Consents Hearing
3 December 2018

Alliance Group Limited – APP 20171566

Appendices

Application

MITCHELL DAYSH

Alliance Group Limited

MATAURA PLANT – HYDRO ELECTRIC GENERATION PLANT

Resource Consent Applications and Assessment of Environmental Effects

22 December 2016

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REPORT INFORMATION

Report Status	Final
Our Reference	9047
File Location	Dunedin
Author	Claire Hunter
Review By	John Kyle

A

PART A

Resource Consent Applications

FORM 9

APPLICATION FOR RESOURCE CONSENTS

Section 88 of the Resource Management Act 1991

To **Southland Regional Council**

Private Bag 90116

INVERCARGILL

1. **Alliance Group Limited applies for the following consents:**

   Water permit – to dam, divert and use water via an existing weir located in the Mataura River for the purposes of hydroelectric generation.

   Discharge permit – to discharge water via the hydroelectric generation infrastructure back to the Mataura River.

2. **The activity to which the application relates (the proposed activity) is as follows:**

   Dam, Diversion, Use and Discharge of Water

   Alliance is seeking consent in order to continue to dam, divert, use and discharge water from the Mataura River in order to generate hydroelectricity. The infrastructure that exists within the Mataura River diverts water from the Mataura River via a U shaped weir and raceway structure.

   Once the water has passed through the turbine and race it will be discharged back into the main stem of the Mataura River, approximately 300m downstream.

   Alliance holds existing authorisations to undertake these activities, however these are due to expire in June 2017. The Water Conservation Order which applies to the Mataura River enables existing permits to be renewed on similar terms and conditions and given this a 25 year consent term is being sought.

   The hydro-race is approximately 300m long and conveys approximately 6.0 to 10.0m^3/s of diverted water past the Mataura Plant to enable water abstraction for Plant operations as described earlier.

3. **The site at which the proposed activity is to occur is as follows:**

   The Mataura Plant and infrastructure are located on the true right bank of the Mataura River, within the Mataura township.

   Map reference: **NZMS 260 F46: 911 384**

   Legal description: **Lots 1-2 DP12431 Lot 1 DP 12500 Blk XIII Mataura TN**

4. **The full name and address of each owner or occupier (other than the applicant) of the site to which the application relates are as follows:**

The Alliance Group Limited is the owner and occupier of the land associated with the Mataura Plant.

The bed of the Mataura River is Crown Land.

5. The other activities that are part of the proposal to which the application relates are as follows:

The permits that are being sought enable electricity to be generated at the site for the Plant operations. The Plant is a permitted activity under the Gore District Plan, as it and the immediate area is zoned for industrial purposes. The hydro-race also enables Alliance to abstract water for its Plant operations and this activity is consented via 204126.

6. No additional resource consents (other than those set out in 1 above) are needed for the proposal to which this application relates.

7. I attach an assessment of the proposed activity's effect on the environment that—

- **includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and**

(a) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

(b) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

8. I attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

9. I attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

10. The value of the investment of the existing consent holder is approximately $4 million.

Date: 22nd December 2016

Signature: 

(person authorised to sign on behalf of applicant)

Address for Service: Alliance Group Limited

C/- Mitchell Daysh Limited
PO Box 489
City

Telephone: (03) 477 7884
Email: Claire.hunter@mitchelldaysh.co.nz

Contact person: Claire Hunter

Note to applicant

You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.

You may apply for 2 or more resource consents that are needed for the same activity on the same form. If you lodge the application with the Environmental Protection Authority, you must also lodge a notice in form 16A at the same time.

You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991 (if any).

If your application is to the Environmental Protection Agency, you may be required to pay actual and reasonable costs incurred in dealing with this matter (see section 149ZD of the Resource Management Act 1991).

B

PART B

Assessment of Environmental Effects

1. INTRODUCTION

1.1 BACKGROUND

Alliance Group Limited (Alliance) owns and operates the Mataura Meat Processing Plant (the Mataura Plant or the Plant) located in Mataura, Southland. Part of its operations includes the diversion of water from the Mataura River into a small (530 kilowatt (KW) on-site hydroelectric plant (HEP) with an open flume Francis Turbine. Alliance holds an existing consent (98031) issued from the Southland Regional Council (or Environment Southland) to dam, divert and use water for the purposes of hydroelectric generation, and also consent to discharge water from the Plant back into the Mataura River. This consent expires on 30 June 2017, and as such Alliance is seeking to renew these existing permits on similar terms. A copy of this existing consent is attached as Appendix A.

1.2 COMPANY OVERVIEW

Alliance is a large meat processing and exporting company operating six meat processing and exporting plants throughout the South Island and two plants in the North Island. These plants are located at:

- Stoke, Nelson
- Smithfield, Timaru
- Pukeuri, North Otago
- Mataura, Southland
- Makarewa, Southland
- Lorneville, Southland
- Levin, Horowhenua
- Dannevirke, Hawkes Bay

The company was established in 1948 and is now a wholly farmer-owned co-operative company. On an annual basis, Alliance processes approximately 6 million lambs, 1 million sheep, 200,000 cattle, 115,000 deer and 270,000 calves. This equates to approximately 30% of New Zealand's sheep meat production, 10% of beef and 30% of venison.

The company exports products to over 65 different countries. Approximately 80% of its activities are related to sheep and lamb processing, the remainder being beef, and deer processing.

Processing is vertically integrated with about 80% of the meat production being further processed by boning, cutting and consumer packaging. A proportion of the production is exported in a chilled state to Europe and North America. Co-products such as wool, skins and other carcass material are also processed for export by the company, usually at the same location as the meat processing facility.

As a wholly farmer-owned co-operative company, all profits are returned to the company's farmer shareholders with a portion retained for growth. The company employs close to 5,000 people (permanent and seasonal staff) and services about 5,000 farmer suppliers of

livestock. Alliance's annual turnover for the 2015/2016 season was $1.36 billion and profit was $10.1 million.

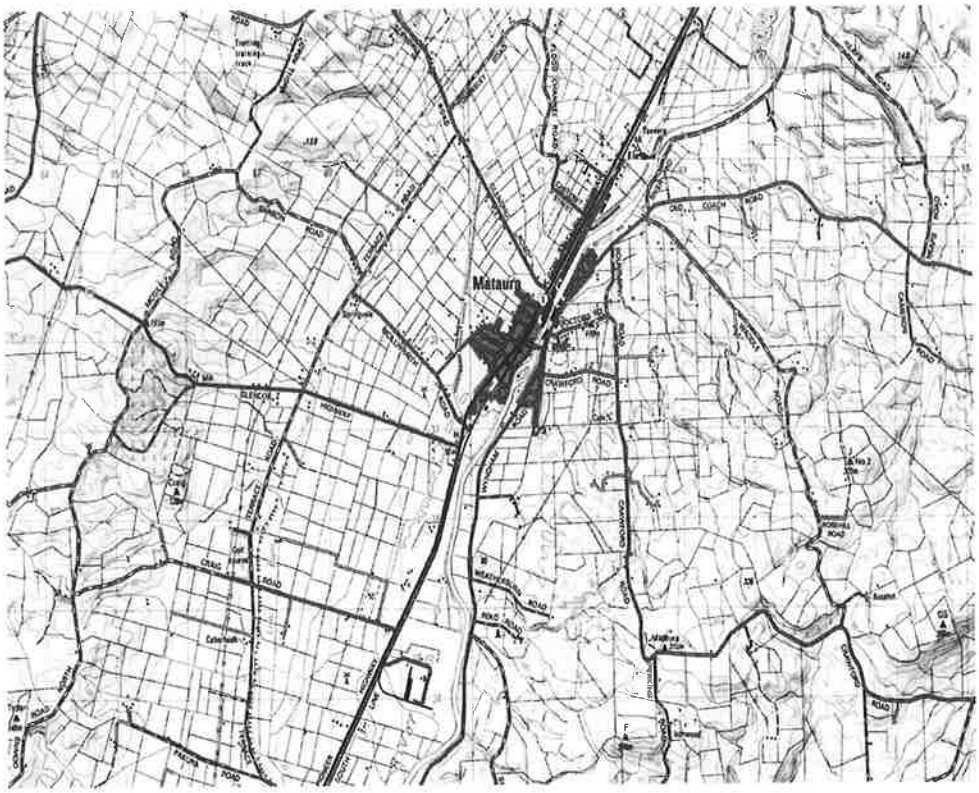


Figure 1: Location of the Mataura Plant

1.3 MATAURA PLANT

The Mataura Plant is located on the true right bank of the Mataura River in the Mataura township (refer Figure 1).

The land parcel on which the Mataura Plant is located is owned by Alliance, and is legally described as Lots 1-2 DP12431 Lot 1 DP 12500 Blk XIII Mataura TN. A copy of the relevant certificate of title is attached as Appendix C.

The true left bank of the river is occupied by the former Carter Holt Harvey paper mill now an industrial site managed by the Mataura Industrial Estate (MIE).

The Mataura Plant processes up to 1,120 beef cattle per day over two shifts at the peak of the season. The Plant generally operates 5 days per week, over almost 24 hours during peak processing. All processing (of stock killed at Mataura) is carried out on-site, except for some transfer of soft offal and bones off-site for further processing or rendering. Processed carcasses and meat cuts are refrigerated and stored in on-site chillers and freezers. Water for a range of uses is abstracted from a hydro-race on the bed of the Mataura River.

1.3.1 The Hydroelectric Plant and Hydro Race

The hydroelectric plant (HEP) at the Mataura Plant diverts water from the Mataura River via a U shaped weir and raceway structure (refer Figure 3 further below). The diversion is upstream of the Mataura Falls water fall. The MIE operates the diversion structure jointly with Alliance Group. The natural fall in the river provides the hydraulic head for the hydroelectric turbine.

The diversion operates under existing consent conditions that require a minimum water depth of 0.05m to be maintained over the weir at all times. The race where the water is diverted to, is approximately 300m long and conveys approximately 6.0 – 10.0 m^3/s of Mataura River water past the Mataura Plant to supply water to the HEP and to enable the authorised water abstraction for Plant operations including refrigeration cooling and other purposes.

The race within the building commences as a 7m wide section and reduces to 4 m wide just upstream of the screen/hydro intake. The screen has vertical bars across it every 60 mm across the width of it. The maximum net head of the HEP is 7.25 m, refer Figure 2.

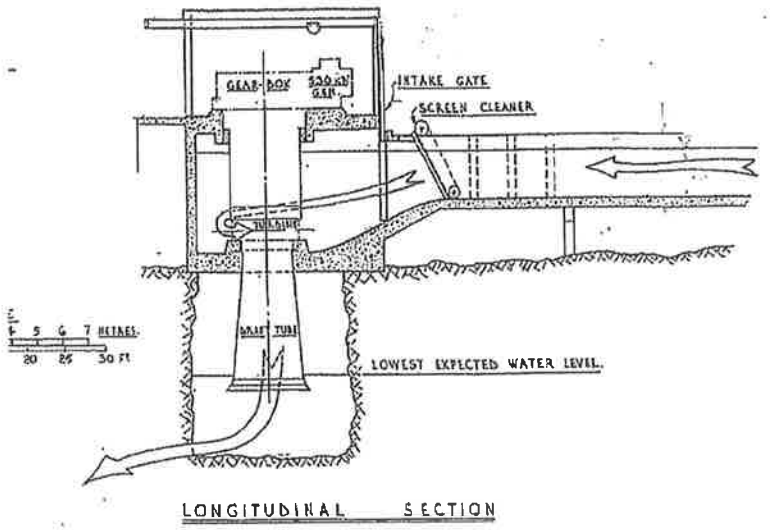


Figure 2: Longitudinal Section of HEP

1.4 THE REPORT STRUCTURE

This document has been prepared to describe the nature of the proposal and provide an Assessment of Environmental Effects (AEE) for the activity as required under section 88 of the Resource Management Act 1991 (RMA). Specifically:

- Section 2 provides a description of the existing environment.
- Section 3 describes the activity for which consent is sought.
- Section 4 identifies the status of the proposal under the Resource Management Act 1991 (RMA).

