, while the circled area is expanded in the lower graph.

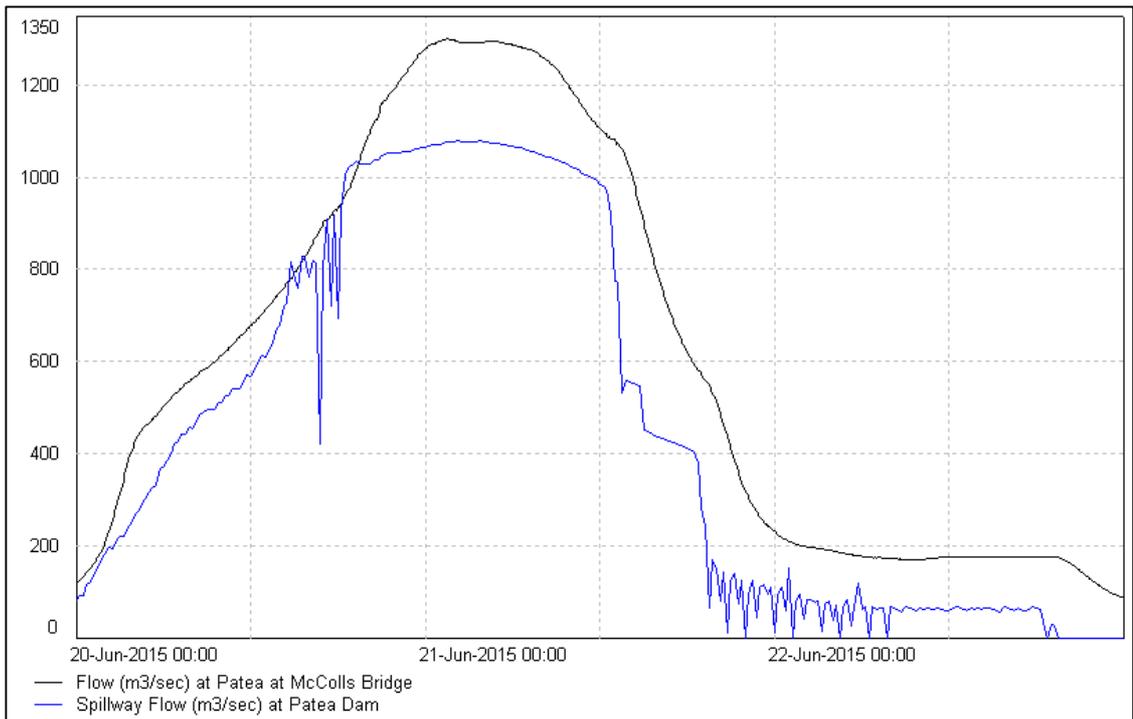


Figure 8 Spillway flow and Patea River flow at McColl's bridge during the June 2015 flood event.

An inspection of the lake, undertaken on 25 June 2015 found that the high lake level coupled with the high flow rate had caused damage to a private pontoon, and a house boat had broken free from its mooring. This house boat was eventually re-secured approximately 16 km downstream. The new pontoon at Pukekino landing was still intact (Photo 8). A large amount of logs and debris had entered the lake, much of which had accumulated at the log boom, where Company staff were working to clear it (Photo 9, Photo 10).

In summary, although this flood event caused inundation and damage to the Mangamingi Bridge and the banks of the lower Patea River, management of this flood was largely as required by consent conditions. Although there was significant slumping of the banks downstream of the dam, other South Taranaki rivers which also experienced extremely high flows during this event also experienced significant bank slumping. For example, the flow recorder on the Whenuakura River, a catchment neighbouring the Patea River, suffered catastrophic damage with the recorder tower being completely washed away.

Through discussions following this event, the Council was informed that the spillway gates had not been opened to 100% even though the lake level was above 78.5 m. This is strictly not inline with special condition 10 of consent 0489-2. This was satisfactorily explained to the Council, as holding the gates open at 100% had the potential to damage the controlling mechanism for the gate, and although they weren't open 100%, they were not restricting the release of water. Hence the Council decided no follow up action was required. However it is possible that the Company may apply for a change to this condition.



Photo 6 Slumping of the banks of the lower Patea River, observed on 7 July 2015.



Photo 7 Bank slumping at the McColl's quarry recorder site, 7 July 2015.



Photo 8 The pontoon at Pukekino Landing, 25 June 2015.



Photo 9 Boats clearing the logs at the Patea Dam log boom, 25 June 2015.



Photo 10 The logs cleared from the log boom ready for burning, 7 July 2015.



Photo 11 The Patea Dam and spillway, June 2015⁵

⁵ Photo sourced from Patea Dam Lake Rotorangi Camp site facebook page

3. Discussion

3.1 Discussion of site performance

The most complex aspect to the consent conditions are the various monitoring and reporting requirements. These can be broken into two broad categories, ecological monitoring and monitoring of water flows and levels. Numerous investigations have been undertaken and reported on to date relating to the ecological monitoring components, with most of these summarised in the previous (2011-2014) monitoring report. In the currently reported period the Company has supplied two reports, while another five are either in preparation or with the expert panel for review. The work undertaken in relation to these reports was completed largely in line with consent requirements. In a number of cases delays were experienced, and at times the requirements of the consents were not strictly followed. In each of these cases the Company liaised closely with Council, and these minor departures from the consent requirements were approved, as they were largely related to complications not realised at the time the consents were granted.

Two reports are now overdue, being the monitoring of dissolved oxygen in the lower Patea River and the effects on of the dam on trout. These reports have been delayed either because of the complexity surrounding the data (dissolved oxygen), or due to the need to clarify the intent of the monitoring (effects on trout). This has been or is being resolved through liaison with the Council, although this iterative process was not explicitly provided for in the timeframes set out by the consent. However it was necessary to ensure the reports included the required detail and as such, a delay in presenting the final reports was approved. However, the Company understands that these reports need to be provided as soon as possible.

With regards to the monitoring of water flows and levels, the Company provided records of flow in the lower Patea River, the level of Lake Rotorangi, discharge rates from the Patea Powerhouse and spillway and also volumes of water taken from groundwater for domestic use. These records were all provided when required, and to the accuracy required. There was an improvement in the way the Company maintained the McColl's quarry flow recorder, which had experienced some issues in the previous year. These issues resulted in enforcement action being taken against the Company. Unfortunately, this recorder was destroyed in the June 2015 flood event, and so no data has been recorded for this site since then. Trustpower are investigating their options for this site, and are considering either reinstalling at the same site, or opting for an alternative monitoring location. They are aware that if an alternative monitoring location was opted for that a variation to the consent would be required.

The only area where there was a need to consider enforcement action during the 2014-2015 period related to access at the boat ramps. It became apparent at the start of this period that access at the Glen Nui and Tangahoe Valley boat ramps was restricted when the lake level was lowered. Although a landowner was disadvantaged by this restricted access, an agreement was made with the Company as to how this access restriction was to be managed. This meant that no enforcement action was required.

It should be noted that the primary Company representatives based in Tauranga have maintained good channels of communication with Council, with numerous requests for consent condition clarification, and numerous notifications of potential consent

non-compliance. They have also frequently consulted with stakeholders, and organised a stakeholder meeting as required by consent.

The Company also have a team of local staff who have numerous responsibilities, including responding to alarms at the Patea HEPS, and implementing some of the more tangible consent requirements, such as the installation of signs. Through inspections and liaison with these staff, it is apparent to TRC that this team is very proactive in ensuring consent compliance. For example, signs have been erected and maintained as required at numerous locations, the floating pontoon has been installed and maintained at Pukekino Landing and a significant amount of work has gone into implementing both the upstream and downstream fish passage systems.

The Company has an emergency management plan which is reviewed annually, and forwarded to all parties as required by consent. This emergency management plan covers such emergencies such as floods, earthquakes and volcanic eruption.

Overall, the scheme has been operated well, and site performance has been good. The only area of concern related to the access restrictions at the two aforementioned boat ramps, around which there is now an agreed process. It is this incident that has most influenced the Company's compliance rating for the reported period.

3.2 Environmental effects of exercise of consents

Although the Council did little in the way of receiving environment monitoring during the period being reported, the monitoring undertaken by the Company and observations made during inspections provided a valuable insight into the environmental effects of the scheme.

