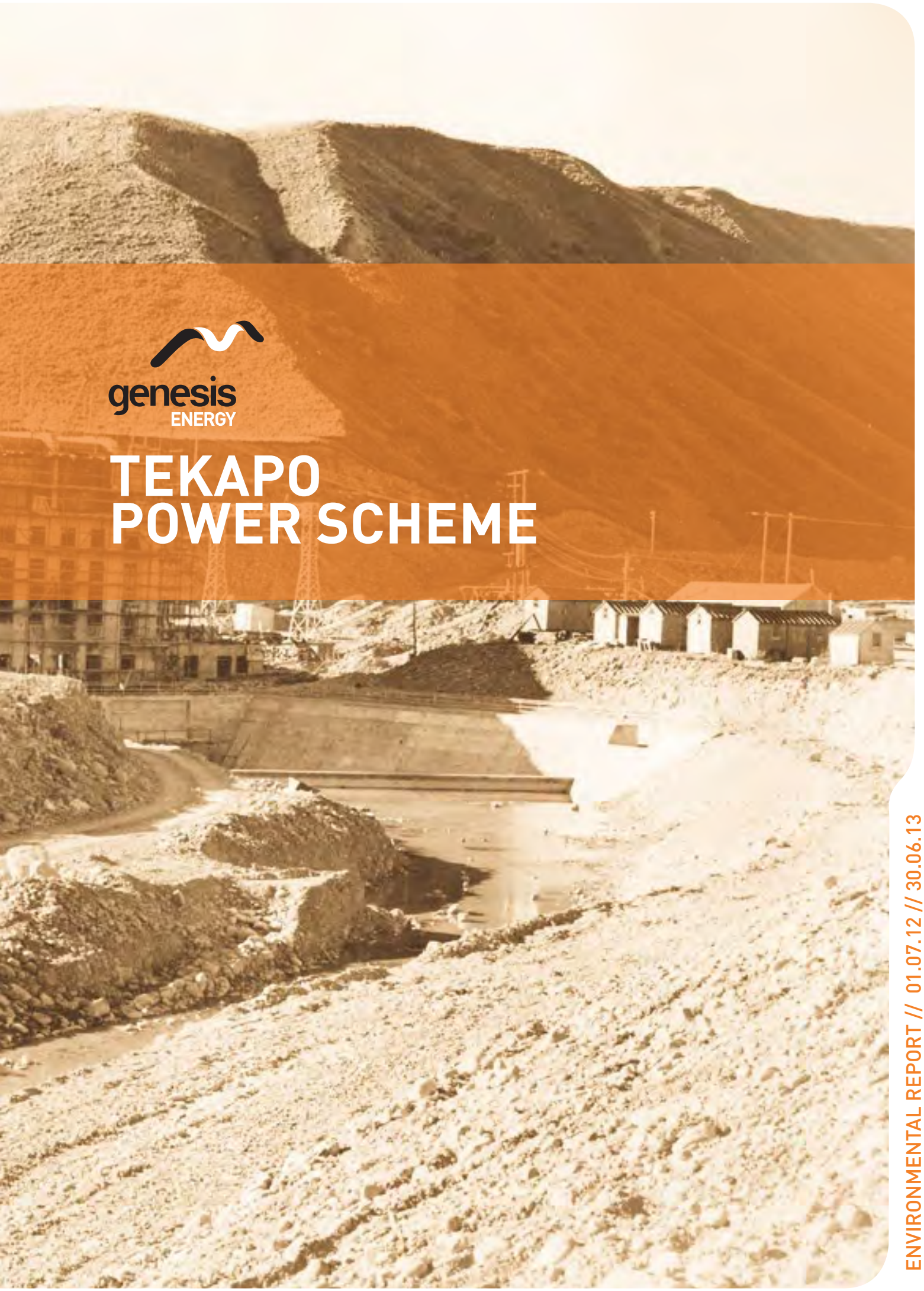


genesis ENERGY

TEKAPO POWER SCHEME

ENVIRONMENTAL REPORT // 01.07.12 // 30.06.13

13

DISCLAIMER //

This report summarises the key outcomes at the Tekapo Power Scheme for the operating period 1 July 2012 to 30 June 2013. There are a number of technical reports, research programmes, environmental initiatives and agreements that have fed into this report; it is not the intention of this report to reproduce or replicate this information, rather to provide a summary of it. Genesis Energy is happy to provide further details or technical reports or discuss matters directly with interested parties.

CONTENTS

HIGHLIGHTS

1 July 2012 to 30 June 2013

Tekapo Canal Remediation Project Genesis Energy successfully completed season one works to re-line six kilometres of the Tekapo Canal. The works were completed on time, to specification, without any significant health and safety incidents and with full resource consent compliance. Season two works will occur during the summer of 2013/14 (chapter 7).

Schoolgen Schoolgen is a Genesis Energy initiative bringing solar energy and energy efficiency to life for New Zealand schools. Lake Tekapo School became a Schoolgen school in July 2013 and is the only school in New Zealand to have the ability to store the electricity they have generated from their own solar panels, in a battery bank (section 9.1).

Lake Tekapo Footbridge Society Genesis Energy has entered into a Memorandum of Understanding with the Lake Tekapo Footbridge Society to provide funding towards the construction of a footbridge across the Lake Tekapo outlet upstream of the Lake Tekapo Control Structure. A footbridge will provide safe access between the Church of the Good Shepherd and Lake Tekapo township (section 9.2).

Environmental Monitoring Genesis Energy undertook studies to provide a snap shot of the current environment in which the Tekapo Power Scheme operates, and to better understand the effects of the scheme on the environment (chapter 6).

ABBREVIATIONS

AER	Annual Environmental Report
CSR	Comprehensive Safety Review
DO	Dissolved Oxygen
DOC	Department of Conservation
EMS	Environmental Management System
GWh	Gigawatt hour
HiCoG	High Flow Management Coordination Group
kW	Kilowatt
masl	Metres above sea level – Moturiki Datum
MW	Megawatt
NIWA	National Institute of Water and Atmospheric Research
PRR	Project River Recovery
PV	Photovoltaic
RCMS	Resource Consent Management System
RECC	Renewable Energy Control Centre
SMP	Supplementary Management Plan
TekPS	Tekapo Power Scheme
WMA	Water Management Agreement

Cover photo: Tekapo A Power Station construction and tailrace excavation (8 May 1950).

01 INTRODUCTION

E mihi ana ki a koutou i runga i ngā tini āhuatanga o te wā. Anei te Ripoata Taiao e hāngai ana ki ngā mahi hihiko mō te rohe o Takapō.

Welcome to the 2012-2013 Annual Environmental Report (AER) for the Tekapo Power Scheme (TekPS). The purpose of this report is to update the community and stakeholders on the wide range of activities that occurred at the TekPS between 1 July 2012 and 30 June 2013 (the 'reporting period'). This document is the second AER for the TekPS and follows the previous year's reporting. This report will:

- provide an overview of resource consent compliance at TekPS;
- provide an update on monitoring and research programmes;
- report back on key projects;
- report on community and environmental initiatives; and
- define environmental objectives for the next 12 months.

Genesis Energy aims to be accessible to the public, to address issues as they arise and to develop closer working relationships within the communities in which it operates.

1.1 DOCUMENT OVERVIEW

Genesis Energy produces a suite of reports and other documentation on its activities each year (Figure 1). These include detailed technical reports, audit reports and various reporting requirements to stakeholders. They address specific issues at a site/local level.

The Company's Annual Report provides an overview of Genesis Energy's performance as a company and sets objectives for the coming year.

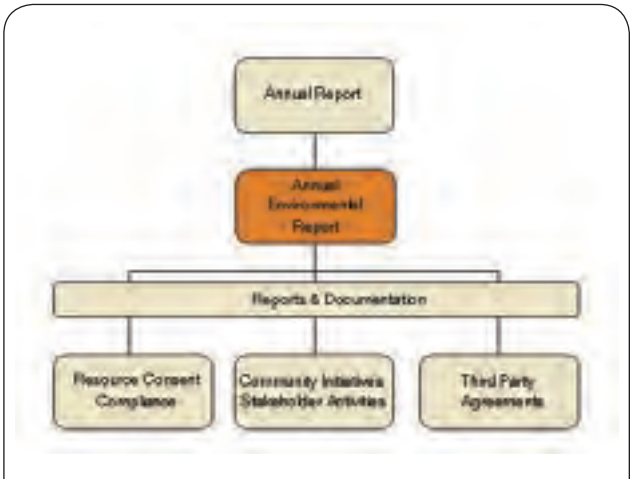


FIGURE 1 // Report hierarchy at Genesis Energy.

This AER bridges the gap between site specific reporting and the company's Annual Report. It provides an overview of all environmental and stakeholder activities relating to the TekPS. It does not detail company strategy or performance (refer to the Annual Report for this information) or provide extensive detailed information on monitoring programmes and other initiatives undertaken (refer to specific technical reports listed in the references).

More information about Genesis Energy, including an electronic copy of this document, can be found on the website: **www.genesisenergy.co.nz**

1.2 RESOURCE CONSENT OVERVIEW

Resource consents for the ongoing operation of the TekPS were split or transferred to Genesis Energy on 1 June 2011 as part of the Sale and Purchase Agreement between Genesis Energy and Meridian Energy. Obligations under these resource consents remain unchanged. The only modifications were those required to make Genesis Energy the consent holder for those consents related to the TekPS.

The resource consents for the TekPS are regulated by Mackenzie District Council and Environment Canterbury. They include a range of water permits, land use and discharge permits to take and use water from Lake Tekapo throughout the TekPS and to allow for minor maintenance works around the scheme. The consents are operative until 2025.

1.3 HOW TO USE THIS DOCUMENT

This report documents environmental outcomes based on three key areas of the scheme:

- Lake Tekapo;
- Tekapo River and Lake George Scott; and
- Tekapo A Power Station, Tekapo Canal and Tekapo B Power Station.

This report also provides information for:

- Scheme-wide Outcomes;
- Community and Environmental Initiatives.

There is also a chapter which describes Environmental Monitoring (chapter 6) and the Tekapo Canal Remediation Project (chapter 7).

Bold text like this will help you to find your way around the report.

Consent # (condition) identifies the parts of the report that relate to specific resource consent conditions.

Orange text like this throughout the report provides useful background information on specific issues.

1.4 GENESIS ENERGY'S APPROACH TO ENVIRONMENTAL MANAGEMENT

1.4.1 GENESIS ENERGY'S VALUES

Genesis Energy's four core values define the way things are done at Genesis Energy. They are the actions and behaviours which help contribute to the success of the company.

Genesis Energy Values

- Respect – We treat people and places as we would wish to be treated.
- Drive – We achieve with energy, courage and commitment.
- Imagine – We challenge today and change tomorrow.
- Support – We work together, take responsibility and have fun.

Genesis Energy's intent is to become the preferred provider of energy in New Zealand. We will achieve this by:

- Delivering efficient service and smart solutions to customers;
- Optimising the performance of our generation portfolio;
- 'Living' our values; and
- Operating in a way that is safe and healthy for our people, our customers, our communities and the environment.

1.4.2 ENVIRONMENTAL MANAGEMENT SYSTEM

Genesis Energy has an Environmental Management System (EMS) which ensures that environmental and social awareness are core to the operation of the Company. The EMS sets out the Company's values in respect of environmental and stakeholder management, and clearly states its commitment to compliance with all environmental legislation.

Genesis Energy's Environmental Values are:

- Act with integrity at all times.
- Foster close relationships with the community and stakeholders, so that their views can be incorporated into the environmental decision-making processes.
- Acknowledge that our activities affect both the environment and the communities within which we operate.
- Respect the role of tangata whenua as kaitiaki of the natural resources and taonga within their rohe.

- Investigate to better understand the nature of the environmental effects – and share this information with the community and stakeholders.
- Seek environmental improvements in all aspects of our business.

During the reporting period Genesis Energy began a review of its EMS. This is to ensure that the EMS encompasses the number of different business systems used by the environmental teams and to ensure that they are integrated with other core business systems, for example the Resource Consent Management System. The review is also checking that the EMS applies to all activities involving the use of natural and physical resources and the environment, from the conceptual stage of any project through to the normal operational activities of Genesis Energy. The review will be completed in the 2013/14 reporting period.

1.4.3 RESOURCE CONSENT MANAGEMENT SYSTEM

To help manage compliance across all generation sites, Genesis Energy has developed a Resource Consent Management System (RCMS). This system holds all information relating to resource consents, third party agreements, and permitted activities, and defines, prompts and monitors actions required by their conditions, and reports on the status of these. The purpose of the RCMS is to ensure that Genesis Energy manages its statutory and stakeholder obligations effectively and that essential requirements are not overlooked.

All Genesis Energy staff can access the RCMS through the company's intranet but only designated administrators within the Environmental Team can make changes and update/sign off tasks, or view potentially confidential information contained within third party agreements.

An internal RCMS and environmental compliance audit is undertaken on an annual basis at selected generation sites. The purpose of the audit is to ensure the correct procedures are being followed and to identify any improvements that could be made to RCMS systems or processes to best achieve 100% compliance.

During the reporting period, required improvements to the RCMS were identified including enhanced reporting functionality and ensuring that the system is more user-friendly. A project is planned to incorporate these changes in the RCMS in the 2013/14 reporting period.

During the reporting period the TekPS resource consents and third party agreements were internally audited. The audit observed overall excellent compliance with processes in place, with a few minor process improvement recommendations identified. These recommendations have been captured in Genesis Energy's Event Management System, with actions assigned and given specific dates for completion.

1.4.4 HYDROLOGY

Genesis Energy has an extensive hydrology monitoring network around the TekPS. A variety of water level, flow and meteorological recording sites collect data in real-time and near real-time. This information is sent to Genesis Energy's Renewable Energy Control Centre (RECC), located near Turangi, with a range of plant and market information.

The TekPS hydrology data is collected on behalf of Genesis Energy by the National Institute of Water and Atmospheric Research (NIWA) and other third parties. Data is collected, managed and stored within Genesis Energy. Genesis Energy also has an in-house Hydrology team who collect data and manage Genesis Energy's Hydrometric network. This team manages the Hydrometric Services Contract that Genesis Energy holds with NIWA for hydrology monitoring around the TekPS.

Data collected by NIWA must be internally reviewed before being provided to Genesis Energy on a quarterly basis. This data is then checked by an external auditor before being appended to the Genesis Energy Archive database.

1.5 FEEDBACK

Genesis Energy has worked to make this report informative and easy to understand. Your feedback is welcome on both content and layout. Contact details are as follows:

Genesis Energy
PO Box 9056
Tower Junction
CHRISTCHURCH 8149
Attn: Environmental Manager

02

genesis ENERGY

TEKAPO POWER SCHEME

02 TEKAPO POWER SCHEME

The Tekapo Power Scheme is located at the head of the Waitaki Valley in the Mackenzie District and uses water from the glacial-fed Lake Tekapo to generate electricity through two power stations. The scheme is situated close to the majestic Aoraki Mt Cook and near the Lake Tekapo township.

Lake Tekapo is the source of water for the entire Tekapo Power Scheme. The lake is dammed by the Lake Tekapo Control Structure (Gate 16) at the head of the Tekapo River which also forms the bridge over the river at State Highway 8.

Construction of the Tekapo A Power Station (25 MW) began in 1938 but was halted between 1942 and 1944 as labour and materials were diverted to World War II. The station was finally commissioned in 1951. Tekapo A Power Station generates an average of 160 Gigawatt hours (GWh) of electricity per year from water diverted from Lake Tekapo via a 1.4 km tunnel.

In 1970 a 25.5 km canal was constructed to take outflows from Tekapo A to Tekapo B. The Tekapo Canal has a maximum capacity of 130 cubic metres per second (m^3/s).

Water in Lake Tekapo can bypass Tekapo A Power Station via water released through the Lake Tekapo Control Structure (Gate 16). When the control gates are open, water flows down the upper Tekapo River to Lake George Scott. Water can then be released into the Tekapo Canal via a gate in the control structure (Gate 17) that impounds Lake George Scott, or continue to the Tekapo River.

Commissioned in 1977, Tekapo B Power Station (160 MW) is the only power station in New Zealand completely surrounded by water. Sitting in Lake Pukaki, essentially as an island, the station is connected to land via a 74 m long bridge.

Constructed on concrete raft foundations, Tekapo B is 46 m high. However, nearly two thirds of the power station is below the waterline. The station is powered by water from the Tekapo Canal with outflows entering Lake Pukaki. This same water then passes through a further six power stations within the Waitaki Catchment.

2.1 OPERATING THE TEKAPO POWER SCHEME

Genesis Energy's Renewable Energy Control Centre (RECC) is located at Tokaanu Power Station (near Turangi at the southern end of Lake Taupo). The RECC operates three hydro power schemes; Waikaremoana, Tongariro and Tekapo Power Schemes. The 24/7 control centre operates the Tekapo Power Scheme as efficiently as possible, to optimise electricity generation requirements, while maintaining compliance with resource consent conditions and operating within the electricity market rules. A complex operational control system provides details on all aspects of the scheme, enabling remote control and alerting operators when various parameters trend outside their standard operating limits (including resource consent limits).

There are maintenance staff, including roaming operators, on site at Tekapo A Power Station. The Maintenance Team is available 24/7 to fix faults or defects as they arise and this team can also operate the power scheme locally if required in rare circumstances.

An Environmental Team is based in Christchurch and is responsible for managing the resource consents, and community and stakeholder relationships for the TekPS.