- Section 5 provides an assessment of the effects on the environment associated with the proposed activity.
- Sections 6 - 11 provides an analysis of the proposed activity in relation to the provisions of the relevant policy and planning documents along with relevant sections and Part 2 of the RMA.
- Section 12 describes the consultation undertaken with interested and potentially affected parties and the results of that consultation. It also requests that the applications be processed on a non-notified basis.
- Section 13 sets out the key conclusions of this AEE.

2. EXISTING ENVIRONMENT

2.1 LOCATION

As set out above the Mataura Plant is located on the true right bank of the Mataura River (refer Figure 1).

2.2 HISTORY AND EXISTING LAND USES

The Mataura Paper Mill and Southland Frozen Meat and Produce Export Company first established the HEPs on the Mataura River in the early 1890s. The Southland Frozen Meat and Produce Export Company was granted permission to take water from the Mataura River in 1890 for hydroelectric generation. In 1893 the Mataura Paper Mill also began operating an HEP. In 1905, after the generation plant had been upgraded, the HEP supplied electricity to the processing plant and the town of Gore, and this was extended to supply electricity to the township of Mataura in 1913. The hydro plant continued to supply power to Gore and Mataura until 1924 when the Southland Electric Power Board began supplying electricity to Gore and Mataura from its Monowai Power Station. The meat processing plant became electrified in 1932.

Just when the diversion structure was completed during this development period is unclear; however it is evident that the HEPs at Alliance's site and the MIE site in Mataura have been operating for approximately 115 – 120 years. Diversion structures and the intake race are likely to have been in place either prior to or put in place during the plant upgrades in the 1920s or 1930s.

2.3 ZONING

The Mataura Plant is situated within the Gore District and Southland Regional Council jurisdiction. In terms of the Gore District Plan the site is zoned industrial. The surrounding area and river bank are dominated by industrial uses, and the wider surrounding area is made up of a mix of residential use, small scale commercial and community support activities.

2.4 MATAURA WATER CONSERVATION ORDER

The Mataura River is subject to a Water Conservation Order (WCO) that was applied for by Fish and Game New Zealand and was issued in 1997. The WCO lists as protected waters the Mataura River from its source to the sea, and it also applies to many of the tributary

streams and the Waikaia River. The outstanding features that the WCO seeks to protect are the outstanding fisheries and angling amenity. The outstanding fisheries are not defined further in the WCO, but given the reputation of the Mataura River as highly significant for brown trout angling, this is likely to be one of the fisheries of particular interest.

Clause six of the WCO prohibits damming of the Mataura River, with the exception of the existing weir provided water permits are granted and renewed on similar terms and conditions of the former permits.

2.5 MATAURA TE AWA MATAITAI

The Mataura River Mātaitai Reserve (the Mātaitai Reserve) covers approximately 10km of the Mataura River in the vicinity of the Mataura Falls, and came into effect on 12 August 2005. The area is noted for its native fish populations and is an especially important place of mahinga kai (food gathering) for tuna (eels) and kanakana (lamprey).

Mātaitai reserves are one of the suite of management tools created under Part IX of the Fisheries Act 1996. These are designed to give effect to the obligations stated in the Treaty of Waitangi Fisheries Claims Settlement Act 1992 to develop policies to help recognise use and management practices of Māori in the exercise of non-commercial fishing rights. The Part IX tools provide practical recognition of the rights guaranteed to tāngata whenua under the Treaty of Waitangi. The Mātaitai Reserve does not affect trout fishing (as it is not managed under the Fisheries Act 1996).

The Mataura Mātaitai Reserve's management plan aims to "maintain a healthy fishery, managed appropriately for the environment and consistent with the economic, cultural and social interests of all". The Hokonui Runanga and the Tangata Tiaki/Kaitiaki for the Mātaitai Reserve are concerned about the sustainability of tuna and kanakana within the Mātaitai Reserve. There are bylaws which apply within the reserve, and prohibit commercial fishing within the area, and customary fishing may only take place with the authorisation of the Tangata Tiaki/Kaitiaki.

2.6 EXISTING CONSENTS

Alliance's existing consent 98031 provides for the damming, diversion and use of water from the Mataura River for hydroelectric power generation, and to discharge water from the plant back to the Mataura River. The key conditions attaching to this consent include:

- That the flow at the centre of the existing weir shall not be less than 0.05m in depth;
- The requirement to maintain a monitoring system to provide immediate warning to staff in the event that overflow at the weir has ceased;
- Reduce water usage for power generation to comply with the weir depth in parallel with MIE;
- Maintain an adequate fish ladder in conjunction with MIE.

2.7 EXISTING AQUATIC ENVIRONMENT

The report attached as Appendix E prepared by Golder Associates, provides a summary of the existing Mataura River aquatic environment in vicinity of the Plant. A summary of the key findings is presented below:

- The differences in conductivity, pH, TP, NH_4-N, NO_3-N and NO_2-N are considered minor and not meaningful as the slight differences upstream and downstream are unlikely to result in an ecological response.
- Trend analysis performed on the Alliance data and obtained from the LAWA database indicates that concentrations of TP, DRP and NO_3-N have declined. Although this is positive for the overall health of the lower Mataura River these parameters are not associated with the operation of the hydro water take race.
- Despite the improvement in the concentrations of certain water quality parameters over time, the LAWA database nevertheless indicates that the Mataura River generally has degraded water quality, being in the worst 25 % and 50 % of all lowland sites in New Zealand for NH_4-N and DRP, respectively.
- The Alliance ecological monitoring data is highly variable amongst sites upstream and downstream of the discharge point and amongst years. However, all ecological monitoring data is below the thresholds for the protection of aesthetics, recreation and trout habitat and angling.

3. DESCRIPTION OF THE PROPOSAL

3.1 HYDROELECTRIC PLANT

Alliance is seeking consent in order to continue to dam, divert, use and discharge water from the Mataura River in order to generate hydroelectricity. The infrastructure that exists within the Mataura River diverts water from the Mataura River via a U shaped weir and raceway structure, as shown in the figures below:

Figure 3: Existing Hydro Race

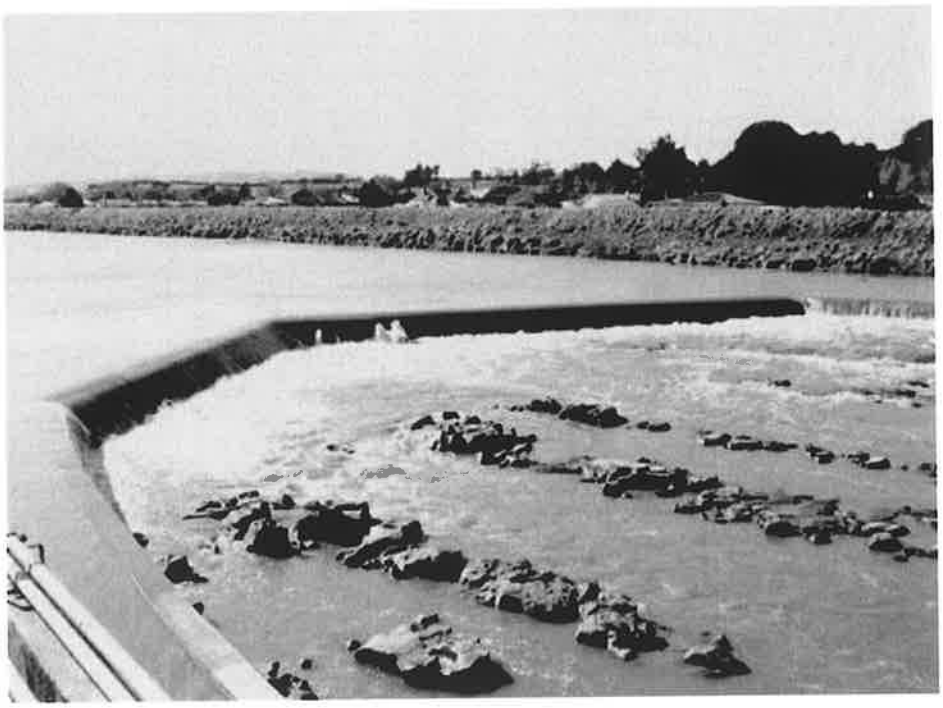


Figure 4: Existing U Shaped Weir

In accordance with the requirements of the WCO, Alliance is proposing to continue to operate the weir and diversion activity under the similar parameters of the existing consent. The existing conditions require:

- the flow at the centre of the existing weir shall not be less than 0.05 m in depth

- the requirement to maintain a monitoring system to provide immediate warning to staff in the event that overflow at the weir has ceased, and
- reduce water usage for power generation to comply with the weir depth in parallel with MIE
- Maintain an adequate fish ladder in conjunction with MIE

As part of the consent conditions, Alliance was also required to undertake an investigation of the effects of the infrastructure on native fish passage within the river. Golder Associates was engaged to undertake this assessment.

Golder Associates completed the assessment in late 2007 which was provided to Environment Southland on 17 January 2008. This report is attached to this application as Appendix D. Overall, the report concluded that the weir does not present a significant barrier for five native fish species that would be able to ascend the Mataura Falls. It was however identified in the report, that there is some concern about the ability of longfin elvers to negotiate the weir due to the 90° angle at the top of the weir.

Fish passage systems have been investigated including ladders, spat ropes and ramps. Some have not been successful and some have not been able to withstand the forces of the river and in the past, have been damaged or destroyed. In addition, fluctuating river conditions make the successful development of a mechanism to get elvers above the weir unlikely. Given this, a trap and transfer system has been developed by MIE, in conjunction with Holloway Environmental Services (refer Appendix F), over the past two years and is considered to be the most efficient and effective way of managing this potential effect.

Once the water that is subject to this application has passed through the turbine and race it will be discharged back into the main stem of the Mataura River, approximately 300m downstream.

A 25 year consent term is being sought for these activities.

3.2 HYDRO RACE

The hydro race is approximately 300m long and conveys approximately 6.0 to 10.0m^3/s of diverted water past the Mataura Plant to enable water abstraction for Plant operations as described earlier.

4. RMA STATUS OF PROPOSED ACTIVITY

This section reviews the provisions of the relevant planning documents to ascertain the resource consent requirements and the activity status in respect of the activities proposed by Alliance. As noted in section 1 to this report, the activities relate to:

- The damming and diverting of water from the Mataura River into a small onsite HEP. Once the water has passed through the turbines it is then discharged back into the main stem of the Mataura River, approximately 300m downstream

As outlined in section 6, the relevant planning documents to determine if consent is required are:

- Southland Regional Water Plan; and
- Proposed Southland Water and Land Plan

The Proposed Water and Land Plan was notified in June 2016. This Plan contains objectives, policies and rules relating to the management of water and land in Southland. Although hearings and decisions on this plan are still some time away, under section 86B(3) of the RMA rules in the Proposed Plan have immediate legal effect from this date. Assessment of the activities and consents necessary under the Proposed Plan is therefore also required.

4.1 RESOURCE CONSENTS REQUIRED

4.1.1 Regional Water Plan for Southland

4.1.1.1 Damming – Section 13 Land Use Permit

Rule 29(a) – (c) relates to activities involving the placement, erection or reconstruction of any dam or weir, in, on or over the bed of any lake or river. Given that the weir is already in place, it is considered that these rules are not relevant.