The lower river ecological monitoring found that the lower Patea River supports a significant native fishery and moderate macrophyte communities. The macroinvertebrate component of the monitoring programme needed to be delayed to the next year due to the low flows experienced at the time. Previous monitoring has recorded a relatively low quality macroinvertebrate community. This is relatively typical for those rivers that are subject to flow regulation from a hydroelectric dam.

Previous monitoring has determined that although there is some risk of fish stranding in the lower reaches due to flow variation, it was concluded that this risk was not significant, as the amount of habitat in which fish could be stranded was limited in the lower river.

Over the reported period, the Company has operated a trap and transfer system, which has resulted in thousands of galaxiids and eels being transferred in to the Patea River headwaters. It is expected that the fish survey that is to be undertaken in the 2016-2017 period will illustrate how successful this trap and transfer programme has been, especially when the results are compared to the fish survey completed in 2012.

Downstream passage of adult eels has been harder to achieve. The Company released water down the spillway on numerous occasions, and monitoring indicated that this can be an effective means of transferring adult eels past the dam. However, there were still observations made during the reported period of dead eels in the Patea River downstream of the dam. The Company has installed an adult eel bypass system which

was commissioned late in the reporting period, unfortunately after the peak of the adult eel migration had passed. This new system will be fully commissioned and monitored in the 2015-2016 period.

The scheme also provides a significant recreational resource to the public, with of Lake Rotorangi being a popular water skiing, jet skiing, swimming and kayaking location. In 2011 the Company completed a survey of lake hazards, and publicised the findings, in an effort to reduce the risk to lake users. In addition, the company has maintained the boat ramps to be accessible across most lake levels, although sedimentation is becoming an issue at the Glen Nui and Tangahoe Valley boat ramps as already discussed.

The scheme also impacts on the recreational value of the lower Patea River. A condition of consent requires Trustpower to provide water for an annual jet boat race event when requested to do so. The lower river also provides an important fishery, with whitebaiting popular in certain locations. The lower river also contains brown trout with the occasional rainbow trout also recorded. These fish can grow to a large size. However it is apparent the numbers of brown trout in the lower river are low.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 7 to 16.

Table 5 Summary of performance for consent 0489-2 Dam the Patea River

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limits rate of water that can be diverted	Review of data provided to Council.	Yes
2 & 3. Clarify how this allocation of water does or does not affect the current and future allocation of water upstream of the dam Location of discharge point	Procedural	N/A
4. Requires a flow of 2.1 cumecs in the Patea River	Review of data provided to Council.	Yes
5. Limits how often flow can be less than 2.1 cumecs during occasions of abnormally low rainfall	Review of data provided to Council.	N/A - Did not meet criteria in monitored period
6. Requires an explanation should condition 5 be engaged	Receipt of explanation	N/A – Did not engage condition 5
7. Allows for a lower residual flow should upstream allocation increase	Procedural & Data review	N/A
8. Sets the absolute minimum flow in the lower Patea River at 1.8 cumecs	Review of data provided to Council.	Yes
9. Sets out the minimum and maximum lake levels	Review of data provided to Council.	Yes
10. Requires the spillway gates to be managed in relation to lake levels	Review of data provided to Council, inspections and liaison with Company	Yes (minor breach only)
11. Requires notification and explanation if lake level being lowered beyond normal seasonal operating range	Notification received	N/A
12. Set out lake level restrictions until hazards have been adequately managed	Review of data provided to Council	Yes
13. Provide a real time estimate of lake level on internet	Liaison with Council	Yes
14. Install and maintain staff gauges in lake	Inspections	Yes
15. Complete and report on hazard survey of Lake Rotorangi	Receive report – provided in 2011	Yes
16. Requires publication of maps detailing the identified hazards	Inspections, liaison with Company– provided in 2011	Yes
17. Construct and maintain a floating pontoon at Pukekino Landing	Inspections	Yes
18. Measure and record lake level, and provide records to Council	Review of data provided to Council.	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
19. Take all reasonable steps to avoid scheme presenting a migration barrier for target fish species	Inspections and liaison with Company	Yes
20-22. Present report detailing how condition 19 will be achieved	Receipt of report	Yes
23. Implement the fish passage systems detailed in report within 12 months	Inspections – note delay allowed for downstream passage system	Yes
24-27. Prepare a monitoring plan following prescribed process	Receipt of monitoring plan	Yes
28. Allows a review of monitoring plan, and prescribes required process	Receipt of revised monitoring plan – not revised in period	N/A
29. Reports annually on the success of the fish transfer programme	Receipt of annual report	Yes
30. Surveys and reports on the estimated densities of the target species upstream of the dam	One report to be received within 9 months of consent commencing, another in the sixth year after commencement	Yes
31. Review report of the fish transfer system, including recommendations	Receipt of report within six years of consent commencing	Not yet due
32. Monitor and report on the downstream ecology of the Patea River	Receipt of one report in monitoring period	Yes (report with expert panel)
33. Investigate and report on the effects of the dam on trout in the lower Patea River	Receipt of reports	Yes – (final report with expert panel)
34. Undertake a trout restocking programme if required	Inspections, liaison with Company	To be undertaken after 14-15 period
35. If trout restocking undertaken, develop and implement monitoring programme	Receipt of monitoring programme, liaison with Company	Not yet required
36&37 Monitor and report on dissolved oxygen investigation	Receipt of report, liaison with Company	Delayed – (final report with expert panel)
38. Monitor and report on the potential for fish stranding	Receipt of report – see 2011-2014 report	Yes
39&40. Monitor and report on the sedimentation of Lake Rotorangi	Receipt of report	Yes
41. Report on the flooding risk to the Mangamingi Bridge and install safety devices	Receipt of report, liaison with Company	Not yet received
42. Ecological and water quality survey of Lake Rotorangi every three years	Receipt of report, liaison with Company	Yes (report in preparation)

Condition requirement	Means of monitoring during period under review	Compliance achieved?
43-52 Sets out how the expert panel will be established and coordinated	Liaison with company	Yes
53. Requires certain reports to be circulated to stakeholders for consultation	Liaison with company	Yes
54. Requires that stakeholder comments are provided to Council	Receipt of comments, liaison with Company	Yes
55. Annual meeting of stakeholders	Attend meeting	Yes
56. Maintain boat ramps	Inspections	No
57. Allows temporary restriction of access at boat ramps, notification required	Notification received, inspections	Not implemented during reported period
58. Erect signs at various locations warning of flow and lake level fluctuations and log debris at	Inspections	Yes
59. Maintain floating booms at the dam	Inspection	Yes
60-62. Provide water for an annual jet boat race event	Liaison with Company	Not required
63 Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 6 Summary of performance for consent 0488-2 Use the Patea Dam and associated infrastructure.

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Maintain dam in accordance with guidelines	Liaison with Company	Yes
2. Provide an Emergency Management Plan to the TCDEMG	Liaison with Company and TCDEMG	Yes
3. Forward copy of plan to various parties	Liaise with Company	Yes
4. Undertake annual review of plan	Liaise with Company	Yes
5. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 7 Summary of performance for consent 0491-2 Take and use water from Lake Rotorangi

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limits rate of water that can be diverted	Review of data provided to Council.	Yes
2 & 3. Clarify how this allocation of water does or does not affect the current and future allocation of water upstream of the dam Location of discharge point	Procedural	N/A
4. Requires a flow of 2.1 cumecs in the Patea River	Review of data provided to Council.	Yes
5. Limits how often flow can be less than 2.1 cumecs during occasions of abnormally low rainfall	Review of data provided to Council.	N/A - Did not meet criteria in monitored period
6. Requires an explanation should condition 5 be engaged	Receipt of explanation	N/A – Did not engage condition 5
7. Allows for a lower residual flow should upstream allocation increase	Procedural & Data review	N/A
8. Sets the absolute minimum flow in the lower Patea River at 1.8 cumecs	Review of data provided to Council.	Yes
9. Report on options to deter adult eels from the intake, and recommend one option for implementation.	Report received in 2011.	Yes
10. Implement deterrent measures recommended in report within 12 months.	Inspections, liaison with Company	Yes – delay approved by Council
11. Measure and record the flow in the lower Patea River, provide records to Councils	Inspections, Review of data provided to Council	Yes
12. All water taken to be returned to river	Inspections	Yes
13. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		Good