2.2 CLIMATE AND POWER GENERATION

Rainfall across the Mackenzie Basin is influenced by the rainfall shadow created by the Southern Alps. There is a steep gradient of rainfall which decreases rapidly from the northwest to the southeast of the Mackenzie Basin. The mean annual rainfall at Panorama Ridge at the top of the Godley catchment (at an altitude of 1509 masl) is 5362 mm compared with Lake Tekapo which is 509 mm (at an altitude of 710 masl). This clearly illustrates the orographic rainfall effect induced by the Southern Alps.

During the reporting period, rainfall was slightly below average across all of the gauges in the upper catchments (Table 1). The Lake Tekapo gauge located near the Lake Tekapo Township recorded 145% of the expected annual rainfall at 739 mm compared to a long term average of 509 mm.

TABLE 1 // Rainfall during the reporting period.

Monitoring Site	Rainfall Total (mm)	Long Term Average (mm)
Eade Hut	4,622	4,868
Panorama Ridge	5,262	5,362
Rose Ridge	3,680	3,950

Despite the slightly below average rainfall conditions in the upper catchment, Lake Tekapo experienced extremes in weather conditions during the reporting period. Late winter 2012 had above average rainfall, which quickly tailed off to significantly below average rainfall leading into summer. During this period the lake was maintained at low levels leading into the outage period for season one of the Tekapo Canal Remediation Project.

However, in early January, 861 mm of rain fell in just 5 days. This coincided with the start of the Tekapo Canal Remediation Project where outflow from Lake Tekapo was zero. This resulted in Lake Tekapo rising almost five metres in 20 days, pushing the lake above the maximum control level. A controlled spill event was initiated down the Tekapo River to return the lake to at or below maximum control level until the Tekapo Canal returned to service.

The period of extreme inflows was immediately followed by an extended period of significantly below average rainfall which extended from February to until the start of June. Rainfall totals during this period were consistently low at approximately 50% of the long-term average.

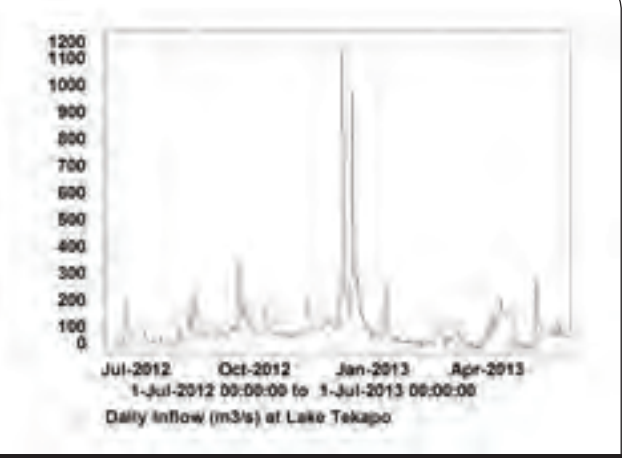


FIGURE 2 // Mean daily inflows for Lake Tekapo.

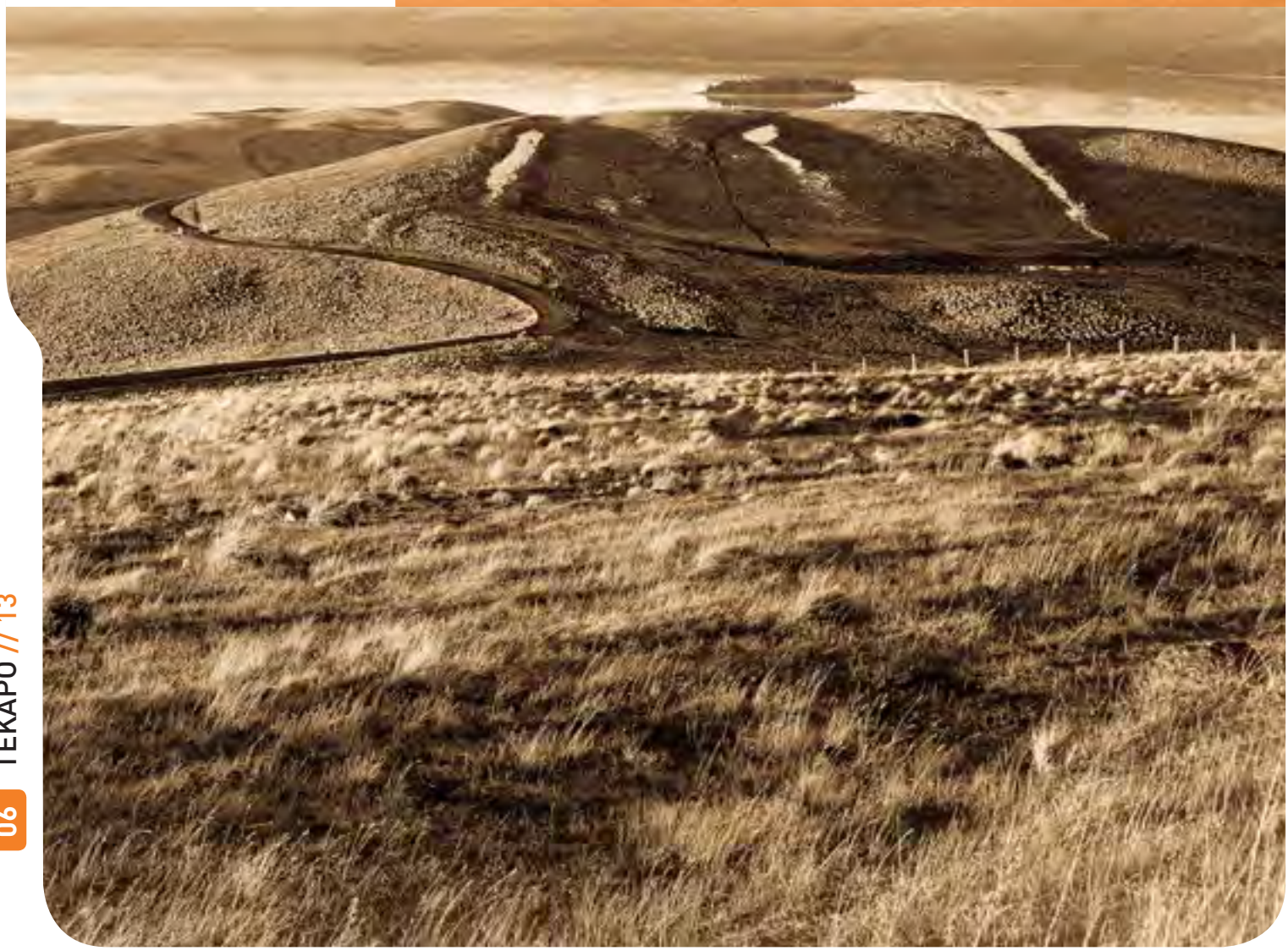
Tekapo A Power Station generated 90 GWh while Tekapo B Power Station generated 691 GWh giving a total for the TekPS of 781 GWh for the reporting period. Generation for the TekPS as a whole during this period was significantly below average. This was a direct result of the generation outage during season one of the Tekapo Canal Remediation Project over the summer.

Based on an average figure of electricity consumption per household of 7,760 kWh/yr (Ministry of Economic Development, 2012: p121), the 781 GWh produced in the reporting period was enough electricity to power the annual demand of approximately 100,644 households.

03

genesis ENERGY

LAKE TEKAPO



03 LAKE TEKAPO

Lake Tekapo is approximately 25 km long and covers an area of around 95 km^2. The turquoise colour of the lake is caused by suspended fine silts created by glaciation. These fine silts are transported to Lake Tekapo via the rivers that feed the lake including the Godley River, Macauley River and Cass River.

The last glacial maximum approximately 17,000 years ago resulted in glaciers flowing from the Southern Alps, through the Godley Valley, out to the sloping plains of the Mackenzie country. The movement of these glaciers caused large volumes of rock to be deposited creating moraines that dammed the valley. Lake Tekapo was formed behind the terminal moraine dam as the glaciers retreated.

Lake Tekapo (Takapō) was an important mahinga kai (food gathering area), particularly for the local Ngāi Tahu hapū (sub-tribe) of South Canterbury. Whānau travelled to Tekapo (Takapō) to gather foods such as tuna (eel), weka and a variety of waterfowl.

Prior to the development of the Tekapo Power Scheme, the outflow of Lake Tekapo (the Tekapo River) meandered across the Mackenzie Plains in a wide stream before being joined by the outflow of Lake Pukaki and Lake Ohau.

3.1 HYDROLOGY

Lake Tekapo is the sole source of water for the TekPS. The lake is dammed by the Lake Tekapo Control Structure (Gate 16) at the head of the Tekapo River. The control structure also forms the crossing point for State Highway 8 over the Tekapo River.
Resource Consent CRC905301.4

The management of the level of Lake Tekapo is authorised via resource consents CRC905301.4 and CRC905302.3 which enable Genesis Energy to operate the lake between a level of 701.8 masl and 710.9 masl. The minimum operating level of Lake Tekapo varies throughout the year:

- 1 April and 30 September – Minimum Level of 701.8 masl; and
- 1 October and 31 March – Minimum Level of 704.1masl.

However, in accordance with resource consent CRC905302.3, the level of Lake Tekapo may be further reduced between 1 October and 31 March if the Electricity Commission determines that reserve generation capacity is required, or the National or South Island minzones have been breached. Genesis Energy also has responsibilities under a stakeholder agreement with Mackenzie District Council, to liaise with the Lake Tekapo Community Board when the level of Lake Tekapo falls below 704.5 masl.

The maximum operating levels for Lake Tekapo are as follows:

- September to February – Maximum Level of 709.7 masl;
- March – Maximum Level of 710.0 masl;
- April and August – Maximum Level of 710.3 masl; and
- May – Maximum Level of 710.6 masl.
- June and July – Maximum Level of 710.9 masl.

The conditions attached to resource consent CRC905301.4 also require Genesis Energy to control and operate the level of Lake Tekapo in accordance with the provisions contained in "Tekapo Power Scheme, Appendix A, Extracts of Waitaki Operating Rules (9 November 1990), as modified by an order pursuant to Section 122 of the Electricity Industry Act 2010" (spill rules).

Figure 3 shows the level of Lake Tekapo during the reporting period with maximum and minimum control levels overplotted. During the reporting period Lake Tekapo was 100% compliant with the minimum control level. During season one of the Tekapo Canal Remediation Project, the Tekapo Canal, Tekapo A and Tekapo B power stations were out of service and water was not able to flow through the scheme. This resulted in inflows filling Lake Tekapo to maximum control level and spill flow commencing down the Tekapo River on 11 January 2013, which was sooner than planned due to the large inflow event described previously.

Maximum lake level compliance is determined by compliance with the spill rules while Lake Tekapo is at or above maximum control level. Spill flow from Lake Tekapo is enabled under resource consent CRC905309.4 (spill over Lake George Scott weir). During the reporting period, compliance for maximum lake level of Lake Tekapo was 99.91% (Table 2). During the period of spill on 29 January 2013, while Lake Tekapo was above maximum control level, an automated communication fault resulted in Gate 16 closing and flow reduced from 130 m^3/s to 17 m^3/s over Lake George Scott weir in approximately 45 minutes (as seen in Figure 5). This caused a non-compliance with a condition in the spill rules that sets out that the rate of flow reduction is 20 m^3/s per hour. Spill was reinstated back to 130 m^3/s using the ramping up process outlined in the spill rules and Environment Canterbury was notified.

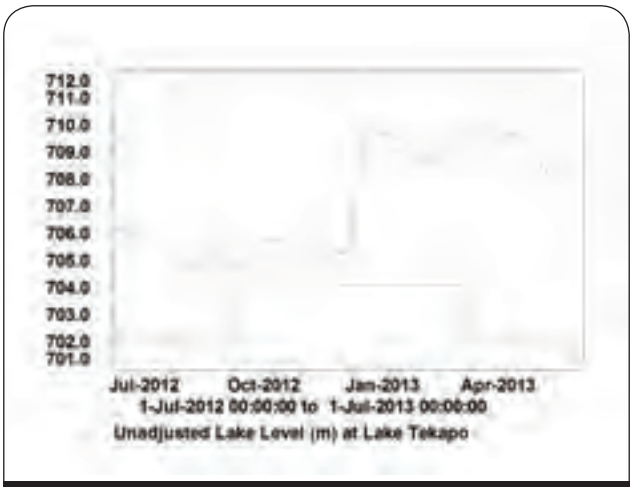


FIGURE 3 // Lake Tekapo lake level compliance during the reporting period.

TABLE 2 // Lake Tekapo lake level compliance during the reporting period.

Parameter	Value (masl)	Compliance (%)	Consent Number (condition)
Minimum Lake Level	701.8 - 704.1	100	CRC905301.4 (2)
Maximum Lake Level	709.7 - 710.9	99.91	CRC905301.4 (2)

04

genesis ENERGY

TEKAPO RIVER AND LAKE GEORGE SCOTT

04 TEKAPO RIVER AND LAKE GEORGE SCOTT

The Tekapo River is the natural outlet of Lake Tekapo, although it is dammed and controlled for hydro-electricity at the Lake Tekapo Control Structure (Gate 16). Gate 16 consists of five steel radial gates that were constructed across the outlet of the lake in 1954, around three years after Tekapo A power station commenced operation. The gates have a total discharge capacity of 850 m^3/s. State Highway 8 crosses the dam structure.

The Tekapo River is dammed approximately 2 km downstream of Gate 16 by a concrete weir, creating Lake George Scott. Water spilled from Lake Tekapo and impounded in Lake George Scott can be discharged into the Tekapo Canal via Gate 17. Water from Lake Tekapo can also flow over Lake George Scott weir and continue down the Tekapo River to Lake Benmore.

The Tekapo River is approximately 45 km long and is augmented by spring fed flows and tributaries such as Fork Stream, and the Grays and Maryburn Rivers. The Tekapo River converges with the Pukaki River before discharging into the Haldon Arm of Lake Benmore.

4.1 HYDROLOGY

Resource Consent CRC905304.3
Resource consent CRC905304.3 enables Genesis Energy to discharge up to 850 m^3/s of water from Lake Tekapo into the Tekapo River via the Lake Tekapo Control Structure (Gate 16). Genesis Energy typically only allows water to spill into the Tekapo River downstream of Gate 16 in the following circumstances:

- When the maximum operating level of Lake Tekapo has been reached and the capacity of the Tekapo A Power Station is not sufficient to reduce the level of Lake Tekapo;
- If there is an outage event at the Tekapo A Power Station and Genesis Energy still wants to generate electricity at the Tekapo B Power Station;
- For recreational release purposes; or
- To top-up Lake George Scott with the purpose of augmenting flow in the Tekapo Canal to achieve maximum generation from Tekapo B Power Station.

Figure 4 presents flow data for the Tekapo River between the Lake Tekapo Control Structure and Lake George Scott weir. Flow from Lake Tekapo Control Structure was 100% compliant with the maximum consented flow during the reporting period as shown in Table 3.

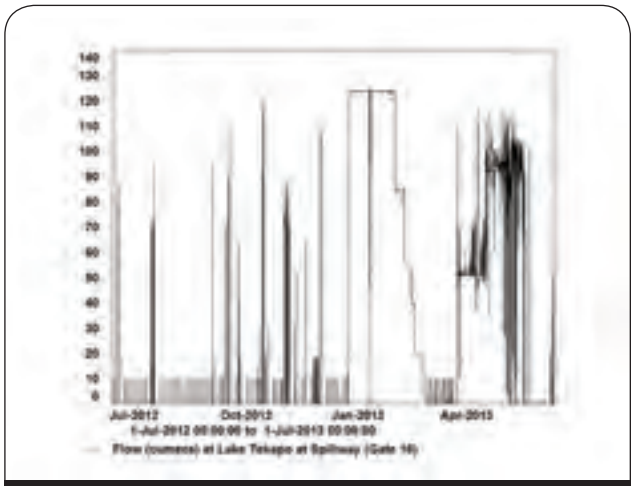


FIGURE 4 // Flow via the Lake Tekapo Control Structure during the reporting period.

TABLE 3 // Flow via the Lake Tekapo Control Structure compliance during the reporting period.

Parameter	Value (m^3/s)	Compliance (%)	Consent Number (condition)
Maximum Flow	850	100	CRC905304.5 (3)

Resource Consent CRC905306.3
Genesis Energy operates Lake George Scott to a level of 684.05 masl which is also the level of the spillcrest of the weir. Figure 5 shows the level of Lake George Scott during the reporting period. Once the maximum level of Lake George Scott is reached, spill occurs down the Tekapo River. Spill from Lake George Scott weir is enabled under resource consent CRC905309.4 and maximum level of Lake George Scott is determined by compliance with the spill rules. During the reporting period Lake George Scott maximum level and flow over Lake George Scott weir was 99.79% compliant (Table 4). This compliance result is explained in the following section (CRC905309.4).

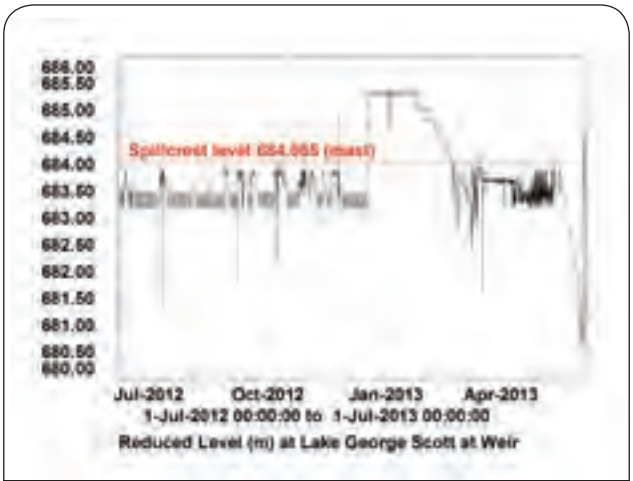


FIGURE 5 // Lake George Scott lake level during the reporting period.