Rule 29(d) provides for the use of any dam or weir in, on or over the bed of any river, modified watercourse, stream or lake as a **permitted activity**, provided the following conditions are met:

i. *The structure was lawfully established (either before or after this [Water Plan] plan came into force.*

ii. *The use of the structure shall not cause a hazard to navigation.*

iii. *The structure shall not be used to store hazardous substances.*

iv. *The standard conditions in Rule 48(b) and (c).*

v. *Fish passage shall not be impeded as result of the activity.*

Compliance with these conditions can be achieved. The diversion weir was lawfully established prior to the Regional Water Plan becoming operative. The weir does not present a hazard to navigation, and will not be used to store hazardous substances. With regard to condition (iv) and the conditions attaching to Rule 48(b) and (c):

Rule 48(b):

i. *The structure shall not cause significant erosion of, or deposition on, the surrounding bed or banks;*

ii. *Any build-up of debris against the structure, which may adversely affect flood risk, drainage capacity or bed or bank stability, shall be removed as soon as practicable;*

iii. *The structure shall be maintained in a state of good repair.*

Rule 48(c):

i. *No contaminants, shall be discharged to water as a result of the use of the structure unless allowed by a relevant permitted activity rule or resource consent.*

The weir is maintained in a good state of repair and regularly checked and cleared for any debris or other material. Water that passes over the weir and diverted to the turbine is then discharged back into the main stem of the Mataura River, a consent is being sought to provide for this.

The assessments undertaken with regard to fish passage indicate that fish migration is not being significantly impeded by the presence of the weir due to the presence of native fish species and trout at different life stages both above and below the weir, however there may be some individuals which may be unable to complete their upstream migration due to the presence of the weir. Upstream fish passage systems such as ladders have not been able to withstand the forces of the river and in the past, have been damaged or destroyed. Given this, a trap and transfer system is being proposed as a more effective way of managing this potential effect.

With regard to downstream fish passage, the most at risk species in this regard is migrating adult eels. There is the potential for these eels to get trapped in the intake and turbines during downstream migration periods. Adult eels are most likely to migrate during the autumn. There are also certain flow conditions which mean migration is more likely to occur. In order to mitigate the potential effects on adult eel migration downstream, it is proposed to shut generation of the hydroelectric plant off during these optimal seasonal and river flow conditions in order to avoid the potential for eels being trapped in the intake or turbine infrastructure.

4.1.1.2 Diversion of Water – Section 14 Water Permit

Rule 18 provides for the abstraction, diversion and use of surface water. The diversion is not listed as a permitted activity. Rule 18(d) provides that the abstraction, diversion or use of water from the following sources is a **restricted discretionary activity**:

> *(iii) Any surface water body or artificial watercourse where the water abstracted or diverted is returned in the vicinity of the abstraction or diversion point; or...*

Water for the HEP is diverted via the weir and then returned back to the main stem of the Mataura River approximately 300m downstream.

The Council will restrict its discretion to the following matters:

i. The volume of water to be taken (including any water to be returned to the surface water body);

ii. any effects on river and stream flows (including effects on minimum flows, flow variability and duration), wetland and lake water levels, aquatic ecosystems, aquifer storage volumes, the availability and reliability of supply for existing users and water quality;

iii. the location of the abstraction or diversion;

iv. The efficiency of water use;

v. the need for the installation of a water meter;

vi. monitoring requirements;

vii. methods to prevent fish from entering the reticulation system;

viii. minimum flow and level requirements;

ix. *consistency with any water conservation order;*

x. *the degree of hydraulic connection to groundwater.*

Where relevant to this proposal, these matters are discussed later in this report in section 5.

4.1.1.3 Discharges of Water – Section 15 Discharge Permit

Rule 3A provides that the discharge of surface water into a surface water body, or artificial watercourse is a **controlled activity** provided the following conditions are met:

a. *The discharge was lawfully established prior to this [Water] Plan coming into force and is associated with a lawfully established activity that existed prior to this [Water] Plan coming into force;*

b. *The discharge is in the same location as the discharge that existed before the [Water] Plan came into force;*

c. *After reasonable mixing, the discharge shall not reduce the water quality of the receiving waters or give rise to any or all of the effects listed in section 107(1)(c) to (g) of the Resource Management Act 1991.*

As set out earlier in this report, the weir and hydroelectric power generation infrastructure has been in place for a significant period of time. The diversion and associated discharge activity has not altered in terms of the general activity and location and therefore can comply with conditions (a) and (b) of Rule 3A. The proposed discharge will not in any material way alter the quality of the water within the river, as it simply transfers the water via a discharge from a turbine. The discharge will therefore not give rise to any of the adverse effects set out in section 107.

4.2 PROPOSED SOUTHLAND WATER AND LAND PLAN

As noted earlier, the rules within the Proposed Water and Land Plan have immediate legal effect and therefore need to be considered. It is important however that the Proposed Water and Land Plan is still in its very early stages of development and a number of the rules set out below are subject to extensive submissions, including from Alliance as well as Environment Southland itself. It is therefore very likely that these rules will be altered, and the weight to be placed on these provisions at this time is to be considered very low.

4.2.1 Damming – Section 13 Land Use

Rule 60(a) provides that the use, placement, erection or reconstruction of any dam or weir, in, on or over the bed of any lake, river, modified watercourse and the associated damming of water, and any associated bed disturbance and discharge is a permitted activity provided certain conditions can be met. Condition (viii) requires that the dam or weir is not in the Mataura, Oreti or Waikaia River. Condition (x) also requires that the structure is not within any Mātaitai, nohonanga, or taiapure.

The proposal involves the use of an existing weir and therefore does not trigger Rule 60(d), which relates to the placement or erection of a dam or weir in the Mataura River as a prohibited activity. The use of a dam or weir in, on, under or over the bed of any lake, river or modified watercourse that does not meet one or more of the conditions in Rule 60(a) is a **discretionary activity**.

4.2.2 Diversion of Water – Section 14 Water Permit

Rule 49(b) provides for the taking, diversion and use of water from any of the following sources as a restricted discretionary activity:

i. *Any surface waterbody or artificial watercourse where the total surface water allocation is within the secondary allocation specified in Policy 21(3); and*

ii. *Any surface waterbody or artificial watercourse where the total volume of water taken or diverted is returned within 100 metres of the take or diversion point; or*

iii. *Any surface waterbody or artificial watercourse where the total volume of water taken is less than 70 cubic metres per day.*

Water allocation within the Mataura River is provided for under the WCO. The diversion is managed so as to ensure compliance with the water flows and limits in the WCO. The point of return for the water is located approximately 300m from the diversion point and therefore cannot comply with condition (ii).

An inability to comply with Rule 49(b) defaults to either a discretionary activity or non complying activity status. A discretionary activity status is retained if the diversion of water is within the primary allocation specified in Appendix K. Appendix K sets out that *for surface waterbodies subject to a WCO that species an environmental flow and level regime, the primary allocation will be that specified in the Order*. The proposed diversion will comply with the flow regimes set out in the WCO and therefore it is considered that the ongoing diversion activity is a **discretionary activity** pursuant to Rule 49(c).

4.2.3 Discharges of Water – Section 15 Discharge Permit

Rule 8 provides for the discharge of surface water into a surface waterbody or artificial watercourse as a **controlled activity**, provided the following conditions are met:

a. *the discharge was lawfully established prior to 1 January 2010;*

b. *the lawfully established discharge point has not changed; and*

c. *at the downstream edge of the reasonable mixing zone, the discharge does not reduce the water quality of the receiving waters or give rise to any of the following effects in the receiving water:*

    i. *the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;*

    ii. *any conspicuous change in visual clarity;*

    iii. *the rendering of freshwater unsuitable for consumption by farm animals; or*

    iv. *any significant adverse effects on aquatic life, other than the target species.*

The proposed discharge of water will comply with the conditions set out above.

Consent is therefore required as a **discretionary activity** pursuant to Rule 49 and 60 of the Proposed Water and Land Plan.

4.3 SUMMARY

Table 1 provides a summary of the activities and activity status:

Table 1: Summary of Rules and Activity Status

Activity	Plan	Rule	Status
Damming of water	Operative Water Plan	Rule 29	Permitted
	Proposed Water and Land Plan	Rule 60	Discretionary
Diversion of water	Operative Water Plan	Rule 18	Restricted Discretionary
	Proposed Water and Land Plan	Rule 49	Discretionary
Discharges of Water	Operative Water Plan	Rule 3A	Controlled
	Proposed Water and Land Plan	Rule 8	Controlled

Under the operative Regional Water Plan the damming, diversion, and use of water associated with the generation of hydroelectricity is a restricted discretionary activity overall. Under the Proposed Water and Land Plan these activities are assessed as a discretionary activity. It is however considered that the weighting to be applied to the provisions under the Proposed Water and Land Plan is very low.

5. ASSESSMENT OF ENVIRONMENTAL EFFECTS

As a restricted discretionary activity under the Operative Water Plan, the matters of discretion have informed the identification of relevant effects to consider when assessing the proposed diversion, use and discharge of surface water associated with the generation of hydroelectricity. This includes:

- Positive effects
- Effects on water quality
- Effects on river flows and allocation and consistency with the WCO
- Effects on aquatic ecology
- Effects on cultural values
- Effects on natural character, amenity and landscape values

5.1 PROPOSED DAMMING, DIVERSION, USE AND DISCHARGE OF WATER ASSOCIATED WITH THE HYDROELECTRIC GENERATION PLANT

5.1.1 Positive Effects

The proposal provides a reliable electricity source that is used directly for powering operations and activities at the Plant.

The Plant is a significant consumer of energy and having access to its own reliable source means it does not have to rely solely on any national or regional supplies. The scheme has no fuel costs and low operating and maintenance costs, and has been in existence for a significant period of time. It is a very efficient and effective means of generating up to 25% of the Plant's electricity requirement.

The power is provided by hydroelectric generation, which is also a renewable energy source. This type of energy generation is non-polluting. It is also considered to be an efficient use of water and physical resources. This is on the basis that the infrastructure is existing, and the activity returns the water back to the river, once the waters energy has been harnessed to generate suitable electric power. The water is then available for further downstream uses.

5.1.2 Effects on Water Quality

The damming, diversion, use and discharge of surface water associated with the hydroelectric generation infrastructure is not anticipated to have any adverse effects on water quality downstream of the site. The discharge of surface water is a transfer of water through the turbine, and although there may be a very small amount of grease discharged from the turbine, it will not result in any changes to the biological or nutrient characteristics of the water downstream of the site. The effects on water quality are therefore assessed as being minor.

Water quality and ecology monitoring is also undertaken by Alliance during the meat processing season as a requirement of that discharge consent. Therefore, a reasonable understanding of the current state of the Mataura River upstream and downstream of the processing plant is known. This is presented in the report attached as Appendix E.

Water quality indicators that are relevant to the diversion and discharge are temperature and Total Suspended Sediment (TSS). Over the period 2011 to 2016, median temperature upstream of the site is recorded as 10.8, compared to 10.9 at the downstream water quality monitoring site. The median value of TSS at the upstream site was 5.0, compared with 6.0 at the downstream site. These differences are considered to be minor and not meaningful, as the slight increases downstream are unlikely to result in an ecological response. It is also noted that this data is obtained during the time when there are other activities and discharges operating in the environment, and unlikely to be attributed to the hydro discharge.

5.1.3 Effects on River Flows and Allocation

The maximum use of water for the hydro plant is approximately 10m^3/sec. The scheme is essentially a run of the river scheme, with the all of the water that is diverted to the HEP returned to the river further downstream (approximately 300m).

The generation capacity of the plant is limited by both low and high water flows. No changes to the current flow regime are being proposed, and Alliance is proposing to continue to recognise and provide for the existing minimum flow of 50mm (0.05m) over the weir. This is necessary to provide for the ecological values in the River and is consistent with the minimum flow requirements set out in the WCO. When the river flows above 400m^3/s the effective head of the system will be reduced to zero and generation is not possible. Generation may also be ceased during smaller floods flows when there is concern that there is significant debris in the river which could adversely affect the infrastructure.