Table 8 Summary of performance for consent 7188-1 Maintain the Patea Dam

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Activity is for maintenance or minor upgrades	Inspections	Yes
2. No contaminant other than sediment to be released to river or lake	Inspections	Yes
3. Limits the decrease in visual clarity	Inspections where appropriate	Not assessed
4. Remove all excess material from river or lake	Inspections	Yes
5. Any dewatering for minimum time necessary	Inspections	No dewatering undertaken
6. Minimise the area of disturbance	Inspections	Yes
7. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 9 Summary of performance for consent 7190-1 Discharge water from the Patea HEPS

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Survey the erosion of the lower Patea River	Liaison with Company	Yes
2. Alter frequency of surveys is criteria met	Procedural	N/A
3. Provide survey results	Receipt of report	Yes
4. Maintain the dam in accordance with guidelines	Liaison with Company	Yes
5. Provide an Emergency Management Plan to the TCDEMG	Liaison with Company and TCDEMG	Yes
6. Forward copy of plan to various parties	Liaise with Company	Yes
7. Undertake annual review of plan	Liaise with Company	Yes
8. Measure and record the rate of discharge from the Patea powerhouse and main service spillway provide records to Councils	Inspections, Review of data provided to Council	Yes
9. Requires a flow of 2.1 cumecs in the Patea River	Review of data provided to Council.	Yes
10. Limits how often flow can be less than 2.1 cumecs during occasions of abnormally low rainfall	Review of data provided to Council.	N/A - Did not meet criteria in monitored period

Condition requirement	Means of monitoring during period under review	Compliance achieved?
11. Requires an explanation should condition 5 be engaged	Receipt of explanation	N/A – Did not engage condition 5
12. Allows for a lower residual flow should upstream allocation increase	Procedural & Data review	N/A
13. Sets the absolute minimum flow in the lower Patea River at 1.8 cumecs	Review of data provided to Council.	Yes
14. Annual payment to Taranaki Tree Trust	Liaison with Company, Taranaki Tree Trust	Yes
15. Rise rate limit and recession rate limit during high flows	Review of data provided to Council	Yes (minor breaches only)
16. Prescribes how spillway gates are to operate during receding flow	Review of data provided to Council	Yes
17. Contribute to the maintenance of two hydrographic stations	Liaison with Company	Yes
18. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 10 Summary of performance for consent 7191-1 Discharge water through auxiliary and emergency spillways

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Survey the erosion of the lower Patea River	Liaison with Company	Yes
2. Alter frequency of surveys is criteria met	Procedural	N/A
3. Provide survey results	Receipt of report	Yes
4. Rise rate limit and recession rate limit during high flows	Review of data provided to Council	Yes (minor breaches only)
5. Prescribes how spillway gates are to operate during receding flow	Review of data provided to Council	Yes
6. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 11 Summary of performance for consent 7192-1 Take groundwater for domestic use

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Undertake activity in accordance with application	Inspections, liaison with Company	Yes
2. Limits daily volume taken	Review of data provided to Council	Yes
3. Install water meter	Inspections, liaison with Company	Yes
4. Take records of water taken	Review of data provided to Council	Yes
5. Lapse provision	Consent exercised in time	N/A
6. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 12 Summary of performance for consent 7193-1 Discharge contaminants related to abrasive blasting processes – consent not exercised during period under review

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections	N/A
2. No offensive or objectionable discharge beyond boundary	Inspections	N/A
3. Clear work area at end of each day	Inspections	N/A
4. Sand content not to contain more than 5% silica or 2% dust	Inspections, liaison with Company	N/A
5. Ensure operators understand consent	Inspections, liaison with company	N/A
6. Discharge not to cause various effects on surface water	Inspections	N/A
7. All items to be blasted to be screened as completely as practicable	Inspections	N/A
8. Notify Council if blasting within 100m of water	Notification received, liaison with Company	N/A
9. Limits on suspended particulate matter and dust deposition	Inspections	N/A
10. Lapse provision	Date not yet past	N/A
11. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A
Overall assessment of administrative performance in respect of this consent		N/A

Table 13 Summary of performance for consent 7194-1 Discharge contaminants related to the burning of driftwood

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections	Yes
2. Due regard to be had to the direction and strength of wind at the time	Inspections, liaison with Company	Yes
3. No offensive or objectionable discharge beyond boundary	Inspections	Yes
4. To be undertaken in accordance with application	Inspections	Yes
5. Burning to be supervised	Inspections	Yes
6. Council to be notified	Receipt of notification	Yes
7. Maintain a record of each burning event	Liaison with Company	Yes
8. Lapse provision	Consent has been exercised	N/A
9. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 14 Summary of performance for consent 7773-1 Place and use a floating pontoon at Pukekino Landing

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. To be constructed in accordance with application	Inspections	Yes
2. Council to be notified	Receipt of notification	Yes
3. Minimise the area of disturbance	Inspections	Yes
4. Take all reasonable steps to reduce sediment discharges	Inspections	Yes
5. Remove structure if no longer required	Structure still required	N/A
6. Steps to be taken should archaeological remains be discovered.	No such remains discovered	N/A
7. Lapse provision	Consent has been exercised	N/A
8. Review condition	No review sought	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the monitoring period, the Company demonstrated a good level of environmental and administrative performance with the resource consents as defined in Section 1.1.4. This rating related principally to the maintenance of access to three boat ramps, two of which were found to have restricted access during the reporting period. Other components of the Patea HEPS were operated well, and the Company has continued to work through the investigative and reporting work required by the consents. At the time of compiling this report, all aspects of the scheme were being operated well.

Using the environmental performance classifications as defined in section 1.1.4, Trustpower's performance for the 2014-2015 period is 'good'. The Company was not subject to any enforcement action during this period, although there was one verified incident, relating to the boat ramp access issue.

3.4 Recommendations from the 2011-2014 Monitoring Report

In the 2011-2014 Monitoring Report, it was recommended:

1. THAT monitoring of consented activities in relation to the Patea HEPS be amended from that undertaken in 2014-2015 by including monthly inspections of the McColl's Quarry hydro site and three provisional inspections of the Patea, Tangahoe Valley and Glen Nui boat ramps, to be undertaken if the lake level recedes to a level where access may be restricted.

3.5 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, its obligations to monitor emissions/discharges and effects under the RMA, and report 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 2015-2016 monitoring of the Patea HEP continues at the same level as in 2014-2015.

3.6 Exercise of optional review of consent

Seven resource consents provides for an optional review of the consent in their sixth year following commencement (2016), while four consent provide for a review in June 2016. Special conditions of these consents allow the Council to review the consent, if there are grounds that including whether the conditions are adequate to deal with any adverse effect on the environment arising from the exercise of this resource consent or implementing the recommendations of the expert panel.

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

4. Recommendations

1. THAT monitoring of consented activities at the Patea HEPS in the 2015-2016 year continue at the same level as in 2014-2015.
2. THAT the option for a review of resource consents in 2016, as set out in conditions of these consents not be exercised, on the grounds that there are no recommendations from the expert panel that call for a change to conditions, and that the conditions are currently adequate to deal with any adverse effects.

Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m ³ s ⁻¹).
Cumec-hours	A measure of volume. One cumec-hour is the equivalent of 1m ³ /s ⁻¹ sustained for one hour (3,600m ³).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m ³	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
l/s	Litres per second.
m ²	Metres ² .
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.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH ₄	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NO ₃	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.

Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
PM ₁₀	Relatively fine airborne particles (less than 10 micrometre diameter).
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured 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 held by Trustpower in relation to the Patea HEPS

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

Name of Consent Holder: TrustPower Limited
Private Bag 12023
TAURANGA 3143

Decision Date (Change): 27 March 2012

Commencement Date (Change): 27 March 2012 (Granted: 17 December 2010)

Conditions of Consent

Consent Granted: To dam the Patea River [forming Lake Rotorangi] and divert water from Lake Rotorangi through the Scheme's intake structure, the service spillway, auxiliary spillway and emergency spillway, for hydro-electric power generation purposes at or about (NZTM) 1734751E-5621514N

Expiry Date: 1 June 2040

Review Date(s): As per special condition 63

Site Location: Patea Hydroelectric Power Scheme, Maben Road, Hurleyville, Patea

Legal Description: Secs 1 & 2 SO 12618 Sec 1 SO 12962 & Pt Sec 6 Pt Sec 7 Blk VI Opaku SD

Catchment: Patea

Tributary: Lake Rotorangi

*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

Water Abstraction Restrictions

1. Subject to the availability of such flows after any upstream uses currently authorised and any uses subsequently authorised in accordance with conditions 2 and 3 below, the consent holder is authorised to divert up to: 75 cubic metres per second of water for hydro-electric power generation purposes; and 25 cubic metres per second of water for fish passage purposes; and 1,400 cubic metres per second for flood flows.
2. Nothing in this consent or the associated consents shall be deemed to:
 - (a) create an allocation of water to the exclusion of the exercise or renewal of any consents to dam, divert, take and/or use water in the Patea River catchment upstream of the Patea Dam which existed at 6 May 2009 up to the rates and volumes provided for in those consents as at that date; or
 - (b) create an allocation of water to the exclusion of the carrying out of any permitted activity to dam, divert, take and/or use water in the Patea River catchment upstream of the Patea Dam which is authorised in Regional Plans as at 6 May 2009, whether or not that activity was in existence as at May 2009.