TABLE 4 // Lake George Scott lake level and weir flow compliance during the reporting period.

Parameter	Value	Compliance (%)	Consent Number (condition)
Maximum Lake Level	684.05 masl	99.79	CRC905306.3 (2)
Maximum Flow	600 m^3/s		CRC905309.4 (3)

Resource Consent CRC905309.4
The spilling of water into the Tekapo River downstream of Lake George Scott is controlled by resource consent CRC905309.4. This consent enables Genesis Energy to discharge up to 600 m^3/s of water into the Tekapo River over the Lake George Scott weir. The spilling of water under this consent is also managed in accordance with the provisions contained in "Tekapo Power Scheme, Appendix A, Extracts of Waitaki Operating Rules (9 November 1990), as modified by an order pursuant to Section 122 of the Electricity Industry Act 2010".

Flow above the maximum level of Lake George Scott results in flow over the weir (Figure 5). During the reporting period Lake George Scott weir flow was 99.79% compliant (Table 4). Spill flow over the weir reached a maximum of 134 m^3/s which is well below the maximum consented flow of 600 m^3/s. Non-compliance with flow over the weir is due to non-compliance with the spill rules and these instances are outlined below.

During the reporting period, three minor spill events occurred that are considered to be minor non-compliances. All three events were less than 5 m^3/s with durations less than 20 minutes.

Other spill events that occurred during the reporting period include spill on 19 December 2012 where flow reached a maximum of 77 m^3/s for a duration of 30 minutes. This spill was due to an error where Gate 17 did not open immediately as flow was arriving at Lake George Scott. This situation is not expected to reoccur as the control system has since been upgraded (section 8.3.7).

Spill associated with the Tekapo Canal Remediation Project also occurred between 11 January 2013 and 18 March 2013. During this time an automated communication fault occurred on 29 January 2013 resulting in a non-compliance with the spill rules (discussed in CRC905301.4). An investigation was undertaken to determine the cause, which attributed the event to a control system fault. Since the control system upgrade following this event, no further incidents have occurred.

Spill on 30 June 2013 reached a maximum flow of 30 m^3/s and lasted 6.5 hours. This spill event is considered non-compliant with the spill rules; however the spill was necessary to be able to test the upgraded control system between Gate 16, Gate 17 and weir flow as part of re-commissioning the upgraded system (section 8.3.7). Prior to this spill event Department of Conservation, Environment Canterbury, Meridian Energy, Fish and Game and the Lake Tekapo Community Board were informed. A full safety check of the Tekapo River was undertaken prior to spill to warn river users of the impending flow change.

Signs warning of the fluctuations in the level of the Tekapo River are also erected at public access points along the Tekapo River between the Lake Tekapo Control Structure and Lake Benmore and are checked annually, prior to the summer season, to ensure they are still in place and in good condition.

4.2 RECREATIONAL RELEASES

Kayaking on the Tekapo River is a popular recreational activity. The Tekapo Whitewater Upgrade Trust constructed a recreational canoe course in 1998 located near Lake George Scott that utilises water released from Lake Tekapo and is taken into the course by diversion from the Tekapo River. Kayakers also use water released from the Lake Tekapo Control Structure (Gate 16) to kayak on the upper Tekapo River between Gate 16 and Lake George Scott. While resource consent CRC905301.3 (Condition 13 a-d) stipulates criteria for recreational releases, the stakeholder agreement between Genesis Energy, Whitewater NZ and the Tekapo Whitewater Trust (and with the agreement of Environment Canterbury) is the guiding document under which recreational releases are managed.

During the reporting period, recreational releases were requested for the canoe course and upper Tekapo River by a range of school, university and club groups (Figure 6). Table 5 outlines the compliance of recreational releases during the reporting period. Full compliance was achieved for each recreational release event in regards to duration of the release and the required flow. The release scheduled for 5 January 2013 was cancelled due to high flows resulting in spill from Lake Pukaki. Water could not be taken into the Tekapo Canal and the planned recreational release had to be cancelled, as spill rules require any flow release for recreational purposes must be taken into the Tekapo Canal.

FIGURE 6 // Kayakers paddling on the canoe course upstream of Lake George Scott.

TABLE 5 // Recreational releases in the canoe course and upper Tekapo River during the reporting period.

Date	Required Duration of Release (hours)	Duration Gate 16 was open at or above the required flow (hours)	Required Flow (m^3/s)	Actual Average Flow* (m^3/s)	Compliance
13-Oct-12	10	4.6	18	18	Full compliance (Kayakers reported they were finished with the canoe course early and the release was stopped)
14-Oct-12	6	5.4	18	18	Full compliance (Kayakers reported they were finished with the canoe course early and the release was stopped)
30-Oct-12	3	3	30	30	Full compliance
3-Nov-12	7	4.7	18	18	Full compliance (Kayakers reported they were finished with the canoe course early and the release was stopped)
4-Nov-12	6.5	7.2	18	20	Full compliance
6-Nov-12	3	3.1	30	30	Full compliance
27-Nov-12	4	4.1	30	30	Full compliance
14-Dec-12	6	6.3	18	18	Full compliance
15-Dec-12	8	8	18	18	Full compliance
16-Dec-12	6	6.1	18	18	Full compliance
17-Dec-12	6	5.2	18	18	Full compliance (Kayakers reported they were finished with the canoe course early and the release was stopped)
5-Jan-13	8	0	18	0	Release was cancelled due to Genesis Energy's obligations under the Water Management Agreement as Meridian was spilling at Lake Pukaki and Genesis Energy could not generate at Tekapo B power station and therefore could not take water into the Tekapo Canal.

*Actual Average Flow is calculated from when the flow has reached the required level (release duration is calculated from the start of Gate 16 opening to the start of Gate 16 closing). It takes approximately 15 minutes for flow to reach both 18 m^3/s and 30 m^3/s from zero flow.

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TEKAPO A POWER STATION TEKAPO CANAL AND TEKAPO B POWER STATION

05

05 TEKAPO A POWER STATION, TEKAPO CANAL AND TEKAPO B POWER STATION

Situated on the southern foreshore of Lake Tekapo, the intake structure for Tekapo A Power Station draws water for the power station and passes the water through a 6 m diameter, 1.4 km long tunnel. The tunnel terminates in a surge chamber which is designed to accommodate flow differences when the power station operation requires flows to change faster than what the flow in the tunnel can accommodate. Tekapo A Power Station has a single 25.2 megawatt (MW) generator driven by a single Kaplan turbine.

Outflows from Tekapo A power station enter the Tekapo Canal which has a maximum capacity of 130 m^3/s and is 25.5 km long. The Tekapo Canal passes over a number of natural waterways which are accommodated by culverts under the canal, including Forks Stream, Irishman Creek and Maryburn Stream.

The water flows into a head pond before entering the penstocks and Tekapo B Power Station. Two Francis Turbines drive two 80 MW generators at Tekapo B Power Station.

5.1 HYDROLOGY

Resource Consent CRC905302.3
Resource consent CRC905302.3 enables Genesis Energy to take and divert up to 130 m^3/s of water from Lake Tekapo via the Lake Tekapo Intake Structure for hydro-electricity power generation. This intake structure is located in the bed of Lake Tekapo to the west of Lake Tekapo township. The intake structure enables the conveyance of water to the Tekapo A Power Station via a 1.4 km long tunnel.

The flow from Lake Tekapo via the Lake Tekapo Intake Structure into Tekapo A Power Station is shown in Figure 7. Tekapo A Power Station flow was below the maximum consented flow of 130 m^3/s during the reporting period. Table 6 shows the flow was 100% compliant during reporting period.

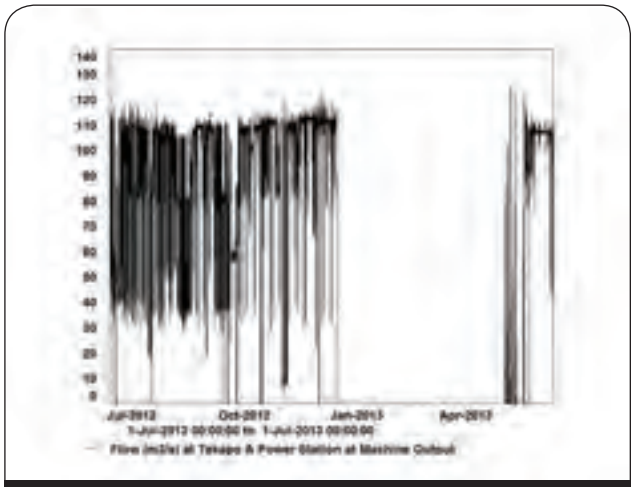

FIGURE 7 // Tekapo A Power Station flow via Lake Tekapo Intake Structure during the reporting period.

TABLE 6 // Tekapo A Power Station flow via Lake Tekapo Intake Structure compliance during the reporting period.

Parameter	Value (m^3/s)	Compliance (%)	Consent Number (condition)
Maximum Flow	130	100	CRC905302.3 (3)

Resource Consents CRC905307.2 and CRC905308.2
Resource Consent CRC905307.2 enables Genesis Energy to divert water up to a maximum rate of 130 m^3/s from the Tekapo River into the Tekapo Canal through Gate 17. Resource Consent CRC905308.2 also enables a take up to 130 m^3/s of water from the Tekapo River into the Tekapo Canal. The rate of flow of water for both consents is measured at Gate 17 (located between Lake George Scott and the Tekapo Canal).

Figure 8 shows the flow at Gate 17 that takes water from the Tekapo River into the Tekapo Canal via Lake George Scott and Gate 17. Flow through Gate 17 exceeded the maximum flow for 15 minutes on 12 April 2013 during gate testing following a control system upgrade. The maximum flow through Gate 17 during the 15 minute breach was 133.98 m^3/s. Compliance for the reporting period was 99.99% (Table 7).

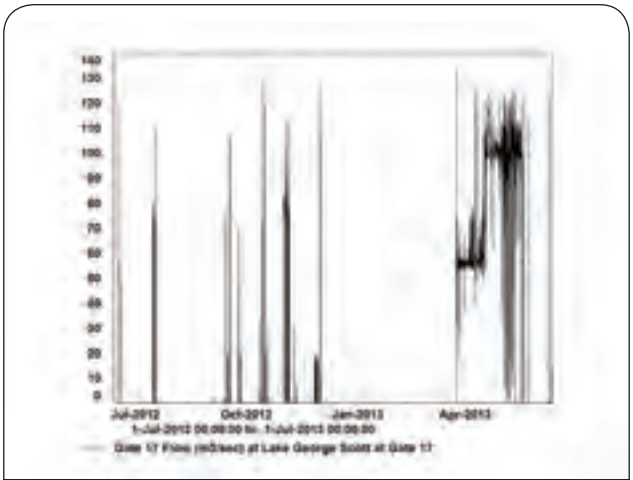

FIGURE 8 // Flow from Tekapo River into Tekapo Canal during the reporting period.

TABLE 7 // Flow from Tekapo River into Tekapo Canal compliance during the reporting period.

Parameter	Value (m^3/s)	Compliance (%)	Consent Number (condition)
Maximum Flow	130	99.99	CRC905307.2 (3) CRC905308.2 (3)

Resource Consent CRC905320.2
Resource Consent CRC905320.2 allows Genesis Energy to discharge water up to a maximum rate of 130 m^3/s into Lake Pukaki via Tekapo B Power Station.

Flow into Lake Pukaki via Tekapo B Power Station was below the maximum consented flow for the duration of the reporting period (Figure 9) and was 100% compliant (Table 8).

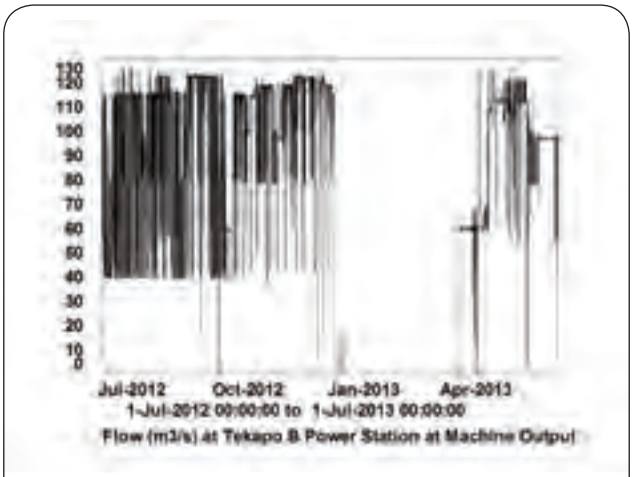

FIGURE 9 // Flow into Lake Pukaki via Tekapo B Power Station during the reporting period.

TABLE 8 // Flow into Lake Pukaki via Tekapo B Power Station compliance during the reporting period.

Parameter	Value (m^3/s)	Compliance (%)	Consent Number (condition)
Maximum Flow	130	100	CRC905320.2 (3)

5.2 WATER MANAGEMENT AGREEMENT

Genesis Energy and Meridian Energy hold resource consents to take, transfer, discharge and use water via interconnected lakes, rivers and canals throughout the Waitaki River Catchment for the purpose of electricity generation.

A Water Management Agreement (WMA) between Genesis Energy and Meridian Energy was reached as part of the sale and purchase of the Tekapo Power Scheme to define the operational inter-relationships that exist between the two companies in the Waitaki Catchment.

5.2.1 THE PUKAKI SUPPLY FLOW

Under the WMA between Genesis Energy and Meridian Energy, Genesis Energy is required to supply Lake Pukaki with a pre-defined minimum volume of water each month. Genesis Energy is also required to contribute to a Fish and Game Minimum Flow during the months of June to September. However, during the reporting preiod, no additional flow was required from Genesis Energy.

Table 9 outlines the required volume of water to be supplied to Lake Pukaki and the volume Genesis Energy supplied each month. Genesis Energy was compliant under the Water Management Agreement for each month during the reporting period.

TABLE 9 // Total monthly Pukaki Supply flow under the Water Management Agreement.

Month	Required Volume (plus additional Fish & Game flow required) (Mm^3)	Supplied Volume (Mm^3)	Compliance (%)
July 2012	88.39 (0)	200.68	100
August 2012	86.78 (0)	218.37	100
September 2012	88.00 (0)	226.61	100
October 2012	89.06	224.41	100
November 2012	92.28	260.11	100
December 2012	97.49	289.38	100
January 2013	91.60	20.90	100*
February 2013	79.83	0.00	100*
March 2013	88.66	0.00	100*
April 2013	88.39	96.59	100
May 2013	95.75	245.77	100
June 2013	89.04 (0)	227.24	100

*During January, February and March of 2013, the Tekapo Canal outage (Tekapo Canal Remediation Project) resulted in no flow (after 9 January) passing through the Tekapo Canal to Lake Pukaki. Under the WMA, Genesis Energy is relieved of its obligations to provide Pukaki Supply Flow in the event of a planned outage of the Tekapo Canal.

5.2.2 HIGH FLOW MANAGEMENT COORDINATION GROUP

The WMA sets out how high flow events will be managed in an integrated manner by Genesis Energy and Meridian Energy. A High Flow Management Coordination Group (HiCoG) was established to communicate between the parties to enable data and information transfers; for communicating and coordinating a pre-emptive high flow response; to manage effectively, as far as practicable, the adverse effects of high flow events on people, the environment, plant and structures; and to review and audit after high flow events.

Work between the parties in preparation for effective flood management has included meetings with Environment Canterbury flood managers to discuss communication protocols and data sharing. Genesis Energy and Meridian Energy have also met to clarify procedures, carry out data transfer testing and refine communication protocols.

High flow events in December 2012 and January 2013 caused HiCoG to meet, exchange High Flow Management Plans and share data to ensure integrated catchment management. Regular meetings and data sharing continued while there was spill from Lake Tekapo to the Tekapo River, including spill due to the Tekapo Canal Remediation Project.

On 29 December 2012, rainfall began to fall in the wider Tekapo catchment. At the head of the Godley catchment a total of 1370 mm of rain fell during the rainfall event which ceased on 13 January 2013. The daily inflow peaked at a flow of 1100 m^3/s into Lake Tekapo (1 in 40 year return period inflow). During this period the lake rose 4.6 m and exceeded the maximum control level on 13 January 2013. The lake rose from 21% to 105% full in 19 days.

HiCoG met for the first time operationally on 31 December 2012 to plan a way forward with managing the flows for the entire Waitaki scheme. These meetings continued for a few weeks as the two companies managed the water levels and flows around the schemes. On 2 January 2013, Meridian Energy officially requested Genesis Energy to cease generation at Tekapo B power station resulting in a halt of generation for the entire TekPS.

Lake Tekapo level had been lowered prior to the Tekapo Canal Remediation Project to enable storage of floodwaters, however spill down the Tekapo River commenced on 11 January 2013, two days before the maximum control level was reached and spill continued until 18 March 2013. During this time, Environment Canterbury flood controllers were kept informed of predicted flows throughout the scheme by Genesis Energy and Meridian Energy.

06

genesis ENERGY

ENVIRONMENTAL MONITORING

06 ENVIRONMENTAL MONITORING

6.1 INTRODUCTION

The suite of resource consents which authorise the operation of the Tekapo Power Scheme do not include any resource consent conditions that require environmental monitoring. Establishing an environmental monitoring programme will enable Genesis Energy to better understand and responsibly manage the effects of operating the Tekapo Power Scheme.