Given that there are no changes to the current flow regime, it is considered that the adverse effects on river hydrology will be no more than minor.

5.1.4 Effects on Aquatic Ecology

The existing aquatic habitat has been altered due the presence of the weir above the Mataura Falls and the industrial activities which have been there for around 100 years. The river environment between the hydro plant diversion and return flow to the river is short in length and confined in width. Habitat in this area is limited in this section of the river, although deep water is retained under all flow conditions, providing habitat for adult trout. Retaining the minimum flow level of 50mm over the weir, will ensure that the adverse effects on aquatic ecology downstream of the diversion, will be minor. Monitoring has not shown a significant difference in water quality or ecological response between upstream and downstream water quality monitoring sites, and therefore it is considered that the operation of the hydro plant is unlikely to have any direct adverse effects on the macroinvertebrate community.

As part of Alliance's current consent, condition 6 requires that Alliance share in the maintenance of an adequate fish ladder, with MIE, which is in place.

The Mataura Falls in themselves present a difficult barrier to upstream fish passage, and the weir's location further upstream means it only has the potential to present fish passage difficulties for fish species that have already negotiated the falls.

Condition 7 requires an assessment into the effects of the diversion and weir on fish passage. In giving effect to this an assessment undertaken by Golder Associates concludes that five native fish species (lamprey, shortfin eel, longfin eel, giant kokopu and koaro) are species that may encounter the weir during upstream migrations.

Of these longfin eel passage is likely to be most difficult, and elvers may be prevented from attaining upstream passage at the waterfall. However, the population of longfin eels upstream of the waterfall and diversion weir does indicate that both the waterfall and the diversion weir are being climbed at times. Intermittent recruitment of longfin elvers is a possibility into the upper catchment and a lack of successful recruitment in recent time maybe giving rise to an observed decline in the commercial fishery. The diversion weir may present a physical obstacle to longfin elvers (and any shortfin elvers present) as they attempt to progress from the vertical climb to the horizontal upper surface.

MIE also holds consent to divert, use and discharge water associated with its hydroelectric power scheme on the river. Similar issues with regard to fish passage arise. These consents require MIE to:

- Construct an adequate passage for native fish species, particular elver and lamprey; and
- Maintain an eel pass to enable elver passage above the weir or hydro race.

MIE constructed a fish pass after the grant of this consent, but it was swept away during a flood. MIE were then subsequently granted a consent in later 2015 to construct a new fish passage. This has not yet been installed, as MIE are undertaking a trap and transfer programme which has been in place for the past two years. This involves monitoring during the elver migration period, and if accumulations are located, trapping and transfer is undertaken.

This trap and transfer programme has also been investigated by Alliance and it appears that this is the more viable option for successful fish passage. Alliance will work with MIE on the recommended system. Details of the recommended transfer system are contained in Appendices F and G. Given the mitigation that is in place and is proposed, the effects on upstream fish passage are considered to be minor.

In terms of downstream fish passage, the most at risk species in this regard is adult eels. Migrating eels can be potentially entrained into water intakes where they can be trapped against protective screens, or pass through turbines which is likely to be fatal. Although Alliance has no evidence that its hydroelectric power scheme is causing any adverse effects on adult eel migration downstream, it is a potential effect that needs to be considered.

In this regard, Alliance has consulted with the Southland Eel Industry representatives and Iwi in order to determine the most appropriate means to manage any potential adverse effect on downstream adult eel migration.

As outlined in the Golder's Report attached as Appendix E, adult eels commence their migration to the sea in the autumn. Migration also usually occurs at night during high flow conditions. Given these known factors, Alliance is proposing to shut down the plant during these optimal migration conditions, that is to cease night time generation during fresh/flood events during March and April, when river flows increase by more than 50% from the preceding day's flow. Once implemented, the nightly shutdown obligations will remain in place until such time as the flood peak has passed, and for two consecutive night after. Such an approach would require real-time flow monitoring data to be available from the Mataura River, in close proximity to the site (Tutura Enviroment Southland flow gauging site).

This will significantly reduce the potential effects of turbine mortality and such an approach has the support of key stakeholders.

5.1.5 Effects on Cultural Values

The Mataura River is significant to Maori. This has been recognised in statute under the Ngai Tahu Claims Settlement Act 1998. The Mataura River is identified as a Statutory

Acknowledgement Area under that Act and contains a Mätaitai Reserve. A Statutory Acknowledgement is a formal acknowledgement by the Crown that recognises the particular cultural, spiritual, historical and traditional association of Iwi with a site of significance or resource identified as a statutory area. Under the RMA, Deeds of Settlement and Settlement Legislation achieved with each Iwi, regional, city and district councils are required to include statutory acknowledgments in relevant district and regional plans and policy statements, and to have regard to them in resource consent decision making.

In the traditional Maori worldview, water is viewed as a taonga or treasure. It sustains life and is central to Maori wellbeing. Both tangible and intangible aspects of water and waterways feature in all aspects of Ngai Tahu culture. Waterways provide a range of resources including food and cultural materials that sustain cultural functions. In some cases, specific resources (e.g. eels) serve as cultural symbols valued through a region.

A key Ngai Tahu resource management principle is the maintenance and enhancement of mauri or life force/life principle. Promoting the mauri of a river will sustain healthy ecosystems, support a range of cultural uses, and reinforce the cultural identity of the people.

The mahinga kai custom under-pins Ngai Tahu culture. It is central to the relationships with places, species and resources, to the cultural, spiritual, social and economic well-being of Ngai Tahu and is vehicle for the transfer of traditional knowledge from generation to generation. Mahinga kai refers to the custom of gathering food and natural resources, the practices involved, and the places where they are gathered.

As recognised by the Mätaitai Reserve the Mataura River remains an important mahinga kai for Ngai Tahu because of its use as an access route for gathering of pounamu. The river was also particularly noted for the gathering of kanakana (lamprey) particularly around the Mataura Falls.

Alliance has engaged with Te Ao Marama and the key issue identified relates to the potential effects on fish passage of native fish species. As discussed above in order to mitigate the potential effects on upstream fish passage a trap and transfer system is proposed. Closing the plant during optimal downstream adult eel migration periods is also proposed in order to mitigate any potential adverse effects on downstream fish passage. Alliance has discussed these proposals with Te Ao Marama and they indicate that it appears to be an acceptable method of managing potential effects.

5.1.6 Recreational Effects

The part of the river affected by the proposed diversion, use and discharge of water is already heavily modified and access to the area is difficult due to the presence of the existing industrial activities and infrastructure in and around the river in this location.

The Mataura River is recognised as a nationally important brown trout fishery, and in its lower reaches a regionally important whitebait fishery. Data shows that the overall trout fishery in the catchment appears to remain strong and is of high quality and is not being directly affected by the presence of the weir structure and diversion activities.

5.1.7 Effects on Natural Character, Amenity and Landscape Values

The part of the Mataura River affected by the proposed diversion, use and discharge of water is highly modified with substantially reduced natural character values. Both sides of the river are dominated by large industrial complexes that have large purpose built industrial buildings.

The existing weir and diversion channels have also reduced the existing natural character values of this part of the river. These existing activities modify a localised and confined section of the river. These physical modifications have a minor effect on the natural character of the wider river and landscape values.

The proposal will maintain a minimum flow of 50mm over the weir and will preserve the existing functioning of the river below the diversion and over the falls. Flood flows will be unaffected by the proposed weir and diversion. Upstream and downstream fish passage will be managed in accordance with a trap and transfer system, and a requirement to close the plant during optimal downstream adult eel migration periods.

Overall it is considered that the adverse effects of the proposal on natural character, amenity and landscape values are minor.

5.2 OVERALL EFFECTS ASSESSMENT

In summary, it is concluded that the environmental effects of the ongoing operation of the weir and diversion for hydroelectric generation purposes will not be significant and will be appropriately managed via consent conditions (refer Appendix H).

6. PLANNING AND POLICY ASSESSMENT

This section sets out the relevant statutory considerations for Environment Southland to consider when assessing the proposed activities.

As set out above in section 4 of this report, the proposed diversion and use of water is a restricted discretionary activity under the Operative Water Plan, and a discretionary activity under the Proposed Water and Land Plan. Although the weighting to be placed on the provisions in the Proposed Water and Land Plan is considered to be very low, an assessment of the proposal against the requirements of section 104 and 104B as a fully discretionary activity has been undertaken below.

6.1 SECTION 104 ASSESSMENT

Section 104 requires that when considering an application for a resource consent, the consent authority must, subject to Part 2 of the RMA, have regard to:

(a) Any actual or potential effects on the environment of allowing the activity; and

(b) Any relevant provisions of –

- *(i) A national environmental standard;*
- *(ii) Other regulations;*
- *(iii) A national policy statement;*
- *(iv) A New Zealand Coastal Policy Statement;*
- *(v) A regional policy statement or proposed regional policy statement;*

(vi) A plan or proposed plan; and

(c) Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

The relevant matters are set out and discussed below.

6.2 NATIONAL ENVIRONMENTAL STANDARDS (NES)

The only potentially relevant NES is the Drinking Water Standard. The proposal will not alter the downstream water quality in any significant way and will therefore not affect any downstream drinking water sources.

6.3 NATIONAL POLICY STATEMENTS

6.3.1 National Policy Statement for Renewable Electricity Generation 2011 (NPS for Renewable Electricity Generation)

The NPS for Renewable Electricity Generation sets out the objective and policies for renewable electricity generation under the RMA.

The overarching objective sets out:

> *To recognise the national significance of renewable electricity generation activities by providing for the development, operation, maintenance, and upgrading of new and existing renewable electricity generation activities, such that the proportion of New Zealand's electricity generated from renewable energy sources increases to a level that meets or exceeds the New Zealand Government's national target for renewable electricity generation.*

Policy A requires decision makers to recognise and provide for the national significant of renewable electricity generation activities, including the national, regional and local benefits relevant to renewable electricity activities. These benefits include, but are not limited to:

- Maintaining or increasing electricity generation capacity while avoiding, remedying, or mitigating or displacing greenhouse gas emissions;
- Maintaining or increasing security of electricity supply at local, regional and national levels by diversifying the type and/or location of electricity generation;
- Using renewable natural resources rather than finite resources;
- The reversibility of the adverse effects on the environment of some renewable electricity generation technologies;
- Avoiding reliance on imported fuels for the purposes of generating electricity.

Policy F of the NPS requires regional policy statements, and regional and district plans to include objectives, policies and methods (including rules) to provide for the development, operation, maintenance and upgrading of small and community scale distributed renewable electricity generation.

The Plant is a significant user of electricity and the hydro scheme enables it to generate a significant amount of electricity for its use. It provides an additional electricity supply for the Plant and means that powering the Plant does not place significant constraint on any

other local, regional or national community electricity supplies. The electricity is also produced via a non-polluting source and this is consistent with the intent of the NPS to promote the use renewable electricity sources.

6.3.2 National Policy Statement for Freshwater Management 2014

The NPS for Freshwater contains objectives and policies relating to the management of water quality and water quantity throughout New Zealand.

Objective A1 recognises the role fresh water plays in sustaining life, both for people and for ecosystems more generally. Recognising this role, and safeguarding the ability of fresh water to support life and human health through the sustainable management of water quality, is an important part of recognising the national importance of freshwater and Te Mana o te Wai.

Objective A2 seeks that overall water quality within a region is maintained or improved.