This consent and associated consents shall not be exercised in such a manner as to limit the exercise of any consent or permitted activity referred to above.

3. The total amount of water authorised to be dammed, diverted, taken and/or used pursuant to this consent and associated consents and the total volume allocated under this consent and associated consents, excludes such water as may be authorised to be taken, diverted and or used, by any other persons upstream of Patea Dam pursuant to a water permit granted during the term of this consent, and nothing in this consent or any of the associated consents shall preclude the grant of such additional consents during the term of this consent. Provided that this exclusion shall be limited to a maximum rate of abstraction for upstream consents not existing as at May 2009, not exceeding 0.305 cubic metres per second.

Consent 0489-2

4. Subject to conditions 5-8 below, the exercise of this consent shall not cause the flow in the Patea River, as measured at the 'McCull's Quarry' measuring site [site no 34304], to be less than 2.1 cubic metres per second (as an hourly average) [the 'minimum flow'].
5. Notwithstanding condition 4 above, following unusually long periods of less than normal rainfall in the Patea River catchment the exercise of this consent may cause the flow in the Patea River to be less than the minimum flow, provided that the flow in the Patea River as measured at the 'McCull's Quarry' measuring site [site no 34304] is not less than 2.1 cubic metres per second (as an hourly average):
 - (a) at any time during more than 5 out of any 10 consecutive calendar years; or
 - (b) for more than 72 hours in any 30 day period.
6. On any occasion when the exercise of this consent causes the flow in the Patea River to be less than the minimum flow in accordance with condition 5 the consent holder shall, within 14 days, provide the Chief Executive, Taranaki Regional Council with documentation showing that the breach of the minimum flow was a direct result of an unusually long period of less than normal rainfall in the Patea River catchment.
7. In the event that any future upstream water takes (not consented as at 6 May 2009) in combination with existing takes, cause the total inflow to Lake Rotorangi to be less than 2.1 cubic metres per second, the minimum flow referred to in condition 4 shall, at times when the total inflow to Lake Rotorangi is less than 2.1 cubic metres per second, be temporarily reduced by a rate equivalent to the estimated combined rate of take by such future upstream water takes.
8. At no time shall the exercise of this consent cause the flow in the Patea River, as measured at the 'McCull's Quarry' measuring site [site no 34304], to be less than 1.8 cubic metres per second (as an hourly average).

Advice Note: For the avoidance of doubt, it is recorded that the intent of condition 7 is to provide relief to the consent holder if a future allocation of some or all of the 0.305 m³/s referred to in condition 3 of consents 0491-2 and 0489-2 causes a reduction in lake inflows below 2.1 m³/s. During those times, the minimum flow below the Patea Dam can be temporarily reduced to reflect the lower inflows. If any future consents are granted on terms that require any future consent holder to cease taking at times when the consent holder is restricted by the minimum flow then the downstream minimum flow will not be affected by that consent.

Advice Note: Nothing in this consent precludes the consent holder from submitting (on any basis permitted by the Act) on any future consent or re-consenting applications to take water from the Patea River catchment upstream of Patea Dam. For the avoidance of doubt, any such future applications need to be considered on their merits.

Lake Level Management

9. The consent holder shall manage the water level of Lake Rotorangi immediately behind the dam so that:
 - (a) the level does not exceed RL 78.5 m unless the service spillway gates are fully open;
 - (b) the level is no lower than RL 74 m;
 - (c) the level only exceeds RL 78 m during and immediately following a flood, and the consent holder shall, within the constraints of condition 10, use best endeavours to ensure the level returns to less than RL 78 m as soon as is reasonably achievable;
 - (d) subject to condition 12, during the period beginning on 15 December and ending on 15 April the following year the level is no lower than RL 76 m, except for a total of up to 264 hours when it may be lower than RL 76 m but no lower than RL 75 m, provided that the level is below RL 76 m only:
 - (i) for the purpose of providing generation for a short term shortage in electricity supply; and
 - (ii) for the minimum period necessary to provide the generation and to return the level to RL 76 m; and
 - (e) subject to condition 12, during the period beginning on 16 April and ending on 14 December the level is lower than RL 76 m on no more than 125 days and lower than RL 75 m on no more than 40 days.
10. As the water level of Lake Rotorangi rises or falls between RL 78 m and RL 78.5 m the main spillway gates shall be progressively opened or closed, so that they are completely closed when the lake level is at RL 78 m and completely open when it is at RL 78.5 m.
11. On each occasion that the water level in Lake Rotorangi is below RL 76 m during a period beginning on 15 December and ending on 15 April the following year, the consent holder shall:
 - (a) advise the Chief Executive, Taranaki Regional Council within 24 hours of the decision to take the level below RL 76 m being made, by sending an email to worknotification@trc.govt.nz, or by another method that the Chief Executive may advise, with an explanation of the need for the low lake level; and
 - (b) within 30 days of the level first being below RL 76 m, provide the Chief Executive, Taranaki Regional Council, with a report demonstrating that the low lake level was necessary to provide for a short term electricity shortage and that the period when the level was below RL 76 m was the minimum necessary.

Consent 0489-2

12. From the commencement of this consent until the hazards to water skiers and boaters have been avoided, remedied or mitigated, in accordance with condition 16 of this consent, the water level in Lake Rotorangi shall be:
 - (a) no lower than RL 76 m for the period beginning on 1 November and ending on 30 April the following year; and
 - (b) during the period beginning 1 May and ending on 31 October:
 - (i) lower than RL 76 m on no more than 128 days; and
 - (ii) lower than RL75m on no more than 36 days.
13. The consent holder shall provide a real time estimate of the level of Lake Rotorangi at Glen Nui Boat Ramp and Pukekino Landing to the nearest ± 0.25 m via a readily available remote electronic means [e.g. the internet] so that recreational users and the public can easily determine whether the lake is suitable for their proposed activity.

Advice Note: TrustPower will consult with the Hawera Water Ski Club on the form of the presentation of the estimate of lake levels. For the avoidance of doubt TrustPower is not required to present the estimates or levels under this condition in a form that displays commercially sensitive information.
14. Subject to the consent holder obtaining any necessary resource consents and access agreements, the consent holder shall install and maintain staff gauges at Glen Nui Boat Ramp and Pukekino Landing that indicate the lake level over the full operating range.
15. The consent holder shall undertake and report on a hazard survey in those areas of Lake Rotorangi that are used for water skiing. In undertaking and reporting on this survey the consent holder shall:
 - (a) following consultation with the Hawera Water Ski Club and Mangamingi Residents, being submitters to this application, identify:
 - (i) the type of survey to be undertaken,
 - (ii) those areas of Lake Rotorangi to be surveyed, and
 - (iii) the known hazards in those areas that do not require surveying;
 - (b) within the areas required to be surveyed, identify the lake bed features between RL 73.5 m and RL 76 m greater than 2 metres from the lake edge at RL 76 m;
 - (c) recommend the measures needed to avoid, remedy or mitigate any hazard which presents a greater threat to water skiers and boaters than existed under the lake level regime existing prior to the commencement of this consent [i.e. as required by condition 14 of consent 0488-1 and the associated Lake Level Management Plan]; and