In late 2012 Genesis Energy commissioned a series of studies to gain a better understanding of the current environment in which the TekPS operates. The four areas that were focused on were:

- The Lake Tekapo Shoreline;
- Aquatic ecology of the Tekapo River and its tributaries;
- Water quality (including the Tekapo River and the Tekapo Canal); and
- Hydrology/morphology of the Tekapo River.

A literature review carried out in early 2012 identified these four areas where additional information was required in order to gain a better understanding of the environment affected by the TekPS. Each of these work-streams is discussed in more detail below.

6.2 LAKE TEKAPO SHORELINE

Genesis Energy holds resource consents which allow the level of Lake Tekapo to be raised and lowered within a set range of approximately nine metres. Genesis Energy identified the Lake Tekapo shoreline as an area where an environmental scoping study should be undertaken, to determine how the management of Lake Tekapo within its operational range may impact the shoreline.

The first round of fieldwork for the Lake Tekapo shoreline study was carried out on 18 January 2013. This coincided with the start of the first season of works on the Tekapo Canal Remediation Project (chapter 7), and at this time the lake was at the maximum control level, following a period of very high inflows. Because the lake had the potential to be at (or near) its maximum level for a number of weeks, as well as forming part of the overall lakeshore study, the 18 January 2013 assessment provided the opportunity to identify any potential impacts associated with the prolonged high lake level.

The lake level at the time of inspection was approximately 710.0 masl. The assessment concluded that the potential for the lake level to remain high for extended periods was not an extraordinary occurrence for the lake, and that the shoreline appeared to have adjusted to the lake's operational range. The assessment also found that the large rocks in the vicinity of the intake structure and water level recorder jetty appeared stable, and that the boat ramps at the camping ground appeared to be unaffected by the high water levels.

A second round of fieldwork will take place when the lake is at or near its minimum control level. Following this, Genesis Energy will receive a report that:

- Describes the physical lakeshore environment and the lakeshore processes;
- Identifies if any lakeshore resources are potentially affected by shoreline erosion; and
- Identifies what impact the TekPS operation has on natural shoreline processes.

This report is expected to be received towards the end of 2013.

6.3 AQUATIC ECOLOGY OF THE TEKAPO RIVER AND ITS TRIBUTARIES

The initial plan was to carry out the first round of aquatic ecology fieldwork in January 2013, after the Tekapo River (and its tributaries) had received low and stable flows over the summer months, in order to gain an understanding of baseline aquatic ecology conditions. This was to be followed by another survey after the expected spill event associated with the Tekapo Canal Remediation Project and the related Tekapo Canal outage, in order to enable a comparison between the ecology of the pre-spill baseline conditions and the post-spill conditions. However the January baseline fieldwork could not be undertaken due to the high inflows in the Lake Tekapo catchment in early January 2013, which meant that spill down the Tekapo River occurred much earlier than anticipated. Therefore the baseline (pre-spill, low and stable flow) fieldwork was postponed and will be undertaken in late 2013.

Instead, the first round of aquatic ecology fieldwork was undertaken in April 2013 (i.e. post-spill conditions), and included electric fishing surveys of the Tekapo River, Fork Stream and Maryburn Stream (Figure 10).

FIGURE 10 // Electric fishing Fork Steam, upstream of the Tekapo Canal culvert.

The baseline (pre-spill) fieldwork, scheduled to be undertaken in late 2013, will include resampling of the sites that were sampled in April, and a drift dive of the Tekapo River, which will give an indication of resident trout populations prior to the fishing season commencing (in November). The fieldwork will also collect data on periphyton and didymo cover, and benthic invertebrates. The report will be completed in early 2014.

6.4 WATER QUALITY

The Lake Tekapo water is of a very high quality. The margins of Lake Tekapo are largely unaffected by land use intensification, however more intensive land use does exist within the Tekapo River catchment, and there is the potential for further intensification within the catchment in future. Water quality therefore forms another key component of the environmental monitoring work which was commissioned during the reporting period. A portion of this work is desk-based, and will involve an assessment of existing water quality information and water quality monitoring sites within the catchment.

A field visit was carried out on 16 May 2013 (Figure 11), in order to gain a better understanding of the water quality of the Tekapo River and the TekPS from a water quality monitoring perspective.

FIGURE 11 // Tekapo River (upstream of the Fork Steam confluence) during the water quality synoptic study field visit.

A draft report outlining the results of the water quality study was received in June 2013, and will be finalised in the next reporting period. The finalised report will include an analysis of existing water quality data for Lake Tekapo and the Tekapo River (and its major tributaries).

6.5 HYDROLOGY

The hydrology and morphology (i.e. shape) of the Tekapo River are both modified by the operation of the TekPS, and for this reason these aspects also form a key component of the proposed environmental monitoring programme.

The response of surface water and groundwater within the Tekapo River catchment to this flow variability is not well understood, and is an area of interest which was specified in the brief for the hydrology study. Flow gaugings in the Tekapo River were undertaken during the reporting period to help characterise flow gains and losses along the river's length, which will in turn provide an understanding of the importance of spill events from Gate 16.

A field visit to the Tekapo River was undertaken on 8 May 2013 to determine the suitability of a number of bores for the installation of pressure transducers, to measure groundwater levels (Figure 12).

FIGURE 12 // A bore on Gray's Hills Station (adjacent to the Tekapo River) which was assessed for its potential to have a pressure transducer installed.

Another focus area of this study will be the morphology of the Tekapo River bed, and exploring the feasibility of establishing bed profiles (cross-sections) at various locations along the Tekapo River in order to better understand the effect of spill events on the morphology of the river.

As was the case with the water quality study, a draft report outlining the results of the hydrology study was received in June 2013, and will be finalised during the next reporting period.

genesis ENERGY

TEKAPO CANAL REMEDIATION PROJECT

07

07 TEKAPO CANAL REMEDIATION PROJECT

7.1 OVERVIEW

When Genesis Energy purchased the Tekapo Power Scheme in June 2011, preparations were made to develop a solution to repair leakage from the Tekapo Canal. The canal had been known to leak for many years and, in places, since it was built. Some of these leaks had deteriorated in recent years requiring remedial action.

Genesis Energy's solution was to re-line sections of the canal with a canal liner imported from Europe. The liner is a specialised PVC material that will withstand various pressures and sunlight for many years. Three sections of the Tekapo Canal will be repaired over up to three construction seasons. The total length of canal to be repaired is 7.5 km.

While that is taking place, Genesis Energy is also taking the opportunity to make some repairs to the canal embankments, undertake seismic strengthening of the three farm bridges and the State Highway 8 Bridge that cross over the canal, and make improvements to the Maryburn Fill section of the canal (Figure 13).

Up to 150 workers were on the construction site during season one to complete the works, consisting of Genesis Energy staff and contractors. The primary contractors for the project included Carpi Tech, Fulton Hogan and Taylors Earthmoving.

7.1.1 CONSTRUCTION MANAGEMENT SITE

In September 2012, Genesis Energy commenced the re-lining and repair works project by first establishing a Construction Management Site on a parcel of land owned by Genesis Energy, situated approximately 8 km down the Tekapo Canal from Tekapo A Power Station. The Construction Management Site consisted of workshops and site offices from where the canal project was managed. The Construction Management Site is also where a large proportion of the aggregate used for the project was excavated from borrow pits (Figure 14).

FIGURE 14 // Construction Management Site for the Tekapo Canal Remediation Project.

7.1.2 SEASON ONE INTERNAL CANAL REPAIR WORKS

In order to lay the liner in the Tekapo Canal, those parts of the canal to be repaired were emptied of water by creating temporary dams (coffer dams) and pumping the water out into the sections of the canal where repair was not required. As a consequence, the flow in the canal was stopped for the duration of the re-lining season as the entire flow of the canal was not able to be moved around the coffer dams.

On 9 January 2013, Genesis Energy stopped the flow of water in the Tekapo Canal, so that the coffer dams could be installed to allow for the dewatering of the two canal sections to be repaired during the summer of 2013 (Figure 15 a – b).

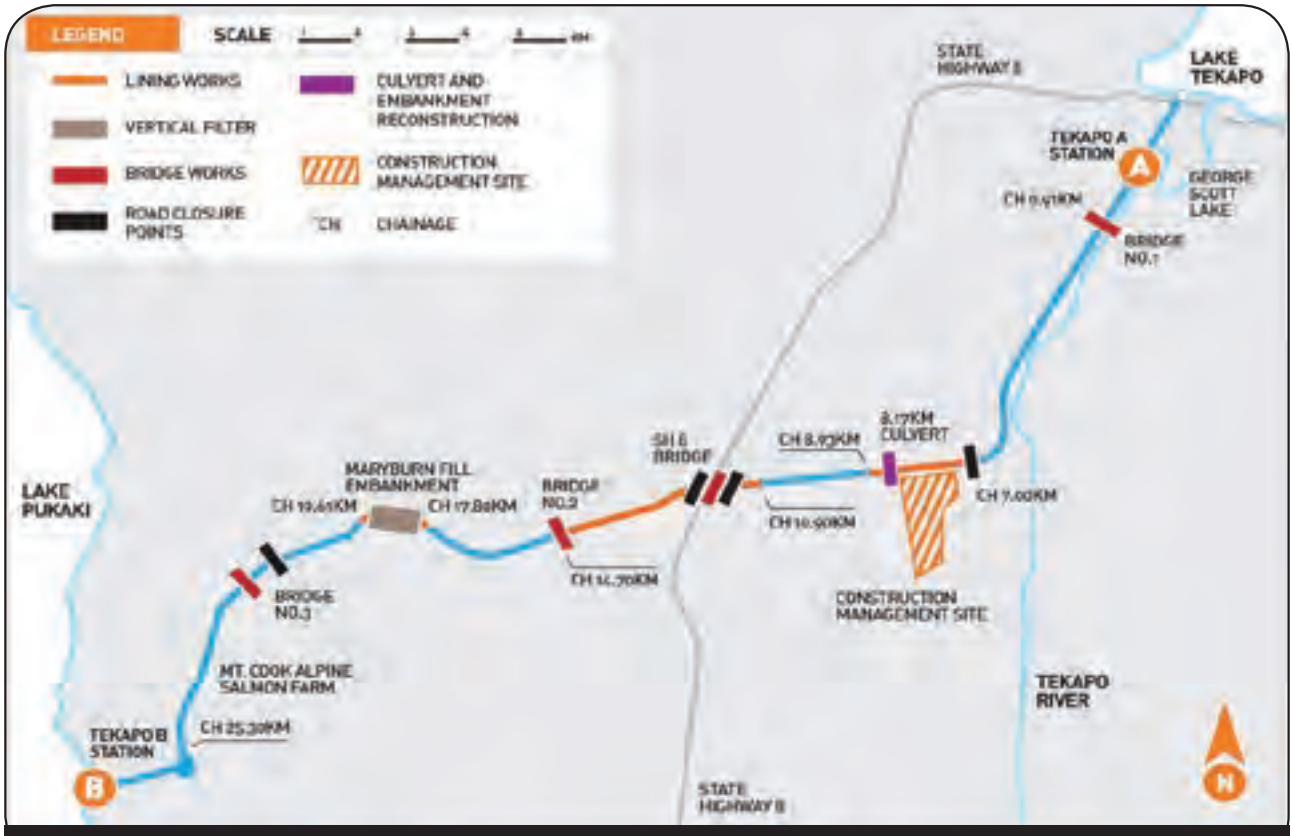

FIGURE 13 // The Tekapo Canal Remediation Project repair locations and access.

FIGURE 15 A & B // Cofferdam installation taking place and a completed cofferdam adjacent to a dewatered section of the Tekapo Canal.

Once the coffer dams were installed, and had been tested for stability by engineers, de-watering of the isolated canal sections to be repaired, began. Large pumps were deployed into the canal, and over the course of six days, the water was removed from the two sections of the canal.

The water level in those sections of the canal which did not require repair was managed via a temporary siphon system which continued to supply water from Lake George Scott into the Tekapo Canal (Figure 16). This meant that existing irrigation and stock water off-takes, located in de-watered sections of the canal, were able to be maintained during the canal outage via bypass pumping systems.

FIGURE 16 // Temporary bypass siphon system installed in Lake George Scott.

During the de-watering process, a fish salvage operation occurred. The fish salvage operation is described in section 7.3.3.

As soon as the water had been removed from the two sections of the canal, machinery entered onto the dry canal bed to commence removing weed and loose material sitting on top of the original earth liner of the canal (Figure 17). Once the existing liner surface had been repaired, sand was laid within the canal as a base course, prior to the specialised PVC liner material being laid.

FIGURE 17 // Original earth liner material being prepared for laying of PVC liner.

The specialised PVC liner material is produced in Italy and Spain, by the company Carpi Tech. The rolls of liner were deployed from the bank of the canal, and rolled down to the bottom of the canal. The liner edges were then welded together with specialised welding equipment which heated the liner material to 200°C to form a continuous welded seam (Figure 18). Each seam was then pressure tested to ensure a continuous leak-free liner.

FIGURE 18 // Welding equipment joining sections of liner together.

Once sections of liner were welded together, rock ballast material was conveyed to the bottom of the canal. The ballast material was placed at the bottom of the canal to anchor the liner material in place once the canal was re-filled with water. The ballast material was transported to the base of the canal by a custom-made conveyor belt system called the 'juggernaut' (Figure 19).

FIGURE 19 // The 'juggernaut' in action, conveying rock ballast material to the bottom of the canal.

When both sections of the canal had undergone re-lining and the ballast was laid, water was pumped back into the empty sections of the canal (Figure 20). Following the removal of the four cofferdams, the canal was brought back into service on 12 April 2013, marking the end of a successful first season for the Tekapo Canal Remediation Project.

FIGURE 20 // Re-watering a repaired section of the Tekapo Canal.

7.1.3 REPAIRS TO THE 8.17 KM CULVERT

In total there are nine culverts of varying size, configuration and construction that pass under the Tekapo Canal. These culverts allow the various tributaries of the Tekapo River to flow underneath the canal structure. Visual inspections of the culvert structure located at 8.17 km downstream of Tekapo A Power Station in 2003 identified flowing water from cracks and holes in the culvert.

In 2009, Meridian Energy completed urgent, temporary repairs to stabilise the canal at the 8.17 km mark along the canal. Leakage was identified from the canal through inspection by divers, who noted a series of sinkhole-like defects where the canal crossed over the double culvert pipes. The temporary repairs included the filling of defects with filter gravel, and staunching the canal bottom to prevent further deterioration. Subsidence on the canal exterior side slopes was prevented by constructing a filter buttress to strengthen the canal sides (Figure 21). Since this time the canal has been subject to regular surveillance inspections.

FIGURE 21 // 8.17 km culvert in 2009, showing the temporary buttress in place (photo: Damwatch).

Permanent remediation works to the 8.17 km culvert took place in early 2013, in conjunction with the season one canal re-lining works (Figure 22). The remediation works involved replacing the damaged embankment and existing earth liner at the location of the double culvert, removal and replacement of the culvert, and removal of the buttress structures that were no longer required.

FIGURE 22 // 8.17 km culvert pipes being installed.

7.1.4. STATE HIGHWAY 8 BRIDGE UPGRADE WORKS

Seismic strengthening of the State Highway 8 (SH 8) bridge, which crosses over the Tekapo Canal, was also undertaken during the canal re-lining season. Works to the SH 8 bridge and surrounding canal included excavating around the bridge foundations and pouring additional concrete foundations linked to the existing bridge columns to provide a strengthened and more stable bridge structure capable of withstanding a significant seismic event (Figure 23 a - b). This strengthening will also stop any scouring of the sides of the canal bank.

FIGURE 23 A & B// State Highway 8 bridge upgrade works and bridge following completion of works.

7.1.5 MARYBURN EXTERNAL EARTHWORKS

The Maryburn Fill is the highest fill embankment on the canal alignment. It has a height of approximately 45 m and is 1.2 km long and crosses the Maryburn Stream.

The Maryburn Fill embankment contains a 'filter' layer beneath the canal. This filter layer is a critical design element of an earth fill embankment as it provides a channel to control any seepage, allowing it to be drained away without weakening the structure of the embankment. At the Maryburn fill, the existing filter installed at the time of construction, did not extend high enough within the embankment to meet modern engineering requirements. As such, a trench was excavated down from the crest (top) of the canal into the existing filter. New filter material was put into the trench and the surrounding aggregate re-instated. The filter layer was extended at the Maryburn Fill by approximately two metres up the sides of the embankment to the crest level. Both sides of the Maryburn fill received this treatment, and works were completed at the end of June 2013. The work was undertaken while the Tekapo Canal was in service (Figure 24), with appropriate water level and canal volume limits in place.

FIGURE 24 // The Maryburn Fill embankment and external earthworks.

7.1.6 FARM BRIDGE UPGRADE WORKS

The three farm bridges which cross over the Tekapo Canal (Figure 25) were also upgraded during June and July 2013, while the Tekapo Canal was in service. Temporary scaffolding was bolted onto the outside of the bridges to facilitate the works. Reinforcement bracing was added to key support beams under the bridge decking to strengthen the bridges against seismic events.

FIGURE 25 // No. 1 Farm Bridge undergoing seismic strengthening works.

7.2 RESOURCE CONSENTS

Genesis Energy hold a total of 39 resource consents associated with the Tekapo Canal Remediation Project, which were sought from Environment Canterbury and Mackenzie District Council. These consents allow for the various activities associated with the repair works to take place.