Policy A1(a) requires regional councils to set freshwater objectives and quality limits, and (b) to establish methods to avoid over-allocation. This policy is closely linked to Policy A2, which sets out a process for setting freshwater objectives. The process involves identifying values that are relevant to a Freshwater Management Unit (FMU), identifying attributes that provide for those values, and setting freshwater objectives for those attributes. Setting limits for water quality involves determining the maximum resource use that will enable a chosen freshwater objective to be met.

Policy A3(a) requires conditions to be imposed on discharge permits to ensure the limits and targets can be met.

The discharge of surface water will have no adverse effects on downstream water quality, as it is simply the transfer of water via the weir and through the turbine. There will be no changes to the chemical or biological composition of the receiving water quality as a result of this discharge. Water quality monitoring has not identified any downstream effects that are directly attributable to the diversion and discharge activity, and overall results indicate that there is a no more than minor change with regard to water quality parameters that have been measured.

The discharge of surface water will not adversely affect the Council or community's ability to achieve the water quality objectives and standards that are to be set for the Mataura River FMU.

The Freshwater NPS sets out objectives for water quantity, which are aimed at:

- Sustainably managing the taking, using, damming or diverting of freshwater to safeguard the life supporting capacity, ecosystem processes and indigenous species;
- Avoiding any further over-allocation of fresh water and phase out existing over-allocation;
- Improving and maximising the efficient allocation and efficient use of water; and
- Protecting significant values of wetlands and outstanding freshwater bodies.

The ensuing policies require regional councils to establish freshwater objectives and to set environmental flows and/or levels for all FMUs, to ensure that the efficient allocation of water resources is achieved, and that over-allocation is avoided.

The existing diversion does not result in over allocation issues within the Mataura River. As consent is being sought on the same terms, it is also consistent with the flows and limits set out in the Mataura River WCO. The majority of the water is also returned downstream, meaning water is available for additional use downstream of the site. There is a section of river which is affected by the diversion, however the minimum flow that is proposed, will retain its existing life supporting capacity, habitats and aquatic ecology. Appropriate mitigation is also proposed to ensure native fish passage is not adversely affected by the proposal.

6.4 SOUTHLAND PROPOSED REGIONAL POLICY STATEMENT

With the exception of the biodiversity chapter of the Proposed Southland Regional Policy Statement (Proposed RPS), this policy statement is considered to carry greater weight than the operative Southland RPS. Nevertheless, the operative RPS contains similar themes and the assessment of the proposal against the objectives and policies of the proposed RPS is considered to cover these issues as well.

Chapter 3 of the Proposed RPS relates to tangata whenua. Objective TW.1 and Policy TW.1 seek that the principles of the Treaty of Waitangi / Te Tiriti o Waitangi are taken into account in a systematic way through effective partnerships between tangata whenua and local authorities, which provide for the capacity for tangata whenua to be fully involved in council decision making processes.

Objective TW.2 seeks that Iwi management plans are taken into consideration in resource management processes and decisions. Objective TW.3 seeks that mauri and wairua are sustained and improved where degraded, and mahinga kai and customary resources are healthy, abundant and accessible.

Relevant policies seek that tangata whenua are involved in resource management decision making in order to recognise and provide for places, sites and values that are of cultural, spiritual or historic significance.

Alliance has consulted with Te Ao Marama, who have expressed concerns about the upstream migration impacts of the weir for native fish species. The proposed trap and transfer system has been discussed with Iwi and it is agreed as an acceptable approach to this potential effect. There are no other matters of significant concern. Any adverse effects on downstream adult eel migration will also be mitigated by a proposal to shut the plant down during optimal migration periods.

Chapter 4 provides for the management of water within the region. Part A relates to water quality. Objective WQUAL.1 sets out the water quality goals and seeks that water quality safeguards the life supporting capacity of water and related ecosystems; safeguards the health of people and communities; is maintained or improved in accordance with the objectives developed in accordance with the Freshwater NPS; and is managed to meet the reasonably foreseeable needs of social, economic and cultural needs of future generations.

As set out above, water quality will not be adversely affected as a result of this proposal, and it will certainty not affect the Council's or the community's ability to seek to achieve an overall improvement in the region's water quality.

Part B relates to water quantity. Objectives seek to sustainably manage the region's freshwater resources by safeguarding the life supporting capacity of water, catchments and related ecosystems; support the maintenance improvement of water quality; meets the needs of a range of uses; and comply with limits or targets set out to achieve freshwater objectives. Objective WQUAN.2 seeks that the allocation and use of water is efficient.

Relevant policies seek that water quantity maintains instream values and to avoid over-allocation.

Policy WQUAN.3 seeks to recognise the finite nature of water resources and to provide for freshwater objectives that derive from flow and levels of water; avoid as far as practicable, and where it is not, remedy or mitigate adverse effects of activities on flows and levels; provide for the current and reasonably foreseeable future needs, and the social, economic and cultural wellbeing of people and communities, and recognise the potential effects of climate change on flows and levels of water and on water availability.

Policy WQUAN.6 requires that water that is taken is used efficiency, and that where fresh water bodies are approaching full allocation, consideration is given to establishing management provisions to maximise the benefits of using any available water. Policy WQUAN.7 seeks to recognise the social, economic, and cultural benefits that may be derived from the use, development or protection of water resources.

As noted above, the proposed diversion of water will not give rise to adverse effects on allocation, nor will it have a significant impact on river hydrology, flows and levels. This is due to the proposed retention of the minimum flow over the weir and falls, and the return of water downstream.

Part C relates to the management of beds of lakes and rivers. Objectives seek that all significant values of lakes and rivers are maintained and enhanced and that public access is maintained and enhanced where necessary, to ensure a level of public access appropriate to the values of the area. The existing level of public access in and around Alliance's activities will remain unaltered.

The weir and associated infrastructure is already existing, and the maintenance activities that are proposed are necessary to ensure the existing hydro race and water intake infrastructure is functioning efficiently and effectively. Alliance is proposing to implement appropriate management measures, including the timing of any proposed maintenance and clearance activities, to effectively avoid, remedy or mitigate any adverse effects on the receiving water body.

Chapter 16 relates to Energy. Objective ENG.2 provides that the use, development, transmission and distribution of local and regional energy resources is undertaken where the adverse effects on the environment including communities are avoided, remedied or

mitigated, or where appropriate, and such measures are volunteered by the resources user, offset or compensated for.

Objective ENG.3 seeks that the generation and use of renewable energy is increased.

Policy ENG.2 seeks to recognise and provide for the development of renewable energy activities, and to recognise their benefits. Policy ENG.3 is specifically relevant here, and seeks to encourage and make provision for the development, operation, maintenance and upgrading of small and community scale distributed renewable electricity generation.

As noted above, the proposal seeks to divert water and undertake associated activities for the purposes of generating hydroelectricity. It is a small scale scheme which provides electricity needs directly to the Plant. This creates significant efficiencies for the Plant. The RPS observes that small and community scale distributed renewable electricity generation has the benefit of increasing reliability of energy supply and reducing risk of energy supply failure for individuals and communities.

Any potential effects arising from this activity on the receiving water body are mitigated via the minimum flow that is proposed, and the timing and management of the hydro-race clearance. The weir itself, although already existing, could create an obstacle for some native fish species and as such a trap and transfer system is being proposed to manage any potential effects in this regard.

6.5 REGIONAL PLANS

6.5.1 Operative Regional Water Plan

The Water Plan applies to freshwater resources of the Southland Region. It also applies to all land in river and lake beds, and to all types of activities that use freshwater, or discharge to freshwater, or that are in the beds of rivers and lakes.

6.5.1.1 Water Quality Objectives and Policies

Objective 2 seeks to manage water quality so that there is no reduction in the quality of water in any surface water body, beyond the zone of reasonable mixing for discharges, below that of the date below that of the date the Plan became operative (January 2010). Objective 3 similarly requires the maintenance and enhancement of water quality so that certain values are protected where water quality is already suitable for them to occur, and where not, measurable progress is achieved towards making it suitable for such activities (bathing, trout, native fish, stock drinking water, Ngai Tahu values, natural character).

There will be no reduction in the quality of water discharged via the diversion and turbine.

Objective 5 requires sufficient water to support the reasonably foreseeable needs of current and future generations and enable people and communities to provide for their social, economic, and cultural wellbeing while protecting aquatic ecosystem health, life supporting capacity, natural character and historic heritage values of surface water bodies.

The proposed diversion and associated activities enable Alliance to use water to generate hydroelectricity. The Plant is a significant power consumer and the ability to generate onsite power provides significant efficiencies and benefits. Natural character of the reach

affected by the diversion is already significantly reduced, due to the large scale industrial buildings and instream modifications that have occurred as a result of the establishment of these works. No changes to the scale or nature of the existing activities is proposed as part of this proposal.

A minimum flow of 50mm will be retained over the weir and downstream, and the water diverted to the HEP will be returned to the river. Maintaining this minimum flow will ensure that the reach affected by the diversion activities continues to support any existing habitat and ecosystems. The proposed discharges will also not adversely affect the downstream water quality to a point where the aquatic ecosystem is altered or life supporting capacity of the river becomes limited.

Objective 7 requires that water efficiency is maximised. The proposal is essentially a run of the river scheme, whereby the water diverted and used for hydroelectric generation is returned to the waterbody at a point downstream. Water that is diverted is also taken for processing requirements of the Plant, and that has been approved under consent 204126. The generation takes advantage of the natural fall of the river, which is an efficient use of the resource.

Objective 10 seeks to maintain or enhance the diversity and integrity of aquatic and riverine habitats and ecosystems. A minimum flow of 0.05 m over the weir and within the reach affected by the diversion is proposed. This will ensure that any existing aquatic habitats and ecosystems are provided for in the affected reach, and further downstream.

Objective 11 seeks to protect significant historic heritage values from the adverse effects of activities in the beds of rivers and lakes. The Mataura River is a Statutory Acknowledgement Area, as well as including a Mātaitai Reserve and is valued by Maori. The key effects in this regard relate to fish passage issues and water quality. The weir may present some passage difficulties for certain native fish species, and this is proposed to be addressed by establishing a trap and transfer system. There is the potential for adult eels during their downstream migration to be caught in the water take and hydro plant, however this potential effect is proposed to be mitigated by shutting down the hydrogeneration plant during optimal conditions for the migration of adult eels.

Objective 12 seeks to maintain and enhance public access to river beds (including beds of streams and modified watercourses) and lakes beds except in circumstances where public health and safety are at risk. Public access to this area of the Mataura River is constrained due to the presence of the existing industrial activities and rocky areas of the river. There are potential health and safety issues with enabling or encouraging public access to this area of the river and as such it is not proposed. This is consistent with the exemption provided for in the objective.

Objective 13 relates to natural character and seeks that it is protected from inappropriate use and development. The natural character of this part of the river has been heavily modified due to the existing industrial activities and infrastructure within and adjacent to the river. Alliance is seeking to continue to operate its existing activities, and will not introduce any new or additional elements to this environment. The proposal is also seeking to divert and use water for hydroelectric generation purposes, which by its nature requires a riverine location in which to function. Natural characteristics of the river, such as

retaining a minimum flow of water over the falls and affected reach, assisting upstream and downstream fish passage and aquatic habitat will not be altered as a result of this proposal. Given this it is considered that it is not an inappropriate use or development of this area of the river.

Policy 1A seeks to take into account Iwi management plans. An assessment of the relevant Iwi management plan is undertaken in section 6.6 to this report.

Policy 1 relates to surface water body classes and quality and seeks to apply water quality standards established under any Water Conservation Order. Related policies seek that there is no reduction in water quality beyond a zone of reasonable mixing, and that the discharge from an artificial watercourse should not cause a reduction in water quality below the standards set in Appendix G in the receiving downstream water body, following a zone of reasonable mixing. Policy 8 prefers that discharges of contaminants to water occur at times of high flow.