- (d) in preparing the recommendations to avoid, remedy or mitigate hazards [required by condition 15 (c)] the consent holder shall carry out reasonable consultation with Hawera Water Ski Club and Mangamingi Residents [being submitters to this application] that includes submitting the report to those parties for comment and allowing at least one month for a response.
16. The consent holder shall implement the following measures to avoid, remedy or mitigate hazards identified from the fulfilment of condition 15, having taken into account the consultation undertaken with, and the response of interested submitters:
- a) Provide a full set of A3 colour hazard maps at the following locations:
- Hawera Water Ski Clubrooms
 - Trust Power internet website (www.trustpower.co.nz)
 - Public boat ramps at Mangamingi, Tangahoe and Patea Dam
- b) Provide a colour copy of the Hazard Report identified in Condition 15 at the following locations/to the following parties:
- Taranaki Regional Council
 - Hawera Water Ski Clubrooms
 - Trust Power internet website (www.trustpower.co.nz)
 - Mangamingi Residents
17. Subject to the consent holder obtaining any necessary resource consents and access agreements, within 12 months of the commencement of this consent the consent holder shall construct, and subsequently maintain, a structure at Pukekino Landing that is operational at all lake levels between RL 74 m and RL 76 m. The consent holder shall consult with the South Taranaki District Council and Hawera Water Ski Club about the structure's location and design but it shall, as a minimum, be:
- (a) able to provide safe access to the shoreline and boats for users;
- (b) capable of having at least two boats tied to it at once;
- (c) located to minimise any navigational hazard; and
- (d) designed to minimise floating debris collected on its upstream side.
18. The consent holder shall measure and electronically record the water level in Lake Rotorangi immediately behind the dam to an accuracy of ± 0.01 metres at intervals not exceeding 15 minutes. These records shall be provided to the Chief Executive of Taranaki Regional Council at monthly intervals or upon reasonable request.

Fish Passage

19. The consent holder shall take all reasonable steps to ensure that the Patea Dam and Lake Rotorangi do not prevent the establishment and maintenance of populations of longfin eels, shortfin eels, lamprey, koaro, banded kokopu, giant kokopu and shortjaw kokopu [the 'target species'] in the major areas of suitable habitat upstream of Lake Rotorangi. The objective shall be to establish and maintain populations of the target species that are comparable with those in similar barrier-free habitats. The steps to be taken shall include:

- (a) operating and maintaining a trap and transfer programme to facilitate passage of the target species upstream;
- (b) undertaking one re-seeding of juvenile lamprey to the upper catchment to facilitate transfer of that species upstream; and
- (c) operating and maintaining a system to facilitate the non-lethal downstream passage of adult eels from upstream of the Patea Dam to below the tailrace.

Advice Note: In carrying out re-seeding of juvenile lamprey under condition 19(b) the consent holder shall be aware that it will require approvals under the Conservation Act 1987.

20. Within six months of the commencement of this consent, the consent holder shall have prepared and submitted a comprehensive report to the Chief Executive Taranaki Regional Council that describes the up and downstream fish passage systems that the consent holder will adopt to achieve compliance with condition 19.

21. The report required by condition 20 must as a minimum:

- (a) For upstream passage:
 - (i) specify the design and location of the fish trap;
 - (ii) specify the period over which the fish trap and transfer programme will be operated [this period will align with the peak migration period(s) for each of the target species];
 - (iii) detail the methodology to be used in the transfer of the fish, including a requirement for the target species to be transferred to suitable areas upstream of Lake Rotorangi (ranging from the mouths of upstream tributaries to above Stratford depending on species);
 - (iv) specify the proposed locations of the releases of each species and the reasons for those locations being chosen;
 - (v) specify the measures to be undertaken to enhance fish survival during the transfer and post release periods;
 - (vi) specify the measures to be undertaken to avoid the transfer of smelt;

- (vii) within the first year of commencement of consent, detail a proposed means of transferring juvenile lamprey from other catchments to upstream tributaries of Lake Rotorangi on one occasion for the purposes of facilitating the passage of lamprey upstream.
- (b) For downstream passage:
- (i) set an objective for the effectiveness of the downstream fish passage system; and
- (ii) describe the proposed non-lethal fish passage system for adult eels, and detail the alternative options considered/assessed, the costs and benefits of each alternative and set out the reasons for recommending the proposed fish passage system.
22. In preparing any report referred to in conditions 20 and 21, the consent holder shall carry out reasonable consultation with the Department of Conservation, Nga Rauru Kaitiaki and Ngati Raukawa that includes submitting the report to those parties for comment and allowing one month for a response. The consent holder shall provide any comments received from Department of Conservation, Nga Rauru Kaitiaki or Ngati Raukawa to the Chief Executive, Taranaki Regional Council.
23. Within 12 months of receiving certification from the Chief Executive, Taranaki Regional Council that the report addresses the matters set out in conditions 20 and 21, the consent holder shall implement the fish passage systems detailed in the report prepared in accordance with conditions 20 and 21.

Monitoring Plan

24. All requirements for monitoring and investigations set out under conditions 25 to 42 below shall be undertaken in accordance with a 'Monitoring Plan', certified by the Chief Executive, Taranaki Regional Council that details techniques, methodologies and procedures that will be employed to ensure compliance with:
- condition 31 [native fish populations];
 - condition 32 [downstream ecology];
 - condition 33 [investigations about effects on trout];
 - conditions 34 & 35 [trout restocking and monitoring of effects];
 - condition 36 [investigations about dissolved oxygen]; and
 - condition 38 [flow fluctuations].
25. In preparing the Monitoring Plan, the consent holder shall carry out reasonable consultation with the Department of Conservation, Fish and Game New Zealand, Nga Rauru Kaitiaki, and Ngati Raukawa, allowing one month for a response on the draft monitoring plan. The consent holder shall provide any comments received from the Department of Conservation, Fish and Game New Zealand, Nga Rauru Kaitiaki, and Ngati Raukawa to the Chief Executive Taranaki Regional Council, at the time the final Monitoring Plan is submitted for certification under condition 27, including any responses from the consent holder to such comments.

26. In preparing the Monitoring Plan, the consent holder shall submit the final plan to the Expert Panel established for the purpose set out in condition 46. The consent holder shall provide any comments received from the Expert Panel to the Chief Executive Taranaki Regional Council, at the time the final Monitoring Plan is submitted for certification under condition 27, including any responses from the consent holder to such comments.
27. Within 6 months of the commencement of this consent the Monitoring Plan shall be submitted for approval by the Chief Executive, Taranaki Regional Council, acting in a certification capacity to ensure it meets the objectives of the respective monitoring conditions.
28. The Monitoring Plan can be revised by the consent holder as required to ensure the current monitoring methodologies or mitigation programmes are adequate to achieve the objective of the relevant condition(s), provided such changes are within the scope of these conditions, subject to the following process:
 - (a) Unless such changes are in response to the recommendations of the Expert Panel under condition 50, the consent holder shall submit any proposed changes to the Monitoring Plan to the Expert Panel;
 - (b) The consent holder shall carry out reasonable consultation about any proposed changes with the Department of Conservation, Fish and Game New Zealand, Nga Rauru Kaitahi, and Ngati Ruanui, allowing one month for a response on the proposed changes;
 - (c) The proposed changes, along with any comments received from the consulted parties and Expert Panel, shall be submitted for approval to the Chief Executive Taranaki Regional Council, acting in a certification capacity to ensure it meets the objectives of the respective monitoring condition(s).

Monitoring Fish Passage and Transfers

29. The consent holder shall report annually to the Chief Executive, Taranaki Regional Council and to the Expert Panel details of the work undertaken to achieve compliance with condition 19 including:
 - (a) an estimate of the number of each species transferred upstream of the Patea Dam and the location of their release;
 - (b) an estimate of the success of each spillway opening event for the downstream passage of adult migrating eels using 'before' and 'after' counts.
30. The consent holder shall provide reports of monitoring that surveys and records the estimated densities of each of the target species upstream of Lake Rotorangi. The reports shall be provided to the Chief Executive, Taranaki Regional Council and to the Expert Panel:
 - (a) within 9 months of the commencement of this consent; and
 - (b) in the sixth year after commencement of this consent.