Environmental Management Plans and Supplementary Management Plans (SMPs) were developed in accordance with Genesis Energy's resource consents. The Environmental Management Plan is an overarching management framework to enable the management of environmental effects which arise from the remediation activities. The Environmental Management Plan identifies roles and responsibilities and includes practical management actions, performance requirements, and a system of monitoring, reporting, auditing, and corrective action requirements for the project. In addition to the Environmental Management Plan, SMPs were prepared to ensure a suitable level of management is implemented for specific locations or activities forming part of the project. Genesis Energy's compliance for the Tekapo Canal Remediation project is assessed against its resource consents and against the Environmental Management Plan and SMPs.

During the reporting period, two separate Environmental Management Plans were developed; one for the establishment and operation of the Construction Management Site and the other for the Internal and External works at the canal. The various applicable SMPs associated with the establishment and operation of the Construction Management Site, and for the internal and external canal works, were also developed. The SMPs that were developed are summarised in Table 10.

TABLE 10 // Supplementary Environmental Management Plans Developed and Implemented for the Tekapo Canal Remediation Project.

Supplementary Environmental Management Plan	Refer to Section:
Water Quality Management Plan	7.3.1
Ground and Surface water Monitoring Plan	7.3.2
Fish Salvage Management Plan	7.3.3
Dust Management Plan	7.3.4
Noise Management Plan	7.3.5
Traffic Management Plan	7.3.6
Lighting Management Plan	7.3.7
Contaminant Spill Contingency Plan	7.3.8
Stormwater, Sediment and Erosion Control Management Plan	7.3.9
Archaeological Discovery Protocol	7.3.10
Rehabilitation Management Plan	7.3.11
Communications Management Plan	7.4

Environment Canterbury carried out a total of four compliance inspections on the Tekapo Canal Remediation Project during the reporting period. Genesis Energy was given a pleasing result of 'full compliance' from Environment Canterbury for its Tekapo Canal Remediation Project resource consents exercised during the reporting period.

Mackenzie District Council carried out one site visit to the Tekapo Canal Remediation Project during the reporting period. Mackenzie District Council was pleased with how the works were being conducted and was comfortable that the works were in accordance with the resource consents that had been granted by Mackenzie District Council.

During the reporting period, Genesis Energy surrendered five resource consents which were sought by Meridian Energy in 2008 to undertake temporary repairs to the 8.17 km culvert (section 6.1.3). The consents were transferred from Meridian Energy to Genesis Energy as part of the TekPS asset transfer in 2011. The consents are now superfluous to requirements due to the permanent repairs undertaken to the 8.17 km culvert.

7.3 ENVIRONMENTAL MANAGEMENT

7.3.1 TEKAPO CANAL WATER QUALITY MANAGEMENT

Genesis Energy's Water Quality SMP (Kelly, 2012) details the monitoring required to ensure water quality within the Tekapo Canal is maintained to an acceptable level during the canal outages. The Water Quality SMP also details the intervention mechanisms that are required to be implemented if pre-determined water quality parameters are exceeded.

A water quality monitoring buoy was installed in the head pond above Tekapo B Power Station shortly after the canal outage commenced (Figure 26). The monitoring buoy measured Dissolved Oxygen (DO) at a depth of 15 m, and temperature at depths of 1 m and 15 m in the head pond. The head pond had previously been identified as the appropriate site for monitoring as any water quality issues associated with the canal outage would first develop in the head pond due to its depth, and accumulation of detritus on the base of the head pond (Kelly, 2012).

FIGURE 26 // Water quality monitoring buoy deployed in the Tekapo B Power Station headpond (photo: Dave Kelly).

Soon after the buoy was installed, it became evident that the head pond was thermally stratifying, and dissolved oxygen levels were declining in the lower depths of the head pond. This water quality deterioration occurred more quickly than had been anticipated.

In response to dissolved oxygen levels dropping below the 50% dissolved oxygen threshold stipulated in Genesis Energy's Water Quality SMP, intervention and further monitoring measures were enacted. The intervention involved placing a compressor-run bubble line across the length and near to the bottom of the head pond, which oxygenated and encouraged water circulation within the head pond (Figure 27). As a result, dissolved oxygen levels effectively increased and were predominantly maintained at levels above 70% throughout the remainder of the outage (Kelly & Barter, 2013) (Figure 28).

FIGURE 27 // Bubble line in operation to aerate the Tekapo B headpond.

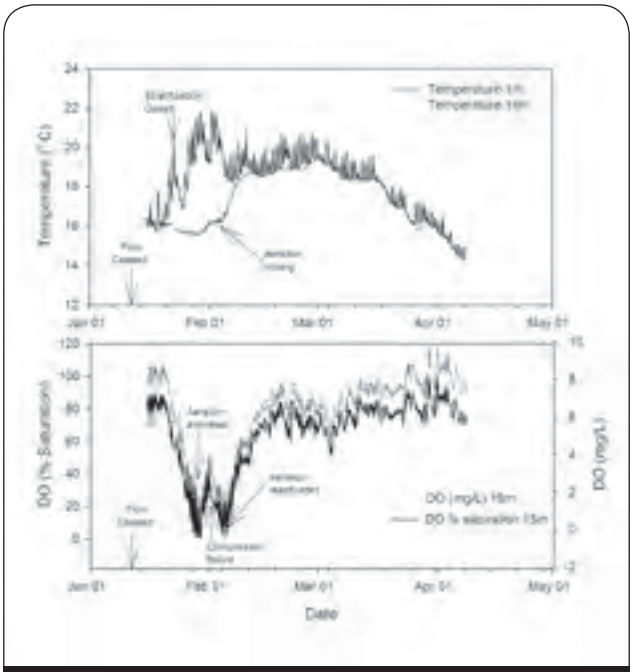

FIGURE 28 // Temperature as measured at 1 m and 15 m depths, and Dissolved Oxygen levels as measured at 15 m depth in the Tekapo Canal headpond during the Tekapo Canal Remediation Project (Kelly & Barter, 2013).

A phytoplankton growth developed in the lower section of the Tekapo Canal between number three Farm Bridge and the Tekapo B head pond in the days following the start of the outage, which was evident as a moderate greening of the water (Figure 27). A phytoplankton sample was collected from this portion of the Tekapo Canal, which determined that the dominant species was a green algae of the genera Dictyosphaerium, a non-toxic species with no risk to human health for recreation or consumption of fish (Kelly & Barter, 2013). Once aeration of the water column was initiated, the phytoplankton growth receded considerably.

In response to the initial decline in water quality in the headpond, Genesis Energy also undertook further water quality monitoring along the Tekapo Canal. Three transducers were installed within the three sections of the canal which remained watered. The transducers recorded dissolved oxygen and temperature for the remainder of the canal outage period. Data from these transducers was downloaded every two weeks. No water quality issues were identified in these other sections of the Tekapo Canal (Kelly & Barter, 2013).

7.3.2 GROUND AND SURFACE WATER MONITORING

Due to the complex ground and surface water interactions in the area, the quantity of leakage from the Tekapo Canal is not able to be accurately calculated, and therefore the relative contribution of leakage from the Tekapo Canal to adjacent surface water bodies and into the surrounding groundwater system is not well understood. To better understand this relationship, Genesis Energy is actively monitoring groundwater and surface water levels prior to, during, and after the Tekapo Canal Remediation Project in the vicinity of the remediation works.

The purpose of Genesis Energy's groundwater and surface water monitoring programme is to measure ground and surface water fluctuations to determine if any changes can be attributable to the re-lining of sections of the Tekapo Canal. The monitoring programme includes measurements of:

- Groundwater levels from six piezometers installed adjacent to the three de-watered sections of the Tekapo Canal;
- The water levels of ponds (old borrow pits) adjacent to the SH 8 and Maryburn Fill sections of the Tekapo Canal;
- The flow in three streams which pass under the Tekapo Canal within the SH 8 and Maryburn Fill sections of the Tekapo Canal;

› Changes in leakage point observations from the external embankments of the Tekapo Canal, and;
› Flows from weirs adjacent to the Tekapo Canal.

In October 2012, ground and surface water monitoring commenced, as per the monitoring programme prepared by Pattle Delamore Partners (2012). An annual monitoring report was produced by Pattle Delamore Partners (2013), which summarises the monitoring carried out during the period between October 2012 and April 2013.

Over the monitoring period, there appears to have been a general decreasing trend of groundwater and surface water levels or flows at the monitoring sites, however this trend was evident prior to the start of the Tekapo Canal Remediation Project and the dewatering of the canal, and the decline continued during construction. The majority of groundwater and surface water monitoring sites along the canal appear to be more directly influenced by rainfall, or the lack of it over the summer period, rather than by leakage from the Tekapo Canal.

Based on the monitoring data collected between October 2012 and April 2013, Pattle Delamore Ltd. (2013) conclude that the effect of reduced leakage from the Tekapo Canal on natural groundwater and surface water levels in proximity to the Tekapo Canal is less than minor.

Monitoring of all sites will continue, to gain a longer-term understanding of the ground and surface water interactions along the Tekapo Canal. The results of monitoring undertaken over the coming year will be reported in Genesis Energy's 2013/2014 Annual Environmental Report for the TekPS.

7.3.3 FISH SALVAGE

The Tekapo Canal provides anglers with the opportunity to regularly catch salmon and large trout, particularly around the Tekapo B headpond area. With the de-watering of sections of the Tekapo Canal, it was anticipated at least a few hundred trout and salmon would need to be captured and transferred. Native fish, including koaro, upland bullies, and common bullies are also known to be present in the Tekapo Canal.

A fish salvage operation took place between 18 – 21 January 2013, within both sections of the Tekapo Canal that were de-watered. The salvage operation took place with the assistance of the Cawthron Institute, Fish and Game, and Ngai Tahu. A total of 831 salmonids (including Chinook salmon, brown trout and rainbow trout) were salvaged and transferred to the parts of the Tekapo Canal which retained water (Figure 29). In addition, two large long-finned eels and about 2,500 smaller native fish (including upland bullies, common bullies and koaro) were salvaged and transferred to other water bodies within the catchment (Figure 30). The comparatively lower air temperatures, combined with the strategic, well-planned and well executed fish salvage meant there were very few fish mortalities. Genesis Energy thanks Cawthron Institute, Fish and Game, and Ngai Tahu for their support.

FIGURE 29 // The fish salvage team working their way down a dewatered section of the Tekapo Canal.

FIGURE 30 // One of the two large eels salvaged and transferred from the Tekapo Canal by Ngai Tahu.

Another fish salvage operation is planned at the start of the second remediation works outage. It is predicted that there will be significantly fewer fish to be relocated in the second season of works, due to the shorter length of canal being de-watered.

7.3.4 DUST MANAGEMENT

Due to the dry, windy climate typical of the Mackenzie Basin, particularly during summer, Genesis Energy had to manage the potential mobilisation of dust carefully during the Tekapo Canal Remediation Project.

The construction team received daily weather forecasts, and an anemometer installed at the Construction Management Site recorded wind speed. These tools, in conjunction with visual observations, were used to inform the degree of dust control required on the construction site.

During dry conditions where dust was easily mobilised by machinery, up to four water carts were used at a time, to keep the construction road surfaces adequately watered to control dust. K-line irrigation systems were also set up in areas that could not be reached by the water carts, to keep dust-prone surfaces damp.

No complaints or compliance issues were raised with respect to dust during the Tekapo Canal Remediation Project over the reporting period.

7.3.5 NOISE MANAGEMENT

The canal repairs involve the use of machinery and equipment with the potential to generate significant noise effects. Fortunately the remote location of the Tekapo Canal means that the construction works can be largely undertaken without noise effects on residents at neighbouring dwellings.

Noise measurements were taken on the boundary of Genesis Energy land upon the commencement of potentially significant noise-generating activities, such as aggregate processing, and on a weekly basis thereafter. No issues were detected with the levels of noise being generated from the project at Genesis Energy property boundaries.

Only one complaint was received with respect to noise during the reporting period. The complaint was received at the beginning of the project, and was investigated to determine the source of noise. Refer to Section 8.5 for details of the complaint and its resolution.

7.3.6 TRAFFIC MANAGEMENT

Most construction traffic movements associated with the Tekapo Canal Remediation Project are contained within the construction site, which is not accessible to the public for safety reasons. However, careful traffic management is required both to protect the public from construction vehicles moving in public areas, as well as to protect contractors and employees within the construction site.

Traffic management was required at the SH 8 bridge where the highway crosses the Tekapo Canal. Construction vehicles crossing SH 8, as well as private vehicles crossing over the SH 8 bridge, were required to adhere to reduced speed limits as well as 'stop/go' traffic control personnel. The traffic control measures utilised around the SH 8 bridge were approved by the New Zealand Transport Agency. No incidents occurred, and in general, adherence by the public to reduced speed limits and traffic control measures was excellent.

Traffic Management Plans are in place for the construction site, and stipulate site-specific speed restrictions, traffic flow directions, signage requirements and incident management processes. The Traffic Management Plans are regularly updated to reflect changes in activities and safety requirements.

7.3.7 LIGHTING MANAGEMENT

In 2012, the Mackenzie Basin was officially designated as an International Dark Sky Reserve. The creation of the Aoraki Mackenzie International Dark Sky Reserve, which includes Lake Tekapo township, recognises the region's unique attraction as a world-class stargazing location.

While Genesis Energy's resource consents for the Tekapo Canal Remediation Project allow for activities to be undertaken during the hours of darkness, lighting restrictions exist to protect the special night sky environment and to avoid lighting-related effects on Mount John Observatory's operations.

The Tekapo Canal Remediation Project works were largely undertaken during the hours of daylight, negating the need for any lighting, except for a small amount of security lighting. On one occasion, work was required to be undertaken during two consecutive nights in order to remove the cofferdams. Prior to commencement of this night time work, Mount John Observatory, Earth and Sky Limited, and Mackenzie District Council were advised. The work was then undertaken with low-level, downward facing lighting, and no adverse effects were reported.

7.3.8 CONTAMINANT SPILL CONTINGENCY MANAGEMENT

Genesis Energy's Contaminant Spill Contingency Plan describes the potentially hazardous substances that will be stored on-site and used during the Tekapo Canal Remediation Project, and the processes to be implemented in the event of any of these substances being spilled.

During the reporting period, there were no instances where contaminants were spilt to water.

There were four instances where a minor amount of contaminant was spilt to land. In each instance, the volume of contaminant spilt was less than two litres, and included either hydraulic oil or diesel. As is required under Genesis Energy's Contaminant Spill Contingency Plan, the spill was immediately cleaned up and disposed of appropriately, and Environment Canterbury was informed at the time of each incident. Table 11 describes each minor spill event.

7.3.9 STORMWATER, SEDIMENT AND EROSION CONTROL MANAGEMENT

The scale of earthworks associated with the Tekapo Canal Remediation Project means careful management is required to minimise the potential adverse effects of sediment movement that can be caused during intensive rainfall and earthworks in and around water.

Sediment retention areas were constructed to contain runoff from active areas, such as on the downstream side of the 8.17 km culvert works. Following a heavy rainfall event at the beginning of the season one outage, hollows within the sections of canal, which had been de-watered, filled with rainwater. This water was required to be pumped out of the canal so that re-lining could continue. Initially this water was pumped onto the adjacent canal road surfaces, however the subsequent development of ponding adjacent to the road required a more suitable solution to be devised, which included the water being pumped into a specially developed bunded area.

Bare earth surfaces created during the season one works were stabilised by compaction, and in some cases hydro-seeding, and were regularly checked to ensure no movement of sediment was occurring off-site, particularly during rainfall events. The areas that were disturbed will be re-vegetated in spring 2013 (Section 7.3.11).

As was expected, the installation and removal of the four cofferdams in the canal resulted in the short-term suspension of fine sediment which created a plume of discoloured water in the vicinity of each cofferdam. However, water quality testing revealed that Total Suspended Solids (TSS) levels were low compared to maximum acceptable limit of 100 mg/L advised by Environment Canterbury. The maximum level of TSS sampled in the canal was 45 mg/L.

Sediment control devices and practices performed well, and there were no instances of earth movement beyond the construction site resulting from the works.

7.3.10 ARCHAEOLOGICAL DISCOVERY MANAGEMENT

As with many construction projects in New Zealand involving excavation below the ground surface, there is the possibility that Maori or early-European artefacts, evidence of occupation, or human remains may be uncovered. By law, any such discoveries must be reported to the New Zealand Historic Places Trust, and the discovery must not be disturbed until the New Zealand Historic Places Trust and / or the relevant Iwi authority have been provided the opportunity to investigate the discovery.

TABLE 11 // Minor contaminant spills to land associated with the Tekapo Canal Remediation Project.

Date	Contaminant Spilt	Estimated Volume	Reason for Spill	Remedial action undertaken	ECAN Notified?
1/11/12	Hydraulic oil to land	250 ml	Hydraulic hose on articulated dump truck burst	Oil and affected soil removed and disposed of appropriately. Hydraulic hose on vehicle was repaired.	Yes
20/11/12	Diesel to land	< 1 L	During a test run of a generator, diesel was noticed leaking from a loose join on the generator to the underlying drip tray. A small amount of diesel escaped the drip tray.	Four shovelfuls of diesel-contaminanted gravel was removed and disposed of appropriately. Leaking generator join was repaired.	Yes
21/02/13	Hydraulic oil to land	< 1 L	Leak was caused by the chafing of an hydraulic brake cooling hose on an articulated dump truck.	Affected metal on the roading surface was removed and disposed of appropriately. Damaged hose on truck was replaced and repairs made so that chafing would not occur again.	Yes
7/03/13	Hydraulic oil to land	1 - 2 L	Hydraulic hose on articulated dump truck burst	Oil and affected soil removed and disposed of appropriately. Hydraulic hose on vehicle was repaired.	Yes

Prior to the commencement of the Tekapo Canal Remediation Project, an Accidental Archaeological Discovery Protocol was developed with the assistance of Ngai Tahu. The Protocol details the types of artefacts that may be uncovered, and outlines the procedure that must be adhered to by any person who makes such a discovery while working on the Tekapo Canal Remediation Site. All contractors on-site were made aware of the protocol and are required to comply with it.