The Mataura River WCO provides a long term management framework aimed at preserving the existing water flows and water quality in the Mataura River and its tributaries, thereby preserving its fisheries and amenity values. The objective of the WCO is to maintain the existing *"outstanding fisheries and angling amenity features"*. The WCO outlines provisions which must be accommodated within RMA 1991 documents and resource consents. As an overview, the provisions of the WCO of relevance to this application include:

- minimum water quality conditions, which are repeated in Appendix G of the Regional Water Plan ('Mataura 3')
- where it is impracticable in a temporary situation for maintenance activities to require compliance with the minimum water quality conditions, Environment Southland can grant water and discharge permits
- to gain a discharge permit, discharges are to be substantially free from suspended solids, grease and oil, and/or to be temporary maintenance works only.

The proposed discharge of surface water will not result in any changes to the receiving water quality as it is essentially transferred via the weir and turbine to a point further downstream.

Policy 14 seeks to recognise the positive effects resulting from the use and development of water resources, while also seeking to avoid where practicable, remedy or mitigate significant adverse effects on:

- the quality and quantity of aquatic habitat;
- natural character, natural features, and amenity, aesthetic and landscape values;
- areas of significant indigenous vegetation and significant habitats of indigenous fauna;
- recreational values;
- the spiritual and cultural values and beliefs of the tangata whenua;
- water quality, including temperature;

- the rights of lawful existing users;
- groundwater quality and quantity;
- historic heritage.

Positive effects arising from the diversion and use of water include the generation of electricity to use for the Plant. As discussed above, the Plant is a significant user of electricity and there are a number of efficiencies associated with being able to source electricity from its own hydroelectric generation plant. The proposed diversion will maintain a minimum flow of 50mm over the weir which will continue to support the existing quality and quantity of aquatic habitat within the affected reach. The discharge of surface water arises from the diversion and transfer of water through the turbine and will not in any significant way alter the water quality that is received downstream. To ensure the weir does not contribute to cumulative adverse effects on the ability of native fish to migrate upstream, a trap and transfer system has been recommended as being the most viable option and will remedy any adverse effects in this regard.

Policy 15 requires that the allocation, minimum flow and level regimes established under any WCO are applied. The proposal will not affect the minimum flow requirements set out in the Mataura River WCO.

Policy 19A relates to damming, diversion and the use of water for the development of renewable energy and requires that particular regard is given to the benefits to be derived from such activities.

As discussed above, the proposal will result in positive effects in terms of efficiencies for the Plant, and being a renewable energy resource will not give rise to polluting effects on the environment.

Policy 32 relate to the management of structures and bed disturbance activities and seeks that adverse effects are avoided, remedied or mitigated. The proposal will utilise existing structures, and the only disturbance relates to maintenance activities, such as the clearance of sediment within the hydro-race, which can be undertaken as a permitted activity. Any maintenance activity is minor, temporary and is undertaken during appropriate flow conditions to appropriately manage any potential adverse effects.

6.5.1.2 Proposed Southland Water and Land Plan

The Proposed Water and Land Plan was notified in June 2016. This Plan contains objectives, policies and rules relating to the management of water and land resources in Southland. At the time of writing this report submissions on the proposed Plan are yet to be heard.

Objective 2 sets out that water and land is to be recognised as an enabler of the economic, social and wellbeing of the region. The proposal enables Alliance to continue to utilise existing infrastructure to generate power for the Plant activities and operations.

Objective 3 seeks that the mauri of waterbodies provide for te hauora o te tangata (health of the people), te hauora o te taiao (health of the environment) and te hauora o te wai (health of the waterbody). Objective 4 requires that tangata whenua values and interests

are identified and reflected in the management of freshwater and associated ecosystems. Objective 5 seeks that Ngai Tahu have access to and sustainable customary use of both commercial and non-commercial, mahinga kai resources, nohoanga, Mätaitai and taiapure.

Alliance has undertaken consultation with Iwi, and the key concern identified relates to the issue of fish passage both upstream and downstream. With respect to upstream migration, a trap and transfer system is proposed. This will assist in the facilitation of upstream migration for any native fish species. Adult eels migrating downstream have been identified as being at risk of being adversely affected by entering the intake and turbines. This potential effect is going to be mitigated by shutting down the plant during optimal migration periods. This is considered appropriate by the eel industry as well as Iwi.

Objective 6 sets out that there is no reduction in the quality of freshwater by maintaining water quality where it is not degraded, and improving it where it has been degraded by human activities. The proposal will not give rise to discharges that will cause a reduction in downstream water quality.

Objective 7 relates to overallocation and seeks that this is avoided, and phased out within established timeframes. The scheme is essentially a run of the river proposal and the majority of the water taken is returned to the river downstream. This enables other users to access this water downstream of the site. It is not proposed to increase the amount of water diverted as part of this proposal and as such it will not contribute to any additional over allocation issues within the catchment.

Objective 9 seeks that the quantity of water in surface waterbodies is managed so that aquatic ecosystem health, life supporting capacity, outstanding features, recreational values, natural character and historic heritage values of surface waterbodies and their margins are safeguarded. The second part of this objective requires that water is available both instream and out-of-stream to support the reasonable needs of people and communities to provide for their social, economic and cultural wellbeing.

Objective 14 seeks that the range and diversity of indigenous ecosystem types and habitats, and their life supporting capacity are maintained and enhanced.

The water is necessary to enable the Plant to operate efficiently, as a run of the river scheme it will also mean that downstream the effects of the diversion and associated activities are not detectable. Within the affected reach of the river where water is diverted, a minimum flow regime will ensure that the existing aquatic ecosystem health and life supporting capacity is maintained. Although it is apparent that the weir is not having a significant adverse effect on upstream fish passage, any potential effect could be remedied by a trap and transfer system that is being proposed by Alliance. Potential effects on downstream eel migration in particular will be mitigated by avoiding operation during optimal migration periods.

Objective 15 seeks that taonga species, as set out in Appendix M, and related habitats, are recognised and provided for. As noted native fish species may find difficulties in achieving upstream migration, due to the presence of the falls and also the weir. Given this Alliance is proposing a trap and transfer system to remedy any potential adverse effects.

Objective 16 relates to the public access to waterbodies and seeks that this is maintained, except in circumstances where public health and safety are at risk. As discussed above, public access in the area is already constrained and it is not considered appropriate to actively provide or encourage this due to the health and safety issues that could arise.

Objective 17 requires that the natural character values of waterbodies including its channel form, seasonably variable flow and natural habitats, are protected from inappropriate use and development. These features will be protected via the minimum flow that is proposed, as well as allowing flood flows to continue over the falls. The proposal is not considered to be inappropriate.

Policies 1 and 2 seek to enable papatipu runanga to participate in freshwater and lands management throughout Southland and to take into account Iwi management plans. As discussed above Alliance has consulted with Iwi, who have identified the key issues arising from this proposal from their perspective. An assessment against the relevant Iwi management plan is undertaken in section 6.6.

A number of policies seek to maintain and enhance water quality throughout the region and refer to the obligations inherent in the Freshwater NPS. As noted above no significant effects of changes to existing water quality are anticipated as result of these activities.

Policy 20(1) seeks to manage the taking, abstraction, use, damming or diversion of surface or groundwater so as to avoid, remedy or mitigate adverse effects on a number of considerations including aquatic habitat, natural character, recreational values and water quality.

Policy 20(4) seeks to recognise the positive effects resulting from the use and development of water resources.

Policy 21 relates to water allocation and requires that provisions of any water conservation order are considered in determining over allocation.

Policy 26 is specific to renewable energy and seeks to recognise and provide for the national, regional and local benefits relevant to such activities when allocating water and in considering all resource consent applications for surface water abstractions, damming, diversion and use.

These policies are similar to those which are contained in the operative Water Plan and the assessment undertaken above applies equally here.

6.5.1.3 Overall Assessment

Overall it is considered that the proposal is generally consistent with relevant objectives and policies of both the operative Regional Water Plan and the proposed Water and Land Plan for the following reasons:

- A minimum flow of 50mm over the weir will be maintained. This will ensure that there is a continuous flow of water over the falls and will provide for the existing aquatic habitat and life supporting capacity within the affected reach of the river.

- The natural character of the area has been modified with the existing industrial activities, weir and other modifications that have occurred to this part of the river over the past 100 years. The proposal will not alter the current situation and will therefore not contribute to any further or additional adverse effects on natural character values, landscape and visual amenity.
- The area is not used for recreational activities, however downstream of the existing weir and industrial activities, the Mataura River is recognised as being a significant trout fishery and also used for white baiting. The effects of the existing diversion and associated discharge activities are therefore not considered to be having any adverse effects on these resources or activities. Consultation with the Wyndham Angling Club has not identified any issues with what is proposed.
- The proposed discharges will not alter or cause any reduction in water quality downstream of the site, beyond a zone of reasonable mixing. The discharge of surface water is simply a transfer of upstream receiving water via the weir and turbine to a point further downstream. Aside from some trace contaminants that might be transferred via the turbine, the proposal will not alter the quality of the water.
- Fish passage could be constrained by the existing weir and hydro generation infrastructure which is of concern to stakeholders, particularly Iwi. Alliance has consulted with Te Ao Marama about its proposal to implement a trap and transfer system to assist in native fish species upstream migration. Adult eels migrating downstream are at risk of entering the intake and turbines. As set out in Appendix E, this risk can be mitigated by avoiding operation of the hydro plant during certain seasonal and flow conditions in the river which provide optimal migration for these species. These methods are supported by Te Ao Marama as an appropriate mitigation for any potential effects on fish passage.
- The proposal will enable Alliance to continue to operate its small scale hydroelectric generation plant which in turn provides efficiencies and significant benefits for the Plant. It is also a non-polluting form of energy generation.

6.6 OTHER RELEVANT MATTERS

The Mataura River, and surrounding land, has had a long association with Iwi.

A Statutory Acknowledgement exists for the Mataura River in Schedule 42 of the Ngai Tahu Claims Settlement Act 1998. This Statutory Acknowledgement outlines Ngai Tahu's association with the Mataura River. Above the Mataura Falls the river was traditionally used by the descendants of the Ngati Mamoe chief, Parapara Te Whenua, along with other famous tupuna. The Statutory Acknowledgement states that:

> *"The Mataura was an important mahinga kai, noted for its indigenous fishery. The Mataura Falls were particularly associated with the taking of kanakana (lamprey). The tupuna had considerable knowledge of whakapapa, traditional trails and tauranga waka, places for gathering kai and other taonga, ways in which to use the resources of Mataura, the relationship of people with the river and their dependence on it, and tikanga for the proper and sustainable utilisation of resources. All of these values remain important to Ngai Tahu today.*
>
> *The mauri of the Mataura represents the essence that binds the physical and spiritual elements of all things together, generating and upholding all life. All elements of the natural environment*

possess a life force, and all forms of life are related. Mauri is a critical element of the spiritual relationship of Ngai Tahu Whanui with the river."

The maintenance of water quality and quantity are paramount resource management issues to Ngai Tahu. The Ngai Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008 states that "*water is a taonga, or treasure of the people*". It goes on to say that *"It is the kaitiaki responsibility of tangata whenua to ensure this resource is available for future generations in as good as, if not better quality"*.

As set out earlier in this report, the Mataura River is also subject to the Mätaitai Reserve. This reserve status recognises the importance of the river as providing a mahinga kai resource for Ngāi Tahu Whänui because of its use as an access route between coastal Murihiku (Southland) to Fiordland and the West Coast for the gathering of pounamu. The Mataura was particularly noted for the gathering of kanakana (lamprey) and tuna (eels), with annual fishing expeditions in season to favoured nohoanga (campsites) along the river. The bylaw for the reserve prohibits commercial fishing within the area. Customary fishing is permitted subject to approval.