31. Within 6 years of the commencement of this consent, the consent holder shall prepare and submit to the Chief Executive, Taranaki Regional Council and to the Expert Panel a report that:
- (a) details the work that has been undertaken to achieve compliance with conditions 19 to 21;
 - (b) reports the contribution made by the upstream and downstream fish passage systems to the achievement of the objective set out in condition 19;
 - (c) assesses the effects of the Patea Dam and Lake Rotorangi on fish populations and the benefits of the work that has been undertaken to maintain and enhance these populations; and
 - (d) makes recommendations about mitigating the effects of the Patea Dam and Lake Rotorangi on upstream fish populations, including:
 - (i) the value of continuing the facilitation of fish passage;
 - (ii) the species that should be targeted for any ongoing facilitation of passage;
 - (iii) any changes to the programme that would help achieve compliance with condition 19; and
 - (iv) alternative measures and/or programmes for avoiding, remedying or mitigating the effects of the Patea Dam blocking fish passage, in the event that the focus on facilitation of fish passage is shown to be unsuccessful in establishing and maintaining populations as required by condition 19.
 - (e) includes any comments received on the draft report by the Expert Panel in relation to matters under (a) to (d) above.

Monitoring downstream ecology

32. The consent holder shall undertake monitoring that identifies and quantifies the ecology of the Patea River downstream of the dam, including the varial zone, using surveys of macroinvertebrates, macrophytes and fish. In the first two years of the commencement of this consent, annual surveys shall be carried out to coincide with monitoring of dissolved oxygen and water temperature required under condition 36. Thereafter, the surveys shall be carried out every two years. The results of each downstream ecological survey shall be reported to the Chief Executive of the Taranaki Regional Council and to the Expert Panel within 4 months of completion.

Effects on Trout

33. The consent holder shall undertake an investigation into the effects of the Patea Dam and Hydro-electric Power Scheme [HEPS] on trout downstream of the dam. Interim reports on this investigation shall be provided to the Chief Executive, Taranaki Regional Council and the Expert Panel annually for the first two years of the commencement of this consent, and a final report including recommendations to be provided to the Chief Executive, Taranaki Regional Council and to the Expert Panel within three years of this consent commencing. The final report shall include conclusions specifically about the effects of flow fluctuations, temperature and low dissolved oxygen on trout recruitment, and recommendations as to whether restocking and/or undertaking further investigations are necessary as a way to mitigate the effects of the Patea Dam and HEPS.
34. If the final report under condition 33 recommends that a trout restocking programme commence and this is confirmed by the Expert Panel, the Consent Holder shall, after consultation with Fish and Game New Zealand (Taranaki Region) and the Department of Conservation, help to mitigate the adverse effects of the power scheme on trout recruitment by annually restocking up to 1,000 tagged yearling brown trout and up to 500 tagged yearling rainbow trout into the Patea River between McColl's Bridge and the Patea Dam. The numbers of trout to be released each year (if any) is subject to North Island availability and shall be decided in consultation with Fish and Game New Zealand (Taranaki Region) and the Department of Conservation and will be reviewed after 5 years of monitoring.
35. If a trout restocking programme is implemented under condition 34, the consent holder, in consultation with Fish and Game New Zealand (Taranaki Region) and the Department of Conservation, shall develop and implement a monitoring programme to assess the success and effects of the restocking programme required by condition 34 including whether modification of the restocking programme is necessary to:
- (a) provide appropriate mitigation for adverse effects on trout populations; and/or
 - (b) address levels of trout predation on native fish species where levels of predation are inhibiting the achievement of the objective of condition 19.

The results of this monitoring shall be reported to the Chief Executive, Taranaki Regional Council and to the Expert Panel.

The monitoring programme referred to in this condition shall be submitted to the Chief Executive, Taranaki Regional Council for certification purposes and thereafter included in the Monitoring Plan.

Investigation of Dissolved Oxygen

36. Within six months of the commencement of this consent, the consent holder shall commence an investigation that, to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council, investigates the extent, frequency, causes and effects of discharges of de-oxygenated water into the river below the Patea Dam. The investigation shall include a determination of the dissolved oxygen concentration in the river by continuously monitoring dissolved oxygen and temperature at appropriate locations as specified in the Monitoring Plan.
37. The consent holder shall prepare reports on the investigation required by condition 36 and provide them to the Chief Executive, Taranaki Regional Council and the Expert Panel as follows:
- (a) within 18 months of the commencement of the investigation, an interim report on the first year of the investigation; and
 - (b) within 36 months of the commencement of the investigation, a final report detailing the dissolved oxygen and temperature characteristics of the study reach and any likely adverse effects of low dissolved oxygen concentration.

The final report shall include an assessment of the environmental effects of discharges of water with low dissolved oxygen from the Patea dam and options and recommendations for mitigating any effects and/or undertaking further investigations.

Monitoring Flow Fluctuations

38. In addition to the monitoring undertaken in accordance with conditions 32 and 33, the consent holder shall undertake and report on a one-off investigation of the effects of the rapid reduction in water level in the Patea River downstream of the Patea Dam on the frequency and ecological significance of native fish becoming stranded. The report shall be provided to the Chief Executive, Taranaki Regional Council and the Expert Panel within two years of the commencement of this consent.

Monitoring Sedimentation within Lake Rotorangi

39. The consent holder shall monitor sedimentation within Lake Rotorangi. The monitoring shall include:
- (a) an annual visual lakeshore inspection of Lake Rotorangi;
 - (b) an annual photographic survey of the 15 permanent cross section locations; and
 - (c) at least once every two years a bathymetric channel cross-section survey of the 15 permanent cross section sites. The cross section sites are as shown on Figure One, attached to and forming part of this consent.

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40. The results, including a comparison with the previous survey, of the monitoring undertaken in accordance with condition 39 shall be forwarded to the Taranaki Regional Council by the consent holder within 60 days of the survey being completed.
41. The consent holder shall, in consultation with South Taranaki District Council prepare a report on the risk to the Mangamingi Bridge from increased flooding as a result of sedimentation in Lake Rotorangi, and shall install safety devices that, to the reasonable satisfaction of the Chief Executive of Taranaki Regional Council, adequately minimises the risk to the public.
42. An ecological and water quality survey shall be carried out to determine the degree of eutrophication of Lake Rotorangi and the amount and species of aquatic weeds established in the lake, together with a plan showing the location and extent of weed beds. The survey shall follow the sampling locations and methods of existing surveys and the first survey shall be completed and reported to the Taranaki Regional Council within 12 months of the consent commencing. Subsequent surveys shall be conducted at least once every three years and reported to the Taranaki Regional Council within 3 months of the survey being completed.

Expert Panel

43. The consent holder shall engage a panel of three independent people who have not otherwise been involved in monitoring of this consent and between them can demonstrate proven expertise in the matters covered by the monitoring required by conditions 31 to 38 of this consent. The consent holder shall also ensure that the Panel contains the necessary level and scope of expertise to address each of the matters listed under condition 46(e). In the event that any member of the Expert Panel becomes unavailable to continue their role, the panel may temporarily consist of fewer than three people with the agreement of the consent holder and the Chief Executive, Taranaki Regional Council until such time as a new Panel member is engaged.
44. The members of the Expert Panel shall be nominated by the consent holder and, after consultation with the Department of Conservation and Fish and Game, shall only be appointed after having been approved by the Chief Executive, Taranaki Regional Council. If less than three acceptable nominations are made, the Chief Executive, Taranaki Regional Council may appoint one or more persons to act as a Panel Member until an acceptable nomination is made.
45. All reasonable costs incurred by the Expert Panel shall be met by the consent holder and it shall be the consent holder's responsibility to ensure that the Expert Panel carries out the tasks required of it within the timeframes specified in the conditions of consent.

46. The purpose of the Expert Panel shall be to peer review and, where appropriate, provide recommendations to the consent holder and the Chief Executive, Taranaki Regional Council, on the following:
- (a) the report on native fish passage systems required under condition 20;
 - (b) the report on the success of native fish passage systems required under condition 31;
 - (c) the reports on the effects of the Patea Dam and HEPS on downstream trout populations required under condition 33;
 - (d) the final Monitoring Plan required by condition 26 before it is submitted to the Chief Executive, Taranaki Regional Council for certification under condition 27;
 - (e) the reports or other outputs required by the following conditions:
 - condition 29 [native fish passage];
 - condition 30 [upstream native fish populations];
 - condition 32 [downstream river ecology];
 - condition 35 [trout restocking];
 - condition 37 [dissolved oxygen]; and
 - condition 38 [fish strandings].
 - (f) For the avoidance of doubt, the Expert Panel may, as part of its function, review the Monitoring Plan and recommend further reviews of that Plan and the role of the Expert Panel in relation to these reviews.
47. The purpose of any recommendations of the Expert Panel shall be either:
- (a) To confirm that the current monitoring, methodologies, or mitigation programmes are adequate to achieve the objective of the relevant condition(s), or;
 - (b) Recommend changes or additions to any monitoring, methodology, or mitigation, in order to ensure that they are adequate to avoid, remedy or mitigate and adverse effect on the environment arising from the exercise of this resource consent.
- 47A Recommendations made in accordance with condition 47(b) may include but are not limited to:
- (a) recommendations to alter the upstream or downstream fish passage programme to help achieve compliance with condition 19, including:
 - (i) recommendations that the consent holder undertake further assessment of the efficiency of the fish trap (utilising dyes or by any other means) and/or that the consent holder alter the location or design of the fish trap;
 - (ii) if new technologies have become available, recommendations for improved monitoring of the success of downstream passage, or that the system to facilitate the non-lethal downstream passage of species is improved; and
 - (b) monitoring of upstream populations of the target species continuing beyond the date required by condition 30 of this consent.