During the reporting period, no archaeological discoveries were encountered, however, the drained section of the Tekapo Canal directly around the State Highway 8 bridge revealed a cache of antique weapons, which had been stolen from a Mayfield resident 25 years prior, and subsequently dumped into the Tekapo Canal from the State Highway 8 bridge. The weapons included a flare pistol used during the First and Second World Wars, a pair of cavalry sabres dating to the late 1700s or early 1800s, a muzzleloading shotgun, a sporting rifle, a flintlock pistol, and an army officer's sword and scabbard (Figure 31). While the weapons had decayed within the Tekapo Canal over the years to the point of being valueless, they were re-united with their owner, who had seen an article about the discovery in the Timaru Herald.

FIGURE 31 // Antique weapons discovered in the Tekapo Canal under the State Highway 8 bridge (Photo: Timaru Herald).

7.3.11 REHABILITATION

Upon completion of the Tekapo Canal Remediation Project, disturbed areas will be rehabilitated to ensure there are no enduring effects on the landscape from the construction project. The rehabilitation will involve backfilling the aggregate borrow pits with fill material, and the stabilisation and re-vegetation of disturbed areas. Although there may be depressions left in the ground surface where the aggregate borrow pits were located, these will be contoured to the surrounding landscape. Monitoring and weed management will continue until an acceptable level of vegetation establishment has been achieved.

During the reporting period, bare earth surfaces that were formed during season one of the Tekapo Canal Remediation Project were stabilised to avoid dislodgement and soil erosion. These areas will be re-vegetated in the coming spring, with a seed mix containing species common to the area.

Backfilling of the aggregate borrow pits will be completed during the season two works, once the required volume of aggregate from each of the potential six borrow pits has been extracted.

7.4 COMMUNICATION

Genesis Energy has endeavoured to keep its neighbours, iwi, stakeholders and the public well informed prior to, and during the Tekapo Canal Remediation Project. A variety of mechanisms were used to circulate information and updates relating to the project, including newspaper advertorials and media releases, public meetings, signage and websites.

Meetings Genesis Energy has met regularly with interested parties during the reporting period, to provide updates and information relating to the Tekapo Canal Remediation Project.

In October 2012, stakeholders were invited to attend a community meeting prior to the commencement of the Tekapo Canal Remediation Project. The meeting provided details on the project and was also an opportunity for the community to ask questions and to meet key Genesis Energy personnel working on the project. The meeting was well attended and there was a high level of community interest in the project.

A field trip down the Tekapo Canal was offered to neighbours and stakeholders to view the season one works.

Genesis Energy has greatly appreciated the support of the Tekapo community. Another stakeholder meeting will be held prior to the season two canal works commencing.

Website Information Genesis Energy has detailed the Tekapo Canal Remediation Project on its website, which includes access arrangements, and regular updates on the progress of the project in the 'Engineers Progress Diary'. Information on the Tekapo Canal Remediation Project can be found at:

www.genesisenergy.co.nz > Generating Electricity > Our Generation Sites > Tekapo Power Scheme > Tekapo Canal Remediation Project

Signage Signage has been erected at road closure points along the Tekapo Canal, advising the public of reasons for road closure. The signage also provides contact information if members of the public wish to enquire about the works taking place.

Signage is also in place along the Tekapo River, advising the public to be aware of sudden flow changes which could occur in the event of spill from Lake Tekapo.

School Bus Trips During the Tekapo Canal Remediation Project, Lake Tekapo and Mount Cook Primary School students were taken on a bus trip along the Tekapo Canal. The trip was a great opportunity for the students to see one of the largest construction projects currently happening in the country. A favourite aspect of the project for the students was the large earthmoving machinery moving around the construction site (Figure 32 a - b). Genesis Energy staff were impressed by the level of interest and questions asked by the students about the project.

Public Enquiries An e-mail address (tekapocanal@genesisenergy.co.nz) and toll-free phone line (0800 T CANAL -0800 822 625) has been set up to receive enquiries from the public related to the Tekapo Canal Remediation Project.

During the reporting period, the Tekapo Canal e-mail received a total of 15 enquiries, and 18 enquiries were received on the Tekapo Canal phone line. All enquires were responded to within 24 hours. The majority of public enquiries received during the reporting period related to access along the Tekapo Canal for fishing.

7.5 ACCESS

The canal repairs involve many movements of heavy vehicles to and from the work sites each day, in addition to heavy machinery working on or near the Tekapo Canal Roads. As such, Genesis Energy has, for safety reasons, closed access to parts of the Tekapo Canal roads to the public during the repair project.

Public access to the Tekapo River continues to be provided along the sealed canal road as far as the Construction Management Site, which is around 7 km downstream of Tekapo A Power Station.

Public access to the canal is closed from the SH 8 intersection (at the SH 8 bridge) with the canal roads to the number three farm bridge above Tekapo B Power Station. This provides vehicle access for the public around the head pond above Tekapo B Power Station on both the sealed and gravel canal roads. The gravel road is closed to the public from Tekapo A to the number three farm bridge. Refer to Figure 13 which illustrates the road closure points along the canal.

Genesis Energy takes precaution to close the road during periods of adverse weather or for operational purposes. There may be times during the remediation works when additional sections of the canal roads also need to be closed for works to be completed.

7.6 LAKE TEKAPO LEVELS AND TEKAPO RIVER SPILL

While remediation works occur and sections of the Tekapo Canal are de-watered, no new water can flow into the Tekapo Canal from Lake Tekapo, and both Tekapo A and Tekapo B Power Stations are not operational. This is called an 'outage'. Prior to the canal outage associated with the canal repair works, Lake Tekapo is lowered to as close to its minimum operational level as possible.

During the outage the level of Lake Tekapo will rise over time, until eventually the lake reaches its maximum control level. At that point, water will spill into the Tekapo River. The period of time between when the canal outage commences, and when spill into the Tekapo River commences, depends on the level of Lake Tekapo at the start of the canal outage, and also on the volume of inflows into Lake Tekapo. Information on the level of Lake Tekapo and likely spill will be communicated to the public during the outage.

Lake Tekapo levels can also be found on Genesis Energy's website:

www.genesisenergy.co.nz/genesis/generation/rivers-lakes-and-rainfal/

Flows in the Tekapo River can be found on Environment Canterbury's website:

ecan.govt.nz/services/online-services/monitoring/river-flows/

Based on historical data, Genesis Energy expected that spill into the Tekapo River would occur between six and eight weeks after the outage commenced. However, high inflows resulting in high Lake Pukaki levels required generation to cease at Tekapo B power station, essentially ceasing flow through the Tekapo Canal, at Meridian Energy's request (section 5.2). This closure of the Tekapo Canal gave Genesis Energy an opportunity to commence season one of the Tekapo Canal Remediation Project four days earlier than planned. The canal was closed on 9 January and a controlled spill of 130 cumecs from Lake George Scott to the Tekapo River started on 11 January 2013 (section 4.1).

7.7 SEASON TWO WORKS

Flow in the Tekapo Canal will once again cease so that season two of the Tekapo Canal Remediation Project can commence. Season two will involve the re-lining of the Maryburn Fill section of the Tekapo Canal (Figure 13). The length of canal to be re-lined during the season two works will be 1.5 km. The methodology used during season one will be employed again for the season two works. Two cofferdams will be installed in the canal to isolate the section of canal to be repaired. The water in the isolated section will then be pumped out, so that the existing earth liner can be removed and the new PVC liner installed. This canal outage may last up to 14 weeks.

Prior to the proposed outage commencing, Lake Tekapo will once again be drawn down gradually as close to its minimum operational level as possible. After inflows into the Tekapo Canal cease (when the outage commences), Lake Tekapo will gradually fill. If the lake reaches its maximum operating level, spill will occur into the Tekapo River. Spill is more likely to occur after about six to eight weeks in an average hydrological year (i.e. based on average rainfall and snowmelt). However, as was experienced during the season one outage, higher than average inflows could result in spill much earlier than this. Conversely, lower than average inflows could result in a spill later.

7.8 ACKNOWLEDGEMENTS

Genesis Energy has been fortunate to have received a great deal of support from the Lake Tekapo community, Iwi, stakeholders, and interested parties to date for the project, for which we are extremely grateful. Genesis Energy looks forward to working closely with our stakeholders going forward.

The high level of environmental responsibility displayed by Genesis Energy's primary contractors working on the Tekapo Canal Remediation Project has also been a significant contributing factor to the successful conclusion of season one. Genesis Energy greatly appreciates the high standards displayed by Carpi Tech, Fulton Hogan, and Taylors Earthmoving.

FIGURE 32 A & B // Art work by Angus and Louie from Lake Tekapo School after their visit to the Tekapo Canal.

08

genesis ENERGY

SCHEME-WIDE OUTCOMES

08 SCHEME-WIDE OUTCOMES

8.1 PROJECT RIVER RECOVERY – DEPARTMENT OF CONSERVATION

Project River Recovery (PRR) is a Department of Conservation programme established in 1990 that aims to protect or restore rivers and wetland ecosystems in the upper Waitaki Basin. PRR is funded by Meridian Energy (87%) and Genesis Energy (13%) under a compensatory agreement. The focus of PRR is an ecological management and research programme focussed on maintaining and enhancing habitat and ecological communities in river beds, and wetland ecosystems in the upper Waitaki basin.

PRR operates under a Strategic Plan that is updated every seven years with the current Plan now due for review. Key objectives of PRR during the current Strategic Plan include the removal of weeds, exploring wetland protection, predator control, increasing public awareness of braided rivers and associated wetlands, and building knowledge and understanding of braided river ecosystems.

This year PRR's core focus continues to be maintaining habitat quality for a range of braided river plants and animals by preventing the establishment of new weed incursions and keeping weeds at low densities at strategically important sites. Over 3500 person hours were spent by contractors removing willows, lupins, and other target weeds in the Godley, Cass, Tasman, Lower Ohau, Ahuriri and upper Tekapo Rivers

PRR's success with intensive predator work in the Ohau River to improve breeding outcomes of black fronted terns has continued this season. Removal of feral cats, ferrets, stoats, weasels, hedgehogs and rats using traps has produced similar results to last season when over 200 nests fledged more than 180 young terns. These results are encouraging and represent the best breeding results for a black fronted tern colony over two consecutive years recorded anywhere in the country. PRR will be looking to repeat this result next year before formally evaluating the project.

Associated with the predator control work in the Upper Ohau River, PRR undertook a separate two year study to examine behaviour of feral cats living near the tern colony. Movements of 17 feral cats were recorded every 15 minutes using GPS collars both outside of, and during the tern nesting season (Figure 33). Results indicate that cats strongly select areas with high rabbit numbers during winter. Some individuals select the river margin and others specifically select the tern colony when nesting birds are present.

Catchment scale predator trapping in the Tasman River jointly funded by PRR and the kaki/black stilt recovery programme is also ongoing. Over 1000 kill and live capture traps have been deployed in the riverbed since 2006 and large numbers of predators continue to be removed each year. This season wrybill and black fronted tern productivity was monitored and motion activated cameras placed at tern nests following high mortality rates for terns in previous years. Wrybill productivity was high with good numbers of nests fledging chicks but tern nests were again predated. Footage from the cameras has implicated black backed gulls as the main predator and a control programme will be put in place for these prior to the next breeding season (Figure 34).

Other ongoing work during the current year includes public awareness initiatives through distribution of a wide range of braided river resource materials including braided river posters, field guide, information pamphlets and a river-care code. PRR also continues to distribute and support a student/teacher resource to secondary schools which examines values, human impacts and management of braided river ecosystems.

Thanks to Chris Woolmore of the Twizel Area Office Department of Conservation for contributing to this section.

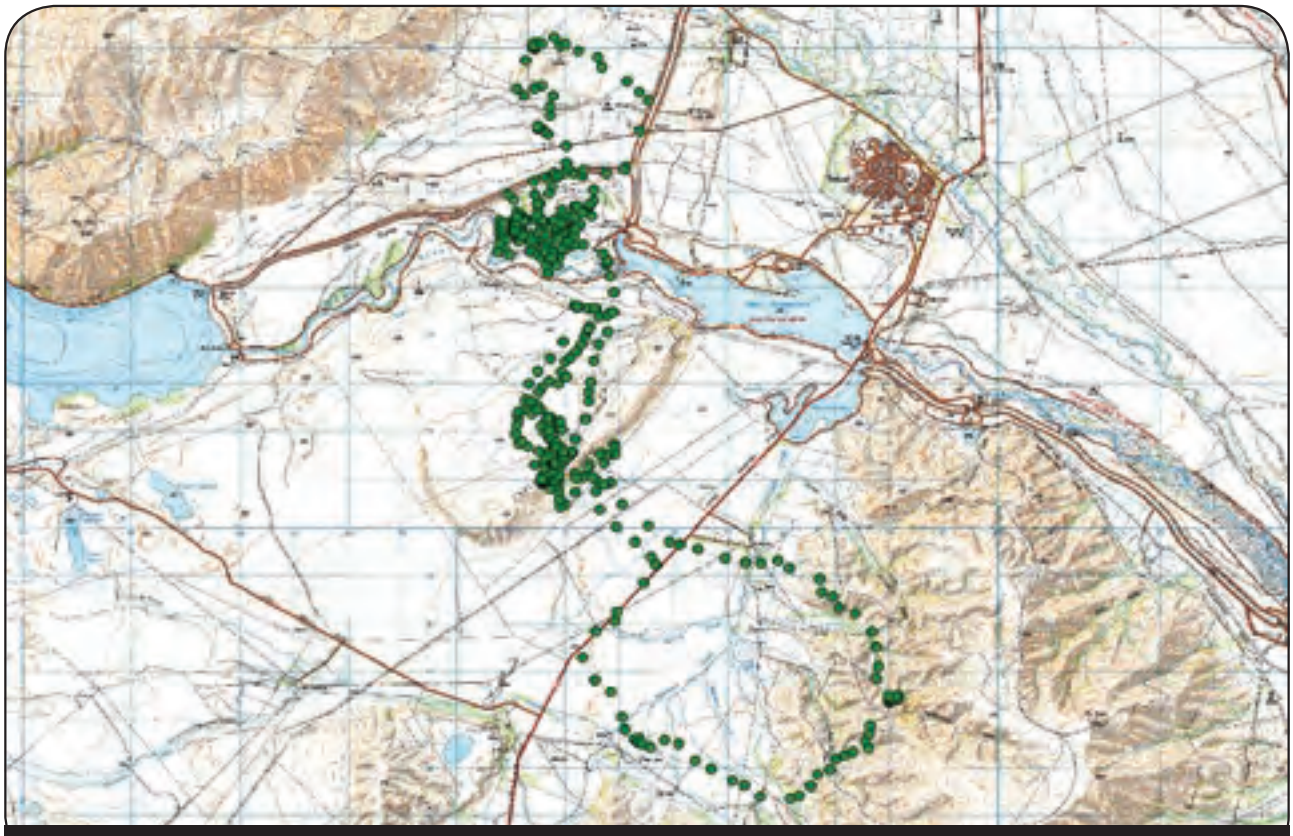

FIGURE 33 // Movements of one cat wearing a GPS collar over a ten-day period (map: DOC).

FIGURE 34 // Black backed gull eating a tern's egg (photo: DOC).

FIGURE 35 // Volunteers constructing weirs at Scotts Creek.

FIGURE 36 // Narrowing of the stream at Scotts Creek using boulders.

8.2 LAKE ALEXANDRINA FISHERY ENHANCEMENT PROJECT – FISH AND GAME

Lake Alexandrina is a significant trout fishery with over 200 fishing huts on its shores and visits by innumerable tourist anglers detouring off the Mackenzie State Highway. Since June 2011, Genesis Energy has assisted Fish and Game with funding to manage the Lake Alexandrina Fishery Enhancement Project. This work has been underway since the 1980s to maintain and enhance the brown and rainbow trout fishery by improving spawning habitat in the lake's only inflowing stream, Scotts Creek, as well as the lake's outflow, Outlet Creek.

The lower 600 m of Scotts Creek was regravelled during 2005 to reinstate around two-thirds of the stream's spawning area. Since then annual grooming of the streambed with a small digger removes humps and hollows created during the previous season's spawning. If the streambed is left too long before grooming the trout spawn on the humps and the total area of spawning habitat, and its quality, declines. A similar regravelling project on the Outlet Creek completed in March 2011 also requires annual maintenance.

Scotts Creek has a flow of around 80 litres per second and to maximise the distribution of spawning, the right depth and velocity characteristics for trout spawning need to be maintained. In combination with the grooming works at Scotts Creek, in the last four years artificial weirs have been created to improve flow characteristics to enhance conditions for trout spawning. This has been achieved using hand constructed rock weirs.

After the digger grooming work occurred in late March 2013 at Scotts Creek, the Lake Alexandrina Conservation Trust held a work day when weirs were reinstated and others added as required. More than 30 volunteers attended this day including staff from Genesis Energy (Figure 35). Approximately 90 weirs were constructed and the stream bank was also narrowed and protected by boulder placement in several reaches totalling approximately 100 m on each bank (Figure 36).