The Ngai Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008 record of archaeological sites also identifies the Mataura Falls as a site of significance to Iwi, which is in the immediate vicinity of the weir and hydro-race.

The Southland Murihiku Conservation Management Strategy also recognises that Ngai Tahu have a special relationship with the Mataura River.

As discussed above, Alliance has consulted with Te Ao Marama and the key issue with regard to these applications, is fish passage upstream and downstream. The mitigation that is proposed to manage these potential effects is considered appropriate in this regard.

Freshwater Fisheries Regulation

Regulation 43 of the Freshwater Fisheries Regulation 1983 requires those seeking to construct dams to seek approval or dispensation from the Regulations by notifying the Director General, Department of Conservation, who may require that fish pass facility is constructed. This regulation however, does not apply to any dam or diversion structure which is subject to a water right issued under the provisions of the Water and Soil Conservation Act 1967 prior to 1 January 1984. Alliance Group Limited holds a water right issued in accordance with the Water and Soil Conservation Act 1967, a record of which is attached as Appendix J. Although Alliance is exempt from having to seek approval or dispensation from the Director General in accordance with these regulations, fish passage issues have been considered as discussed in this application and a suitable solution is being proposed in this regard.

6.7 SECTION 104(2A)

This section of the RMA requires a consent authority when considering an application to renew an existing activity, has regard to the value of the existing investment by the consent holder.

In this regard the HEP and hydro-race are key components of the overall operation of the Plant.

The Mataura township with a population of 1740 (2001 census) is a residential centre servicing surrounding farmland and a number of large industries including the Mataura Plant. The Mataura Plant is a vital component of the local and regional economy employing approximately 485 people in the peak of the season and contributing approximately $96 million per year to the economy (mostly in livestock payments) and approximately $20 million per year for wages and salaries.

On average the hydro plant produces approximately 72,000 kW of energy per week, this converts to around $35,000 worth of electricity savings for the Plant per month. This is a significant resource for the Plant.

The existing weir, HEP and associated infrastructure have also been in place for over a century and enable the Plant to operate efficiently and effectively. Improvements and maintenance in the infrastructure has occurred overtime and the capital value of the weir, race, HEP and associated structures is approximately $4 million.

7. MATAURA RIVER WATER CONSERVATION ORDER

The Mataura River WCO provides a long term management framework aimed at preserving the existing water flows and water quality in the Mataura River and its tributaries, thereby preserving its fisheries and amenity values. The objective of the WCO is to maintain the existing *"outstanding fisheries and angling amenity features"*. The WCO outlines provisions which must be accommodated within RMA 1991 documents and resource consents.

As set out in section 2.4, the Mataura River WCO prohibits the damming or diversion of waters, unless on the same terms as an existing permit. There are no changes proposed to the damming or diversion activity and resulting minimum flows, therefore the proposal will achieve this requirement.

With regard to the discharges, the provisions of the WCO seek that minimum water quality standards are achieved, and in order to gain a discharge permit, it must be substantially free from suspended solids, grease and oil, and/or to be temporary maintenance works only. The proposed discharge of surface water will not have any material effect on water quality downstream.

It is considered that the proposal will achieve consistency with the requirements of the WCO.

8. SECTION 105 ASSESSMENT

Section 105(1) of the RMA sets out the matters that a consent authority must have regard to when considering a resource consent application for a discharge permit. In particular, consideration needs to be given to the nature of the discharge and the sensitivity of the receiving environment to adverse effects, the Applicant's reasons for the proposed choice, as well as any possible alternative methods of discharge, including discharge into any receiving environment.

The nature of the discharge has been described in section 3 and in the AEE. The proposed discharge of surface water will have no material effect on the water quality downstream. It is a necessary component of operating the hydroelectric generation plant.

9. SECTION 107 ASSESSMENT

Section 107 of the RMA places a restriction on the grant of discharge permits to water, if after reasonable mixing, the contaminant or water discharged is likely to give rise to all or any of the following effects in the receiving waters:

- The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
- Any conspicuous change in the colour or visual clarity;
- Any emissions of objectionable odour;
- The rendering of freshwater unsuitable for the consumption by farm animals;
- Any significant adverse effects on aquatic life.

The proposed discharge of surface water will not result in any of these effects.

10. OVERALL PART 2 ASSESSMENT

Under section 104, the consideration of any application is subject to Part 2 of the RMA which sets out the purpose and principles of the RMA.

The promotion of sustainable management often requires a balance between competing resource values and the benefits and adverse effects associated with a proposal.

In terms of section 5 of the RMA, enabling Alliance to continue to divert and use water for the purposes to generate hydroelectricity, and undertake the associated discharge activities, will enable people and communities to provide for their social, economic and cultural wellbeing by:

- Enabling the Plant to continue to operate efficiently and effectively by providing a direct electricity supply using existing infrastructure;
- Increasing the reliability of energy supply and reducing the risk of failure for individuals and communities using other community based supplies;
- Utilising a renewable energy source which is non-polluting;
- Recognising the significant investment that exists with respect to the existing Plant infrastructure and activities.

The proposed activities will not give rise to adverse effects to a point where the life supporting capacity of the receiving water body is constrained.

In terms of the relevant matters in sections 6, 7 and 8:

- Natural character of the river reach affected by the proposal has been significantly modified, however the minimum flow that is retained over the weir provides the

affected reach with an appropriate level of water to maintain existing habitat and aquatic ecology. Upstream and downstream fish migration will be provided for via the mitigation proposals that are outlined in this application (refer Appendices E and F). The nature of the activity, being a hydroelectric scheme requires a river environment, and for the reasons set out above it is not considered to be an inappropriate activity.

- The proposed discharges will not have any adverse effects on downstream water quality or aquatic ecosystems that are any more than minor.
- Enabling the ongoing use of existing infrastructure which will in turn enable the Plant to operate effectively is also considered to be an efficient use of existing resources.
- The proposal will not impact upon amenity values. In this instance, the exiting river environment has already been altered by the presence of the weir, and the industrial plants and associated activities adjacent to and within the river. The proposal will not result in any changes in this regard.
- The proposal will enable the ongoing use of a renewable energy resource to provide direct power for the Plant.
- The lower Mataura River is recognised for its significant trout population, the activities are therefore not considered to be having any adverse effects on this resource.

Overall it is considered that the proposal is consistent with the relevant matters in section 5, 6, 7 and 8 of the RMA.

11. CONSULTATION AND NOTIFICATION

11.1 CONSULTATION UNDERTAKEN

11.1.1 Environment Southland

Alliance has had three pre-application meetings[1] with Environment Southland staff to discuss the proposal. The nature of the proposed application was discussed and other than aspects that needed to be considered in the application, and who might be need to be consulted with, there were no particular issues or concerns raised.

11.1.2 Southland Fish and Game

A meeting with Southland Fish and Game was held on 25 November 2016. The proposal was discussed, and Fish and Game queried whether the Freshwater Fisheries Regulation 1983 apply. This was considered and is discussed in section 6.6 of this report. Fish and Game also questioned whether there were any downstream issues relating to fish passage. This was considered and is addressed in section 4.3 of the Golder Report (Appendix E) in particular. Fish and Game did not raise any issue with the proposed trap and transfer system as it is not particularly relevant to its interests.

11.1.3 Iwi

A meeting was held on 14 December with Stevie Rae-Blair and Rewi Anglem (Hokonui Runanga) representing Iwi. The key issues that were discussed during this meeting related to fish passage. There was general support for the proposal to shut down the hydroelectric

[1] 20 May 2016, 7 September and 11 November 2016.

generation during certain conditions to provide for downstream fish passage, and also support for the proposed trap and transfer system to provide for upstream fish passage. It was agreed to provide a copy of the application.

11.1.4 Mataura Industrial Estate

Consultation with MIE has been ongoing. MIE has no issues with the ongoing operation of the scheme and is supportive of the proposed trap and transfer system, which it is also proposing to implement.

11.1.5 Department of Conservation (DoC)

A meeting with a DoC representative was held on 28 November. The proposal was discussed and matters raised related to the maintenance requirements and protocols that would need to be adhered to during the race clearance (i.e. cleaning of equipment and machinery prior to desilting) and checks to ensure there are no fish stranded within the race.

Fish passage was also discussed. DoC questioned whether there were any issues with regard to downstream passage. As set out in section 5.1.4 of this report potential effects on downstream fish passage have been considered and mitigation is proposed. It was also queried whether the Freshwater Fisheries Regulations apply and as discussed in section 6.6, it is not considered relevant.

The proposed trap and transfer system was also discussed. DoC queried whether the possible predation of pools of elvers by rats could be an issue, and if so, can trapping or baiting be done. This is addressed in the reports attached Appendices F and G and in the draft Plan attached as Appendix H. DoC also requested further detail around the design of the fish trap. This information is also contained in Appendices F and G.

11.1.6 Mossburn Enterprises

A meeting was held on 6 December 2016 with Vic Thompson. Upstream and downstream fish passage matters were primarily discussed. Further detail around the upstream trap and transfer system were required and this has been provided in Appendices F and G. There was support for the proposal to shut down the hydroelectric generation plant for 2 to 3 days during flood events in March and April each year to address downstream eel passage.

11.1.7 Wyndham Angling Club

The Wyndham Angling Club representatives have indicated no issues with the proposal.

11.2 NOTIFICATION CONSIDERATIONS

Section 95 of the RMA states the provisions for determining the need for notification of a consent application. Section 95A(2)(a) states that Council must publicly notify the application if it decides that the "*activity will have or is likely to have adverse effects on the environment that are more than minor*". In all other circumstances, Council may determine whether to notify an application (section 95A(1)). Section 95D then goes on to clarify that for the purpose of determining whether effects will be more than minor pursuant to section 95A(2)(a), that Council must disregard any effects on persons who own

or occupy the application site or adjacent land. Council must also disregard any effect on a person who has given written approval to the relevant application.

As described in section 5 of this report, the proposed activity, coupled with the mitigation that is proposed (refer Appendix I), means that the adverse environmental effects are unlikely to be any more than minor. Accordingly, it is considered that Council can be satisfied that for the purposes of section 95A(2)(a) of the RMA the adverse effects on the environment are not more than minor.

Section 95B(1) of the RMA states that "if a consent authority does not publicly notify an application..., it must decide if there are any affected persons". Subsection (2) then states that "the consent authority must give limited notification of the application to any affected persons". Section 95E clarifies in subsection (1) that for a person to be an 'affected person' that the adverse effects on the person must be "minor or more than minor". Section 95E subsection (3) states that a person cannot be an 'affected person' if they have provided their written approval.

Given the consultation that has occurred to date, which indicates general support for the proposal and mitigation, it is not considered necessary in this instance to formally notify any affected parties. Having said that, if the Council is inclined to consider limited notification on certain stakeholders, Alliance would appreciate advance notice of this.

12. CONCLUSION

The proposal is to enable Alliance to continue to operate a weir and associated diversion and discharge activities in order to operate a hydroelectric generation plant and hydro race. These activities are existing and consent is being sought to renew the ongoing operation of these activities on similar terms and conditions as the original permits. This is a requirement of the WCO which applies to the Mataura River.

An assessment of environmental effects of the weir, diversion and discharge activities, including in relation to river hydrology, water quality, aquatic ecology, natural character and recreational activities concludes that the adverse effects of the proposal are unlikely to be any more than minor. Proposed consent conditions will also ensure that any mitigation or remediation that is required is successfully implemented (refer Appendix I).

The proposal has been evaluated pursuant to relevant objectives and policies of national and regional planning documents and concluded to be consistent with those provisions.

In line with that conclusion, the proposal is considered to be consistent with the purpose and principles of the RMA.