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48. Of those matters specified under condition 46 above, the consent holder shall ensure that the full Expert Panel shall review and make recommendations on:
- (a) The final Monitoring Plan required by condition 26 and any review of that Plan; and
 - (b) The final results required in respect of downstream ecology (condition 32) and dissolved oxygen (condition 37).

Otherwise, of the balance of matters specified under condition 46, only the most appropriate expert(s) need review the relevant report or information and make recommendations, unless the expert(s) consider it necessary to seek the input from another member(s) of the Panel to assist them in their assessment.

49. Unless otherwise specified in these conditions, the expert(s) shall have two months to respond to the consent holder and the Chief Executive, Taranaki Regional Council on any report submitted to them, with any comments to be in writing.
50. The consent holder shall use its best endeavours to ensure that the Expert Panel shall review and provide recommendations to the consent holder and the Chief Executive, Taranaki Regional Council within two months of the receipt of each of the following reports:
- (a) the report required under condition 31 (success of fish passage measures);
 - (b) the final report required under condition 33 (effects on trout populations);
 - (c) if implemented, the report on the monitoring of the restocking required under condition 35;
 - (d) the final report on the investigation required under condition 37 (effects of low dissolved oxygen discharges);
 - (e) the report on the investigation required under condition 38 (effects of flow fluctuations on native fish strandings).
51. Should the consent holder choose to adopt the recommendations of the Expert Panel under condition 50, any proposed amendments to the monitoring programme, methodology, or mitigation requirements shall be implemented by the consent holder subject to the approval of the Chief Executive Taranaki Regional Council, acting in a technical certification capacity.
52. In the event that the consent holder declines to adopt any recommendation provided by the Expert Panel in accordance with condition 50, the consent holder shall within 8 weeks of the Expert Panel making its recommendation, provide to the Chief Executive, Taranaki Regional Council, its written reasons for declining to follow the recommendations of the Expert Panel.

Consultation with Stakeholders and Expert Panel

53. Before any report is submitted to the Expert Panel to be reviewed in accordance with condition 46, 48 and 50 of this consent, the consent holder shall carry out reasonable consultation with Fish and Game New Zealand (Taranaki Region), the Department of Conservation, Nga Rauru Kiiitahi and Ngati Ruanui, including submitting the Plan or Report in draft to those parties for comment and allowing one month for a response.
54. Where any comments are received from Fish and Game New Zealand (Taranaki Region), the Department of Conservation, Nga Rauru Kiiitahi, Ngati Ruanui or the Expert Panel in accordance with condition 53, the consent holder shall provide all such comments, in addition to providing the plan or report itself to the Chief Executive, Taranaki Regional Council. In conjunction with such comments, the consent holder shall as necessary provide to the Chief Executive, Taranaki Regional Council, its response to any of the comments made by any of the parties.

Consent Holder, Submitter and Council Engagement

55. At least once every year the consent holder shall convene a meeting of representatives of the Taranaki Regional Council, and interested submitters to application 4820, including Nga Rauru Kiiitahi, Ngati Ruanui and the Department of Conservation, to discuss any matter relating to the monitoring of this consent.

Recreation

56. The consent holder shall maintain the boat ramps at the locations listed below [and as shown in Figure Three, attached to, and forming part of this consent] so that they are usable at all lake levels between RL 74 m and RL 78 m:
 - (a) The Glen Nui Ramp 1;
 - (b) The Tangahoe Valley Ramp; and
 - (c) The Boat Ramp located at the Patea Dam.

If maintenance of any boat ramp proves to be impracticable it shall be replaced.

57. The consent holder may temporarily restrict public access to the boat ramps highlighted in condition 56 due to reasonable health, safety and security requirements. Where such restrictions are imposed the consent holder shall notify the Taranaki Regional Council and the South Taranaki District Council. The notice shall explain the need for the restriction and estimate the duration that the restriction will apply for.

58. The consent holder shall erect and maintain signs at the boat ramp located at the Patea Dam and the Glen Nui Ramp 1, and at McColl's Bridge and at the Patea Estuary boat ramp. The signs shall alert users of Lake Rotorangi and the Patea River to:
- (a) fluctuations in flow downstream of the dam and of the extent of these fluctuations;
 - (b) fluctuations in lake levels and of the extent of these fluctuations; and
 - (c) the presence of floating log debris and lake bed features that may present a hazard for lake recreational users.
59. The consent holder shall maintain floating booms across the intake to the head race and across the full length of the spillway of the Patea Dam to safeguard persons using the lake for recreation and to prevent floating debris and logs from entering the penstocks. Log debris caught by the boom structure will be removed from the lake and appropriately disposed of in accordance with the special conditions in consent 7194-1.
60. The consent holder shall, in accordance with condition 62 provide jet boaters with water for an annual race event.
61. Water provided in accordance with condition 60 shall:
- (a) be for the annual race event at a flow rate of not less than 40 cubic metres per second at McColl's Bridge, commencing at 2200 on a Friday or a Saturday and ending at 1800 hours on the following Saturday or the following Sunday, as the case may be (a period of 20 hours);
 - (b) occur within the period beginning on 20 May and ending on the following 20 September in any year; and
 - (c) only occur following the written request of a person delegated to make such requests by Jet Boating New Zealand, received by the consent holder no less than 60 days before.
62. All releases of water under condition 60 are subject to water being available from Lake Rotorangi. If the inflows to the lake over the 60 days prior to a release are low with a return period of greater than 15 years the consent holder need not provide the flow of water required by condition 60.

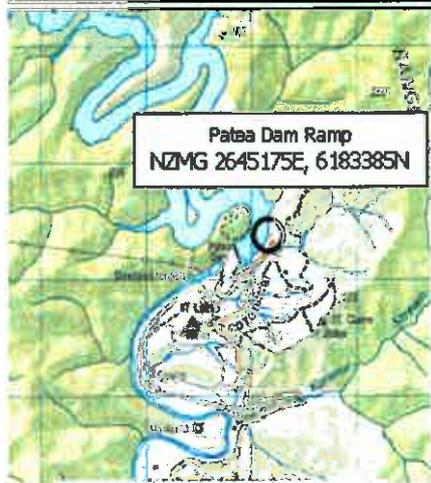
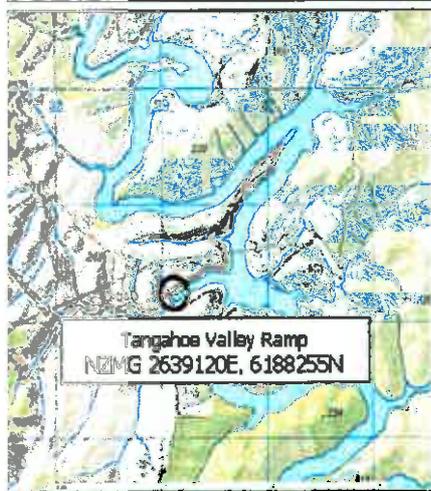
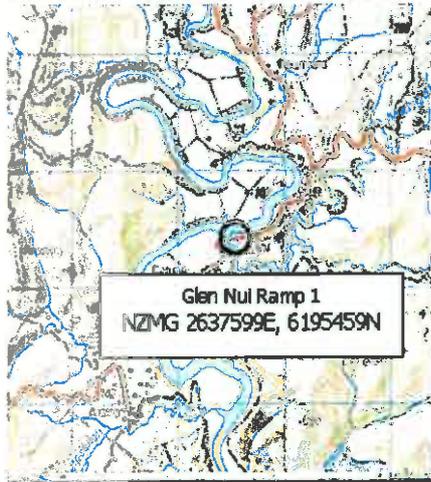
63. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent:
- (a) within the sixth year of commencement of this consent, and every six years thereafter for the purposes of:
 - (i) ensuring that the conditions are adequate to deal with any adverse effect on the environment arising from the exercise of this resource consent; or
 - (ii) implementing the recommendations of the Expert Panel;
 - (b) within two months of the consent holder providing its written response under condition 52 to any recommendation of the Expert Panel provided in accordance with condition 50.