Weirs have been built for the last four years and have been highly successful at reducing superimposition of spawning by providing a wider area of streambed with good spawning characteristics. The overall benefits to angling of the Scotts Creek and Outlet Creek works are being monitored through a mark-recapture programme to estimate pre and post enhancement adult trout population sizes.

Thanks to Mark Webb of Central South Island Fish and Game Council for contributing to this section.

8.3 MAINTENANCE ACTIVITIES

During the reporting period, a number of maintenance projects were undertaken around the TekPS; each activity is described below.

8.3.1 OIL INTERCEPTOR INSPECTIONS

Resource consent CRC950297.2 and CRC950298.2 require a visual inspection of the oil interceptors at Tekapo A and B Power Stations. The oil interceptors are inspected monthly and any hydrocarbon present in the interceptors is removed immediately. The majority of inspections result in minor quantities of oil being removed from both interceptors with the water discharge remaining clean and clear. At six-monthly intervals a representative sample of the discharge is analysed for oil and grease. Discharge samples analysed in November 2012 resulted in an acceptable level of less than 4 milligrams per litre (mg/L) of oil and grease at Tekapo A and less than 5 mg/L at Tekapo B. The second sample analysed in May 2013 also resulted in an acceptable level of oil and grease with less than 5 mg/L traced at both Tekapo A and Tekapo B.

8.3.2 MAINTENANCE OF FORK STREAM CULVERT

During March 2013 Genesis Energy undertook maintenance works to clear the passage of water in Fork Stream directly upstream of the culvert that runs under the Tekapo Canal (Figure 37 and Figure 38). Works involved redistributing the build-up of gravel from in front of the culvert to augment the existing banks; removal of debris such as trees within the river bed that could cause culvert blockage during a flood; and the temporary damming of each culvert barrel to inspect the culvert. The works were carried out under Resource Consents RM030034, CRC111740, CRC111767 and CRC111768. The Department of Conservation, Central South Island Fish and Game and Environment Canterbury compliance staff were contacted prior to the work commencing. Environment Canterbury also carried out a site visit prior to work commencing.

FIGURE 37 // Build up of debris upstream of Fork Stream culvert.

FIGURE 38 // Fork Stream culvert clear of debris following maintenance works.

8.3.3 REMOVAL OF TREES AT TEKAPO A POWER STATION

A large number of pine trees were located on the hill and terraces around Tekapo A and along the slope facing towards the Tekapo Canal along Tekapo Power House Road. The trees were shading the road and Tekapo A car park resulting in ice forming on the roads during winter, creating a significant health and safety issue for Genesis Energy staff, contractors, visitors and users of Tekapo Power House Road. During July 2012 Genesis Energy removed the trees located around these areas to reduce shading of the roads. These areas will be replanted with Douglas fir, Corsican pine, and native plants. Since the trees have been removed Genesis Energy has noticed a marked decrease in the amount of ice forming during the winter season. The removal of trees in these locations was permitted under Section 7 of the Mackenzie District Plan.

8.3.4 REPLACEMENT OF CULVERT (ADJACENT TO TEKAPO POWER HOUSE ROAD)

Maintenance work was required to repair a damaged culvert during September 2012. The works are a permitted activity under the Environment Canterbury Natural Resources Regional Plan, Chapter 6 (Beds of Lakes and Rivers) Rule 5.

8.3.5 FLOW MONITORING WEIR INSTALLATION

During December 2012 Genesis Energy installed a weir to accurately measure minor seepage flow from the Tekapo Canal. Genesis Energy received a non-enforcement decision from Environment Canterbury for the installation.

8.3.6 TEKAPO CANAL REMEDIATION PROJECT

Refer to Section 7 for a detailed description of the Tekapo Canal Remediation Project.

8.3.7 CONTROL SYSTEM UPGRADES

The control system was nearing the end of its practical life, with limited spare parts and support available. An upgrade of the control systems is currently underway with generator one at Tekapo A Power Station and generator three at Tekapo B Power Station completed. Tekapo B generator two is due for completion in early 2014. The control upgrade involved replacing automation controllers and the operator interface with equipment that was compatible with other existing Genesis Energy assets. This provides a common platform across Genesis Energy renewable energy sites for control, ease of integration and efficient operation.

8.3.8 GENERATOR REFURBISHMENT

The generator at Tekapo A is an English Electric machine with a vertical shaft hydro turbine driven synchronous generator. The plant was commissioned in 1951 and is now at the end of its practical life. Genesis Energy plans to replace the generator components including stator windings and stator core and reinsulate the rotor field coils. There is an expectation during this project that the generator will be able to provide a greater output due to the modern materials utilised and the design of components.

8.4 DAM SAFETY

The New Zealand Dam Safety Guidelines published by the New Zealand Society on Large Dams provide the framework for managing and monitoring the hydraulic structures of the Tekapo Power Scheme. Recent legislation may result in changes to current safety practices. The new regulations relating to dams have yet to be formalised, but a review of a draft copy of these rules indicates that the current dam safety practices followed at the Tekapo Power Scheme follow best international practice.

Dam safety at the simplest level involves routine monitoring. On a monthly basis, assets are inspected and data is collected at a number of locations. An expert civil engineer reviews the data and provides Genesis Energy with a monthly dam safety report, which is internally reviewed by an engineer.

Specially trained individuals are involved at the next level of safety. Deformation surveys are carried out, typically once or twice a year. Several times a year an engineer looks at assets and issues not targeted by monthly monitoring. For a number of higher risk assets, a specialist consultant engineer carries out an annual inspection.

As a check of all safety processes and procedures, dam safety reviews are carried out on significant assets at five year intervals. These thorough reviews involve external civil, mechanical and electrical engineering experts.

New dam safety regulations were set to come into force on 1 July 2010, however, following a parliamentary review their implementation was delayed until 1 July 2012. Subsequently rather than bringing the Dam Safety Scheme into effect, while at the same time proposing significant changes, Cabinet recently

agreed to the further deferral of the Dam Safety Scheme from 1 July 2012 to 1 July 2014. The Building (Dam Safety) Regulations 2008 have been amended to reflect this deferral. The focus of the new regulations is public safety, and dams that are found to pose a risk to the public will be required to have a formal Dam Safety Assurance Programme that is lodged with a territorial authority tasked with managing these issues. It should be noted that Genesis Energy already applies these standards to all its dam structures, and will continue to do so at least until the new regulations come into force.

Dam safety monitoring was carried out by appropriately qualified Civil Engineers from Damwatch, who undertook the annual dam inspections at Lake Tekapo Control Structure Gates, Lake George Scott Dam and outlets and the Tekapo Canal. Genesis Energy's dam safety programme also includes regular monthly monitoring and surveillance reports in accordance with our Dam Safety programme, which have also been completed during the reporting period. In addition to this, every five years a very extensive Comprehensive Safety Review (CSR) is carried out on our dams. Copies of the reports are available on request.

8.5 PUBLIC COMPLAINTS

Genesis Energy records all public complaints via an Event Management System. Complaints are documented along with relevant recommendations and actions.

Table 12 details the one complaint received for the reporting period, and the actions taken to address the issue.

8.6 PUBLICALLY AVAILABLE HYDROLOGY INFORMATION

Genesis Energy has an extensive monitoring network around the TekPS recording water level, flow, rainfall, wind and snow data. Currently only Lake Tekapo level is provided publically and this is displayed and updated at 30 minute intervals on the Genesis Energy website under Rivers, Lakes and Rainfall information. Genesis Energy is currently undertaking a review of the data we record and the appropriateness of displaying more data in near real-time on our website.

Genesis Energy accepts requests for hydrology data from our archive data sets. This can be obtained by contacting the Hydrology Team via their email address (hydrology@genesisenergy.co.nz) and stating the data you require and the purpose for obtaining it.

Environmental data in the Lake Tekapo catchment is also recorded by third parties and can be viewed on the Environment Canterbury and NIWA (Environmental Data Explorer New Zealand) websites.

TABLE 12 // Public complaint during the reporting period.

Location	Complaint	Corrective Action
Tekapo Canal	Excessive noise was reported by an adjacent landholder which was heard for a short duration, coming from the construction occuring along the Tekapo Canal.	Upon investigation, source of noise was determined to be a digger driving along the metal side of the Tekapo Canal road in transit from one location to another. The metal wheel tracks of the digger were creating noise which was audible to the neighbour as it passed in the vicinity of the neighbours dwelling. Genesis Energy advised the neighbour of the source of noise, and arranged for a permanant noise monitoring station to be installed near to the neighbours dwelling for the remainder of the season 1 works. No further issues were raised.

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COMMUNITY AND ENVIRONMENTAL INITIATIVES

09

09 COMMUNITY AND ENVIRONMENTAL INITIATIVES

9.1 SCHOOLGEN

Schoolgen is a programme developed by Genesis Energy to bring solar energy to life for children across New Zealand. Children are our future leaders and decision makers so it is important that they understand the role renewable energy will play in their future. By talking and interacting with children we have a real chance to cultivate environmentally-aware thinking and behaviour; not just theirs, but that of the people around them including their teachers, parents, parent's colleagues, friends and the whole community.

Since Schoolgen began in 2006. Genesis Energy has created a comprehensive programme that includes:

- Free, New Zealand curriculum-linked, teaching resources that any Primary, Intermediate or Secondary school in New Zealand can use to explore electricity generation, energy efficiency, renewable energy and climate change.
- A particular focus on solar energy and photovoltaic (PV) systems,
- Providing 50 schools across New Zealand with a 2 kilowatt (kW) PV system, at no cost to the schools. The PV system allows these schools to generate a portion of their electricity from the sun, and to teach their students about solar energy, climate change and electrivity generation.
- A dedicated programme website on which the real time generation data from the solar panels at these schools is displayed for anyone to see.
- Specialised Environmental Educators who work at the Primary, Intermediate and Secondary School level in the Schoogen schools, helping schools to learn about renewable energy and energy efficiency.

During the 2011/12 reporting period, the Schoolgen programme was rolled out to schools in the South Island including: Banks Avenue, Middleton Grange and Sumner Schools in Christchurch. During August 2012, solar panels and a battery back-up were installed at Lake Tekapo School (Figure 39). The school had a launch celebration in September that included a special evening performance for the Lake Tekapo Community. Lake Tekapo School is the first Schoolgen school to have a battery bank installed. The photovoltaic solar system is tied to the electricity grid but is also able to be run independently when required, allowing the school to operate as an emergency centre for the community.

FIGURE 39 // Solar panels installed on the roof of Lake Tekapo School.

9.2 LAKE TEKAPO FOOTBRIDGE SOCIETY

The Lake Tekapo Footbridge Society was formed by a group of Lake Tekapo community members with the goal to build a footbridge across the lake outlet upstream of the Lake Tekapo Control Structure (Gate 16) from the Church of the Good Shepherd to Lake Tekapo township. The establishment of a footbridge will provide safe access between the township and the church, provide a link to cycle ways and walkways, and will enhance the sanctity of the church as vehicles will eventually park on the township side of the bridge and visitors will use the footbridge. During the reporting period, Genesis Energy entered into a Memorandum of Understanding and a Sponsorship Agreement with the Footbridge Society to provide support of $500,000 towards building the footbridge.

During the 2012/13 summer, a test cassion (pile) was drilled into the bed of Lake Tekapo to determine the composition of the river bed. The nine-metre deep cassion was successfully drilled and will now form a pier of the bridge. The cassion is the first permanent part of the footbridge construction. The Footbridge Society has close to $1 million pledged towards the total cost of the footbridge and expects to complete fundraising within the next twelve months.

9.3 AORAKI BOUND – NGĀI TAHU

Genesis Energy in partnership with the Bank of New Zealand support Aoraki Bound, a leadership programme developed by Te Runanga o Ngāi Tahu.

Aoraki Bound is a cultural and personal development programme which combines Ngāi Tahu cultural knowledge and expertise with the experience and reputation of Outward Bound. The course is a 20 day journey that builds leadership, cultural awareness and challenges participants to stretch their personal development. Students spend eight days at the Outward Bound base in Anakiwa, Queen Charlotte Sound, and then hīkoi (journey) down through the Ngāi Tahu tribal rohe (region) finishing at the base of Aoraki/Mt Cook (approximately 50kms from Lake Tekapo).

Aoraki Bound is the highest profile of all the programmes within the Ngāi Tahu capability strategy and has 185 Alumni.

Two courses of Aoraki Bound were successfully held in February and March 2013 with a total of 25 participants. At the conclusion of the course, to acknowledge the participants' journey and achievements, a hākari was held and attended by family, friends, sponsors and Iwi representatives. The hākari provides an opportunity for the participant's to reflect and impart some of their many experiences and learnings gained from the course and simply thank those that supported them to attend the course.

Some feedback received from participants:

- "My Aoraki Bound experience was life changing, it has inspired me to not only live a healthier lifestyle but to encourage and inspire my whānau to live that life too." Estele Leask aged 43.
- "Personally, not being from Ngāi Tahu or any other iwi, I may have been slightly apprehensive about the cultural aspect however it was enlightening and a great experience to witness and partake in ancient Maori traditions; historical sites; travel routes from centuries ago; waiata & haka and te reo. Aoraki Bound was a thoroughly rewarding and fun experience that I wouldn't hesitate to recommend to any New Zealander." Duncan Matthews aged 38.

The Genesis Energy/ Ngāi Tahu agreement was signed on 22 December 2011. It is an exciting opportunity for Genesis Energy to work alongside Ngāi Tahu.

Thanks to Janyne Morrison of Te Runanga o Ngāi Tahu for contributing to this section.

FIGURE 40 // A group of Aoraki Bound participants on the February 2013 course (photo: Ngāi Tahu).

9.4 WHIO FOREVER

In 2010, Genesis Energy received an exclusive invitation from DOC's National Whio Recovery Group to become the corporate sponsor of whio. The Whio Forever Investment Agreement was subsequently signed by DOC and Genesis Energy on 31 August 2011 in Wellington. The agreement commits, in full, $2.5 million over five years to fully implement the National Whio Recovery Programme thereby securing the future of whio.

The Whio Forever Investment Agreement was fully implemented in the reporting period. The Governance committee includes three representatives of each organisation and a representative from the Central North Island Blue Duck Conservation Charitable Trust and from the Royal Forest and Bird Protection Society (Forest and Bird). The committee has met twice and has developed and implemented a five-year management plan in line with the vision and strategy. The committee agreed the year two funding.

Investment in predator control has been a key focus with over 3,620 traps having been put in place to protect whio at 12 different sites throughout the country. This equates to an extra 362 km of trap line at 100 m spacing. A national trial of self-re-setting traps was initiated as a result of the Whio Recovery Programme funding the field assessment and refinement of a new design for stoat traps at Te Urewera. Using self-re-setting traps will ultimately reduce the huge workload associated with checking traditional traps and they will be able to be utilised in areas where toxins are not able to be used.

The Whio Nest Egg project (WHIONE) aims to enhance whio chick survival rates by incubating whio eggs taken from nests in the wild, and raising the chicks in captivity. The juvenile whio are then released into the wild when they are of a size where they are better able to fend off predators. This important project has progressed with funding supporting captive breeding sites and hardening facilities nationwide. Population management has been supported through the allocation of resources to support the development of data loggers and a database to capture whio related information from protection sites.

All of this work has resulted in the managers of the various whio protection sites indicating that they are now confident that they have the capacity to meet their whio protection targets for the first time ever (Table 13) and whio Security Sites now expect to achieve their target numbers of protected whio pairs earlier than anticipated (i.e. the target of 400 in total will be achieved by 2016, rather than 2019).

Security Sites are highest priority for securing the whio in the Whio Recovery Programme with a goal to secure 50 pairs at each of eight sites by 2019. Recovery sites enable linkage between sites and maintain existing range and distribution of whio. The goal is to secure 100 pairs in total by 2019.

TABLE 13 // Whio Forever. The numbers of additional whio pairs protected primarily through the Whio Recovery Programme has increased during the reporting period.

SECURITY SITES	Number of pairs
Te Urewera	15
Whirinaki	15
Tongariro Forest	48
Manganui/ Retaruke	3
Wangapeka	10
Oparara/ Ugly	18
RECOVERY SITES	
Maungataniwha	19
Pureora	12
Hancock Forest Managers	2
Arthurs Pass	2
Glaisnock-Nitz	8
Murchison Mountains	8

In order to grow whio awareness within the country's largest population centre (Auckland), Genesis Energy signed a three year agreement with Auckland Zoo in September 2012 to support its whio enclosure. As part of the arrangement Genesis Energy funded the re-development of all interpretive/interactive displays within the enclosure. Although funded solely by Genesis Energy, the driver was support for the Whio Recovery Programme. DOC and Genesis Energy staff worked alongside Auckland Zoo to develop new interpretive materials for the enclosure which featured the Whio Recovery Programme.

The Whio Awareness campaign in March 2013 worked to raise awareness of the status of the whio through a national advertising campaign and the Whio Family weekend at Auckland Zoo (Figure 41). DOC, Genesis Energy, Forest and Bird and Zoo staff ran the fun days. A significant number of the Zoo patrons (7,238) are estimated to have visited the whio enclosure and participated in activities over the two days. During the month other initiatives were run including visitor centre displays, press releases and an above-the-line marketing campaign to drive traffic to the Whio Forever website **www.whioforever.co.nz**

FIGURE 41 // Zoo patrons taking part in the whio fun days at Auckland Zoo – blue duck race.