Signed at Stratford on 27 March 2012

For and on behalf of
Taranaki Regional Council

Director-Resource Management

FIGURE THREE – BOAT RAMP MAPS



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

Name of
Consent Holder: TrustPower Limited
Private Bag 12023
TAURANGA 3143

Decision Date: 25 June 2009

Commencement
Date: 17 December 2010

Conditions of Consent

Consent Granted: To take and use water from Lake Rotorangi for hydro-
electric power generation purposes at or about (NZTM)
1734751E-5621514N

Expiry Date: 1 June 2040

Review Date(s): As per special condition 13

Site Location: Maben Road, Hurleyville, Patea

Legal Description: Secs 1 & 2 SO 12618 Sec 1 SO 12962 & Pt Sec 6 Pt Sec
7 Blk VI Opaku SD

Catchment: Patea

Tributary: Lake Rotorangi

*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. Subject to the availability of such flows after any upstream uses currently authorised and any uses subsequently authorised in accordance with conditions 2 and 3 below, the consent holder is authorised to take and use up to: 75 cubic metres per second of water for hydro-electric power generation purposes; and 25 cubic metres per second of water for fish passage purposes.
2. Nothing in this consent or the associated consents shall be deemed to:
 - (a) create an allocation of water to the exclusion of the exercise or renewal of any consents to dam, divert, take and/or use water in the Patea River catchment upstream of the Patea Dam which existed at 6 May 2009 up to the rates and volumes provided for in those consents as at that date; or
 - (b) create an allocation of water to the exclusion of the carrying out of any permitted activity to dam, divert, take and/or use water in the Patea River catchment upstream of the Patea Dam which is authorised in Regional Plans as at 6 May 2009, whether or not that activity was in existence as at May 2009;
 - (c) This consent and associated consents shall not be exercised in such a manner as to limit the exercise of any consent or permitted activity referred to above.
3. The total amount of water authorised to be dammed, diverted, taken and/or used pursuant to this consent and associated consents and the total volume allocated under this consent and associated consents, excludes such water as may be authorised to be taken, diverted and or used, by any other persons upstream of Patea Dam pursuant to a water permit granted during the term of this consent, and nothing in this consent or any of the associated consents shall preclude the grant of such additional consents during the term of this consent. Provided that this exclusion shall be limited to a maximum rate of abstraction for upstream consents not existing as at May 2009, not exceeding 0.305 cubic metres per second.

Consent 0491-2

4. Subject to conditions 5-8 below, the exercise of this consent shall not cause the flow in the Patea River, as measured at the 'McCull's Quarry' measuring site [site no 34304], to be less than 2.1 cubic metres per second (as an hourly average) [the 'minimum flow'].
5. Notwithstanding condition 4 above, following unusually long periods of less than normal rainfall in the Patea River catchment the exercise of this consent may cause the flow in the Patea River to be less than the minimum flow, provided that the flow in the Patea River as measured at the 'McCull's Quarry' measuring site [site no 34304] is not less than 2.1 cubic metres per second (as an hourly average):
 - (a) at any time during more than 5 out of any 10 consecutive calendar years; or
 - (b) for more than 72 hours in any 30 day period.
6. On any occasion when the exercise of this consent causes the flow in the Patea River to be less than the minimum flow in accordance with condition 5 the consent holder shall, within 14 days, provide the Chief Executive, Taranaki Regional Council with documentation showing that the breach of the minimum flow was a direct result of an unusually long period of less than normal rainfall in the Patea River catchment.
7. In the event that any future upstream water takes (not consented as at 6 May 2009) in combination with existing takes, cause the total inflow to Lake Rotorangi to be less than 2.1 cubic metres per second, the minimum flow referred to in condition 4 shall, at times when the total inflow to Lake Rotorangi is less than 2.1 cubic metres per second, be temporarily reduced by a rate equivalent to the estimated combined rate of take by such future upstream water takes.
8. At no time shall the exercise of this consent cause the flow in the Patea River, as measured at the 'McCull's Quarry' measuring site [site no 34304], to be less than 1.8 cubic metres per second (as an hourly average).

Advice Note: For the avoidance of doubt, it is recorded that the intent of condition 7 is to provide relief to the consent holder if a future allocation of some or all of the 0.305 m³/s referred to in condition 3 of consents 0491-2 and 0489-2 causes a reduction in lake inflows below 2.1 m³/s. During those times, the minimum flow below the Patea Dam can be temporarily reduced to reflect the lower inflows. If any future consents are granted on terms that require any future consent holder to cease taking at times when the consent holder is restricted by the minimum flow then the downstream minimum flow will not be affected.

Advice Note: Nothing in this consent precludes the consent holder from submitting (on any basis permitted by the Act) on any future consent or re-consenting applications to take water from the Patea River catchment upstream of Patea Dam. For the avoidance of doubt, any such future applications need to be considered on their merits.

9. Within 12 months of the commencement of this consent the consent holder shall have prepared and submitted a comprehensive report to the Chief Executive of the Taranaki Regional Council, that:

Consent 0491-2

- (a) describes the feasibility of installing deterrent measures at the intake structure of the Patea Dam that will, to the greatest extent practicable avoid the entrapment of adult eels;
 - (b) describes the alternate measures considered and assesses the strengths and weaknesses of each measure; and
 - (c) recommends a deterrent measure for deflecting adult eels from the intake structure of the Patea Dam.
10. Within 12 months of receiving certification from the Chief Executive, Taranaki Regional Council that the report addresses all the matters set out on condition 9, the consent holder shall implement the deterrent measures recommended in the report required by condition 9.
11. The consent holder shall measure and electronically record the flow passing downstream of the Patea Dam, at the McColl's Quarry Site [site no. 34304], to an accuracy of $\pm 5\%$ at intervals not exceeding 15 minutes. These records shall be provided to the Chief Executive of Taranaki Regional Council at monthly intervals or upon reasonable request.
12. All the water taken, except that taken for cooling purposes, shall be discharged back into the river immediately below the Patea Dam.
13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
 - (a) 2 years from commencement of consent; during the sixth year and every 6 years thereafter; and/or
 - (b) within 30 days of receiving the report required by condition 9; and/orfor 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 it was not appropriate to deal with at the time the consent was granted.

Signed at Stratford on 17 December 2010

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: TrustPower Limited
Private Bag 12023
TAURANGA 3143

Consent Granted
Date: 30 June 2009

Conditions of Consent

Consent Granted: To take groundwater to provide a domestic water supply to facilities at the Patea Dam, including the powerhouse, dwellings and a camping ground at or about (NZTM) 1734794E-5621358N

Expiry Date: 1 June 2040

Review Date(s): June 2016, June 2022, June 2028, June 2034

Site Location: Patea Hydroelectric Power Scheme, Maben Road,
Hurleyville, Patea

Legal Description: Pt Sec 7 Blk VI Opaku SD

Catchment: Patea

Consent 7192-1

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 4824. If there is any conflict between the documentation submitted in support of application 4824 and the conditions of this consent, the conditions of this consent shall prevail.
2. The volume of water taken shall not exceed 12.5 cubic metres per day at a rate not exceeding 1 litre per second.
3. The consent holder shall install and maintain a water meter on the bore that records the volume of water taken to an accuracy of $\pm 5\%$. The meter shall be installed before the consent is exercised.
4. The consent holder shall maintain a record of the volume of water taken each month. The record shall include date of meter reading, pumping hours and volume pumped, and make these records available to the Chief Executive, Taranaki Regional Council, no later than 31 July of each year, or upon request.
5. This consent shall lapse on 30th June 2014, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

Consent 7192-1

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 2016 and/or June 2022 and/or June 2028 and/or June 2034, 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 June 2009

For and on behalf of
Taranaki Regional Council

Director-Resource Management