9.5 LAKE TEKAPO COMMUNITY FUND

As a way of recognising the Tekapo community's support for the Tekapo Canal Remediation Project, Genesis Energy created a Lake Tekapo Community Fund. Grants totalling $50,000 are being awarded to community projects for each of the two years of the canal project. The initiatives that received support in the 2012/13 funding round included the development of a plant nursery in the Lake Tekapo Recreation Park, the provision of a defibrillator for the Fire Station, the building of a Gecko play structure and the re-barking of the Lake Tekapo School playground (Figure 42). The initiatives were considered alongside seven others that were submitted by groups within the community and were reviewed by the Lake Tekapo Community Fund Committee which was made up of Lake Tekapo Community Board members and Genesis Energy staff. Applications were reviewed in light of Genesis Energy's community investment criteria which focus on community enrichment, education, and/or environmental enhancement. Applications for the second round of funding will be received in the next reporting period.

FIGURE 42 // Lake Tekapo School playground with new bark.

9.6 TEKAPO 10

Tekapo 10 is a ten hour cross country mountain bike relay race that was held in the Lake Tekapo Regional Park on 2 February 2013 (Figure 43 and Figure 44). Students from Mackenzie College in Fairlie had successfully competed in the regional events of the Genesis Energy Hillary Challenge so the Tekapo 10 event was held to raise funds to cover the cost of getting students to the final of the Genesis Energy Hillary Challenge in Tongariro National Park. Genesis Energy was the major sponsor of the mountain biking event to ensure the students reached their goal and were able to attend the event in the North Island. With over 111 riders on the day, a significant amount of money was raised towards this.

9.7 CURTAIN BANK

Genesis Energy is proud to be the major sponsor of three different Curtain Banks, located in Auckland, Wellington and Christchurch. Involvement in these community initiatives is one way in which Genesis Energy can assist low income households to save money on their energy bills and create warmer, healthier, more private homes.

The Christchurch Curtain Bank is run by Community Energy Action and primary funds come from the surpluses generated by that organisation. The Christchurch Curtain Bank assists low income households who live in a cold and/or damp homes and have insufficient, or no curtains to shut out the cold and draughts. The programme's objective is to protect the health of people by making their homes warmer by providing recycled thermal or lined curtains for living rooms and bedrooms.

Genesis Energy has sponsored the Christchurch Curtain Bank since August 2010. During 2012, the Christchurch Curtain Bank fitted 1,831 windows in 345 houses with curtains, totalling 5,759 square metres of fabric for Christchurch residents.

FIGURE 43 // Josh Sheenan riding for "The Mackenzie Marauders" 1st U19 Boys Team (photo: Mackenzie College).

FIGURE 44 // Ian Meredith (Genesis Energy) presenting medals to "Mackenzie Une" 1st U19 Girls Team (Jessica Adams, Charlotte Willson, Lucy Gibson) (photo: Mackenzie College).

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KEY OBJECTIVES

10

10 KEY OBJECTIVES

10.1 REVIEW OF KEY OBJECTIVES FOR 2012-2013

TABLE 14 // Review of key objectives for 2012-2013

Outcome / Initiative and Objectives	Actions 2012-13	How did we do?
Tekapo Canal Remediation Project continue to plan for and begin works for the Tekapo Canal Remediation Project	› Undertake season one works in line with resource consents and stakeholder agreements.	› Season one works were completed on schedule. Environment Canterbury and Mackenzie District Council have reported full compliance (Chapter 7).
Environmental Monitoring Programme update our understanding of the environment in which Tekapo Power Scheme operates	› Undertake environmental studies to better understand the effects of operating the Tekapo Power Scheme	› Initial synoptic environmental studies are near completion and all studies will be finalised early in the next reporting period (Chapter 6).
Signage all signage is relevant and reflected in the Signage Management System	› Review signage to ensure consistency with other hydro-generation assets. Ensure Signage Management System is up-to-date and a review process is established.	› Signage has been reviewed and the process is underway to bring signage across Renewable Energy sites into alignment.
Maintain Genesis Energy's environmental response have robust spill response requirements in place	› Review and obtain necessary spill response equipment and requirements at the Tekapo Power Scheme.	› Spill resonse equipment has been purchased.
Ngāi Tahu continue to develop a relationship with Ngāi Tahu	› Seek to establish a formal relationship with Ngāi Tahu and participate in shared learning opportunities.	› Completed a native fish salvage while sections of the Tekapo Canal being re-lined were dewatered, and have drafted a relationship agreement.
Community Partnership continue to develop partnership with the Lake Tekapo community	› Continue to meet and discuss opportunities with the Lake Tekapo Community Board and others.	› Entered into a Memorandum of Understanding and Sponsorship Agreement with the Lake Tekapo Footbridge Society; set up a Lake Tekapo Community Fund in partnership with the Lake Tekapo Community Board; entered into other sponsorship opportunities with the community (Chapter 9).
National Whio Sponsorship continue to implement the National Whio Investment Agreement	› Support Whio Investment Agreement Committee and Technical Working Group to develop and implement a 5 year strategic plan and a communications plan, and begin Whio Forever advocacy in the South Island.	› Implementation well underway; over 3600 predator traps deployed; targets for whio numbers on track; Genesis Energy has partnered with Auckland Zoo for three years to raise awareness to New Zealand's biggest population centre; whio awareness month held with family days at Auckland Zoo; Genesis Energy assissted Te Anau DOC staff to undertake whio monitoring in the Milford area.
Genesis Energy's Annual Lake Tekapo Community Meeting keep Lake Tekapo community informed of Genesis Energy's activities	› Genesis Energy to hold a public meeting during 2012.	› Complete.
Schoolgen implement the Schoolgen programme in Christchurch and Lake Tekapo	› Genesis Energy will roll out Schoolgen at two further Christchurch schools and will host a launch to celebrate Schoolgen at Lake Tekapo School.	› Complete (section 9.1).
Public safety maintain the high priority focus of health and safety at and around the Tekapo Power Scheme	› Review and continually update health and safety procedures at and around the Tekapo Power Scheme.	› Process of continual improvement.

10.2 KEY OBJECTIVES FOR 2013-2014

Key environmental objectives for the 2013-14 year build on many initiatives and programmes that are already underway.

TABLE 15 // Key objectives for 2013-2014

Outcome / Initiative	Objective	Action 2013-14
Tekapo Canal Remediation Project	› Continue to plan for and begin works for seasion two of the Tekapo Canal Remediation Project.	› Undertake season two works in line with resource consents and stakeholder agreements.
Ngāi Tahu	› Continue to progress relationship seeking opportunities with Ngāi Tahu.	› Work alongside Ngāi Tahu for the fish salvage as part of season two of the Tekapo Canal Remediation Project and seek other opportunities to work alongside Ngāi Tahu.
Lake Tekapo Community Fund	› Support community projects via the Lake Tekapo Community Fund.	› Make $50,000 available for community projects in partnersup with Lake Tekapo Community Board.
Signage	› All signage is relevant and reflected in the Signage Management System.	› Review signage to ensure consistency with other Genesis Energy generation assets. Ensure Signage Management System is up to date and robust procedures are in place to ensure it is kept up to date.
Volunteer Day	› Support projects in the community in which we operate.	› All Tekapo Environmental staff to participate in a volunteer day.
RCMS Reporting	› Enhance RCMS reporting capabilities.	› Review RCMS reporting requirements and work with IT to ensure that a reporting system is developed that meets those requirements.
Environmental Management System	› To review and update the company-wide EMS.	› Complete review of EMS and roll-out across the company.

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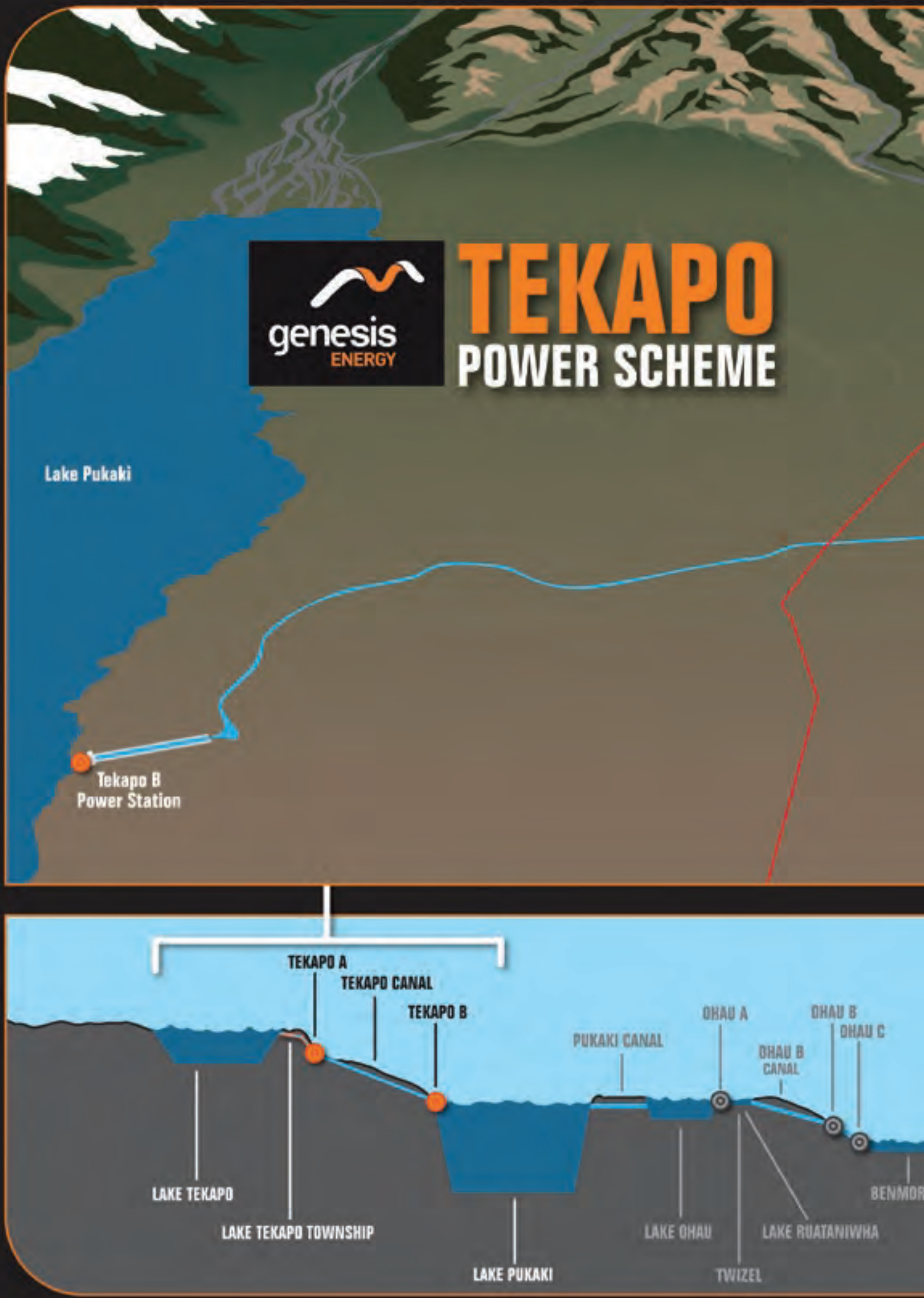
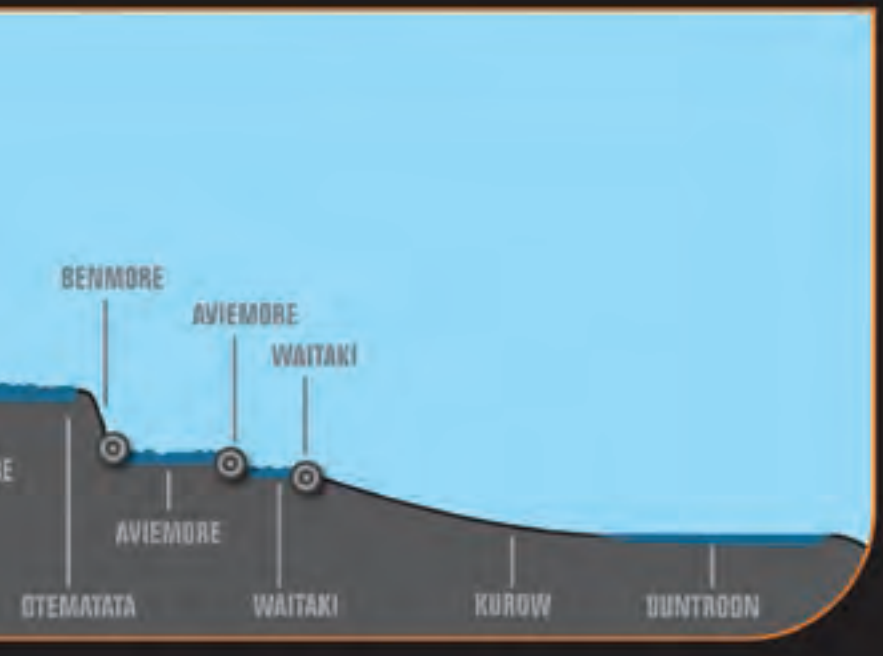
TEKAPO POWER SCHEME MAP // 13


genesis
ENERGY
TEKAPO
POWER SCHEME
Lake Pukaki
Tekapo B
Power Station
TEKAPO A
TEKAPO CANAL
TEKAPO B
PUKAKI CANAL
OHAU A
OHAU B CANAL
OHAU B
OHAU C
LAKE TEKAPO
LAKE TEKAPO TOWNSHIP
LAKE PUKAKI
LAKE OHAU
TWIZEL
LAKE RUATANIWHA

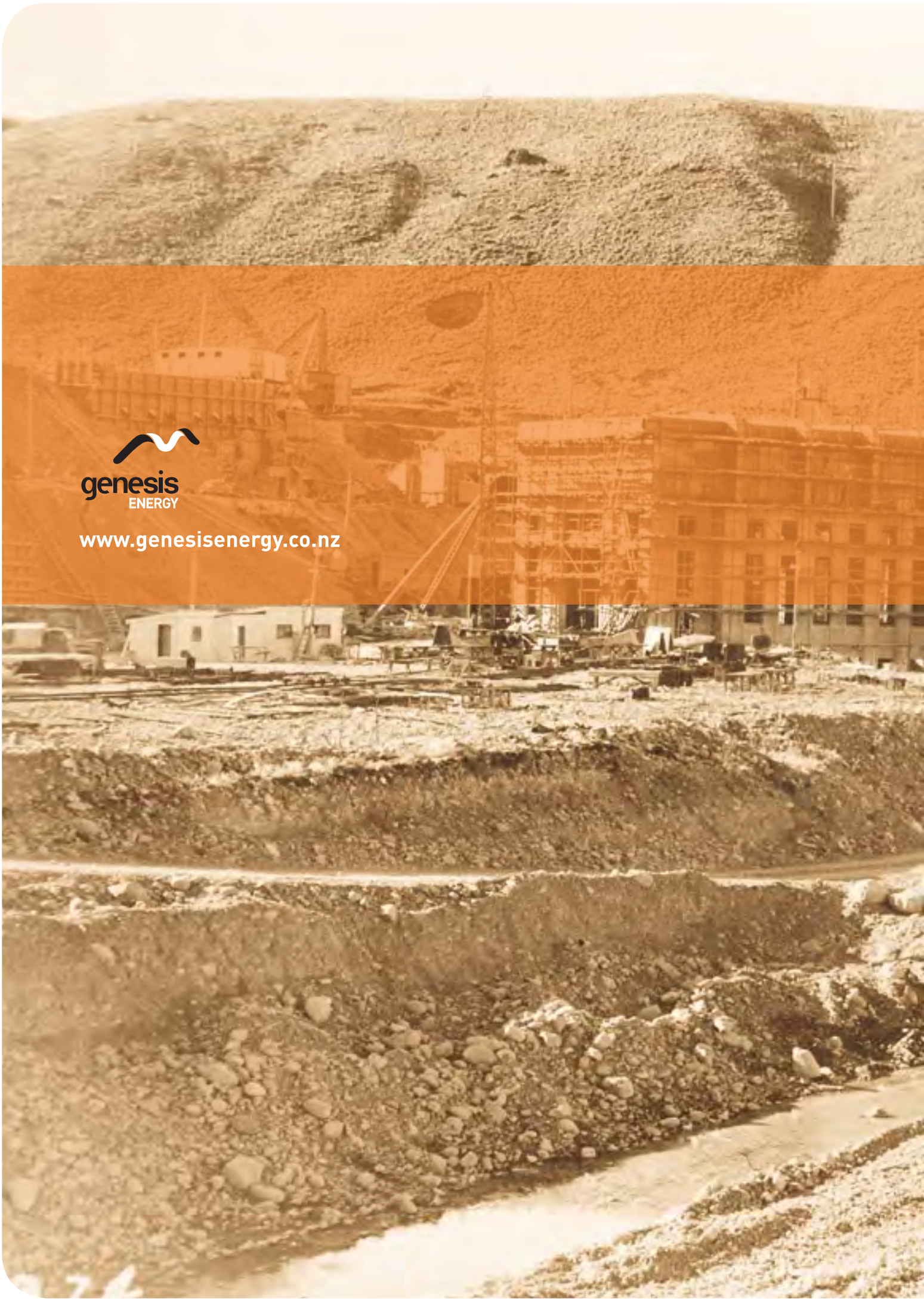
TEKAPO A POWER STATION
One 25 MW Unit. Commissioned 1951

TEKAPO B POWER STATION
Two 80 MW Units. Commissioned 1977

LAKE TEKAPO CONTROL STRUCTURE
(Gate 16)



LAKE GEORGE SCOTT & CONTROL STRUCTURE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