A

APPENDIX A

Existing Consent 98031

Application no. A024-004

Consent no. 98031

SOUTHLAND REGIONAL COUNCIL

Private Bag 90116
Telephone (03) 215-6197
Fax No. (03) 215-8081

Cnr North Road and Price Street
Waikiwi
Invercargill

WATER AND DISCHARGE PERMIT

Pursuant to Section 105(1) of the Resource Management Act 1991, a resource consent is hereby granted by the **Southland Regional Council**

to Alliance Group Ltd – Mataura (called the "consent holder")

of P O Box 1, Mataura. Attn: A B Gerrie

from 17th March 1999

PLEASE READ THIS CONSENT CAREFULLY AND ENSURE THAT ANY STAFF OR CONTRACTORS CARRYING OUT ACTIVITIES UNDER THIS CONSENT ON YOUR BEHALF ARE AWARE OF ALL THE CONDITIONS OF THE CONSENT.

DETAILS OF PERMIT

Purpose for which permit is granted: -		To dam, divert and use water from the Mataura River for hydro-electric power generation and to discharge water from the hydro-electric power plant into the Mataura River
Location	- site locality :-	Mataura
	- map reference :-	F46:911:382
	- receiving environment :-	Mataura River
	- catchment :-	Mataura
Expiry date :-		30th June 2017

SCHEDULE OF CONDITIONS

1. This consent shall expire on the 30 June 2017.

2. The flow at the centre of the existing weir on the Mataura River shall not be lesser in depth than 0.05 metres due to the exercise of the consent.

3. The consent holder shall maintain a monitoring system to provide immediate warning to its staff that overflow of the weir has ceased.

4. No alteration to the existing weir or diversion channel shall be carried out by the consent holder without the written approval of the Council's Environmental Compliance Manager.

5. When a reduction in water usage for power generation is necessary to comply with condition 2, it shall be achieved by a parallel reduction in water usage through the generators of both companies, namely the consent holder and Carter Holt Harvey Limited.

6. The consent holder shall share in the maintenance of an adequate fish ladder, in terms of the fish pass regulations, with Carter Holt Harvey Limited.

7. The consent holder shall carry out an investigation into the effects of the hydro-electric power plant diversion on the Mataura River native fish passage. This investigation shall be carried out in consultation with the following parties:

   - Arai Te Uru Eel Management Committee
   - Department of Conservation
   - Carter Holt Harvey Limited.

   A report outlining consultation and/or investigation shall be submitted to the Councils Environmental Compliance Manager on an annual basis during the month of March.

8. The consent holder shall pay the Southland Regional Council an administration charge and monitoring charge, under Section 36 of the Resource Management Act, in advance, payable on the first day of July each year.

9. The consent holder may, in accordance with Section 127 of the Act, apply to the Council for a change to the conditions of this consent in the month of June each year.

10. The Council may, in accordance with Section 128 and 129 of the Act, serve notice, at 12 monthly intervals from the date of commencement of this consent, of its intention to review the conditions of the consent for the purpose of:

    (i) dealing with any adverse effects on the environment which may arise from the exercise of this consent;
    (ii) responding to findings of the investigation into the effects on native fish species passage; and
    (iii) complying with the requirements of a regional plan.

For: **THE SOUTHLAND REGIONAL COUNCIL** 15th April 1999

W J Tuckey
DIRECTOR OF ENVIRONMENTAL MANAGEMENT

SRC:08:92

B

APPENDIX B

Existing Consent 205558

environment SOUTHLAND

File No: A024-013
Consent: 205558

Cnr North Road and Price Street
(Private Bag 90116)
Invercargill

Telephone (03) 211 5115
Fax No. (03) 211 5252
Southland Freephone No. 0800 76 88 45

Discharge Permit

Pursuant to Section 104D of the Resource Management Act 1991, a resource consent is hereby granted by the Southland Regional Council (the "Council") to **Alliance Group Ltd – Mataura** (the "consent holder") of **P O Box 1, Mataura** from **15 September 2008**.

Please read this Consent carefully, and ensure that any staff or contractors carrying out activities under this Consent on your behalf are aware of all the conditions of the Consent.

Details of Permit

Purpose for which permit is granted:		To discharge natural river sediment immediately to a river bank
Location	- site locality	Next to the hydro race on the Mataura River in Mataura township
	- map reference	F46:911-384
	- receiving environment	Mataura River
	- catchment	Mataura
Legal description of land at the site:		Lot 1 DP 12431
Expiry date:		15 September 2033

Schedule of Conditions

1. This consent is granted for a period of 25 years.
(Note: Pursuant to Sections 123 and 124 of the Resource Management Act 1991, a new consent will be required at the expiration of this consent. The application will be considered in accordance with the plans in effect at that time, and the adverse effects of the proposed activity).

2. The consent holder shall, at least one week prior to the exercise of this consent on each occasion, notify the Southland Regional Council and the following parties:

   - Department of Conservation
   - Te Ao Marama Inc
   - Fish and Game New Zealand, Southland Region

- Wyndham Angling Club
- South Island Eel Industry Association

3. Works are to be carried out generally as described in the application. In particular, the location of the discharge shall be the area of the river bed immediately adjacent to the hydro-race wall. On any occasion that the consent is being exercised while the bed of the river is inundated at this location, then the consent holder may complete the work, while taking all practical steps to minimise any discolouration of the river.

4. The discharge shall only contain natural river sediment. No oils, greases or other contaminants shall be discharged into the river.

5. The consent holder shall, if requested, provide an annual report to the Southland Regional Council outlining sediment discharges that have occurred, and comment on the effects of the discharge on the Mataura River. This report shall be submitted to the Council's Compliance Manager, by 31 July each year.

6. The consent holder shall pay annual administration and monitoring charges to the Southland Regional Council, collected in accordance with Section 36 of the Resource Management Act 1991, payable on invoice. This charge may include the costs of inspecting the operation of this resource consent on each occasion it is exercised.

7. The Southland Regional Council may serve notice of its intention to review the conditions of this consent, in accordance with the conditions of this resource consent and Sections 128 and 129 of the Resource Management Act 1991, during the period May to July each year, for the purposes of:

   (i) dealing with any adverse or cumulative effects on the environment, which may arise from the exercise of this consent;
   (ii) complying with the requirements of a regional plan.

8. If an event (such as contamination by anything other than natural river sediment) occurs that may have significant adverse effect on water quality of any Mataura River, the consent holder shall notify, as soon as reasonably practicable, the following:

   - Environment Southland's Compliance Manager (ph 03 211 5115 or 03 211 5225 after hours);
   - Department of Conservation (ph 03 211 2400);
   - Te Ao Marama Inc (ph 03 931 1242);
   - Fish and Game New Zealand, Southland Region (ph 03 215 9117);
   - South Island Eel Industry Association (ph 03 230 4475).

for the **Southland Regional Council**

per W J Tuckey
Director of Environmental Management

C

APPENDIX C

Certificate of Title

COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **SL9C/848**
Land Registration District **Southland**
Date Issued 20 September 1990

Prior References
SL41/254 SL9C/685

Estate	Fee Simple
Area	5.5965 hectares more or less
Legal Description	Lot 1 Deposited Plan 12500 and Lot 1-2 Deposited Plan 12431

Proprietors
Alliance Group Limited

Interests

Subject as to Lots 1 and 2 DP 12431 to Section 308 (4) Local Government Act 1974

Subject as to 1 and 2 SO Plan 11584 to Section 3 Petroleum Act 1937

Subject as to 1 and 2 SO Plan 11584 to Section 8 Atomic Energy Act 1945

Subject as to 1 and 2 SO Plan 11584 to Section 3 Geothermal Energy Act 1953

Subject as to 1 and 2 SO Plan 11584 to Section 6 and 8 Mining Act 1971

Subject as to 1 and 2 SO Plan 11584 to Section 5 and 261 Coal Mines Act 1979

Subject as to Sections 31 and 32 Block XIII Town of Mataura to Section 59 Land Act 1948

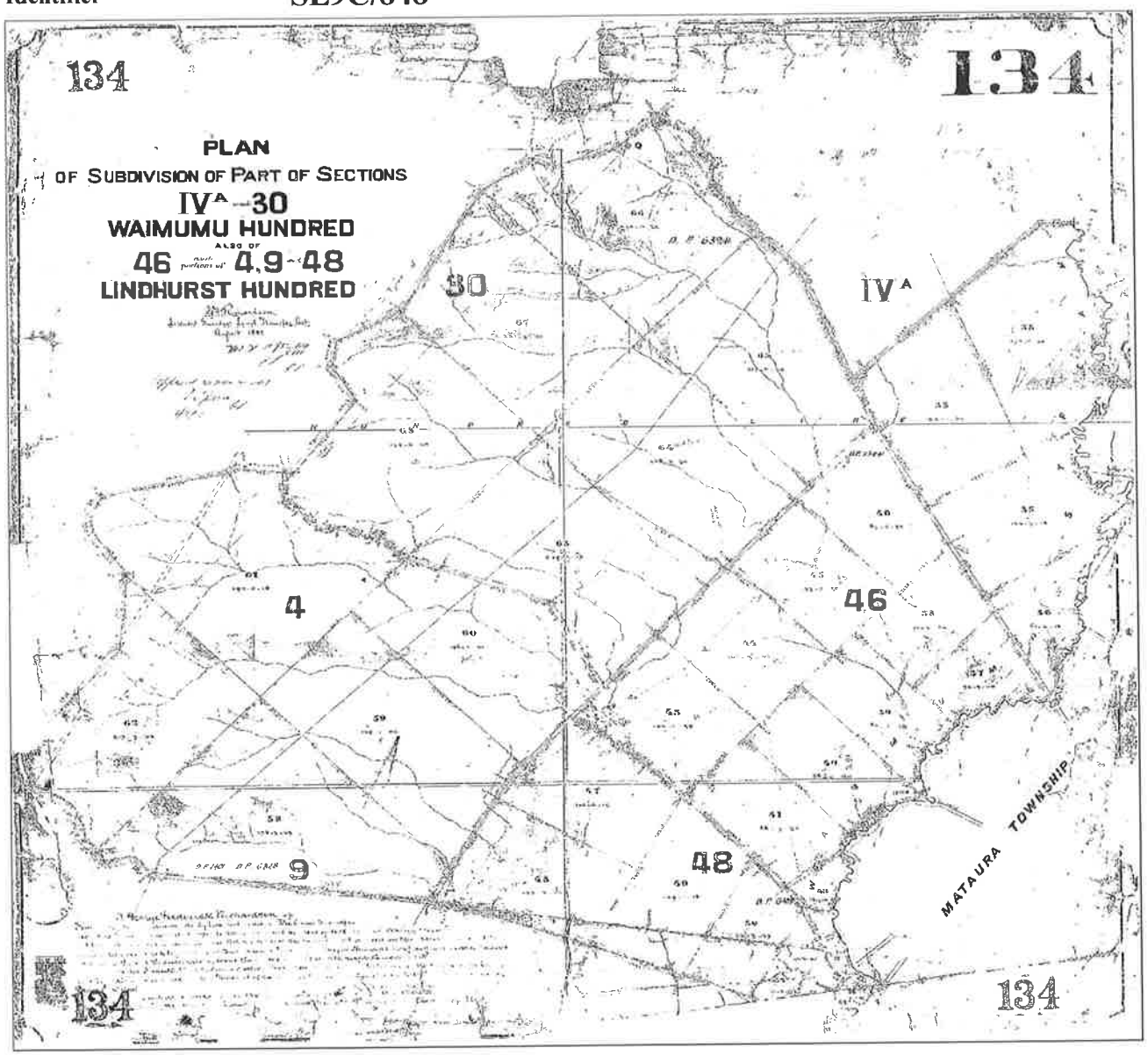
168564.1 Transfer creating the following easements - 13.11.1989 at 9.06 am

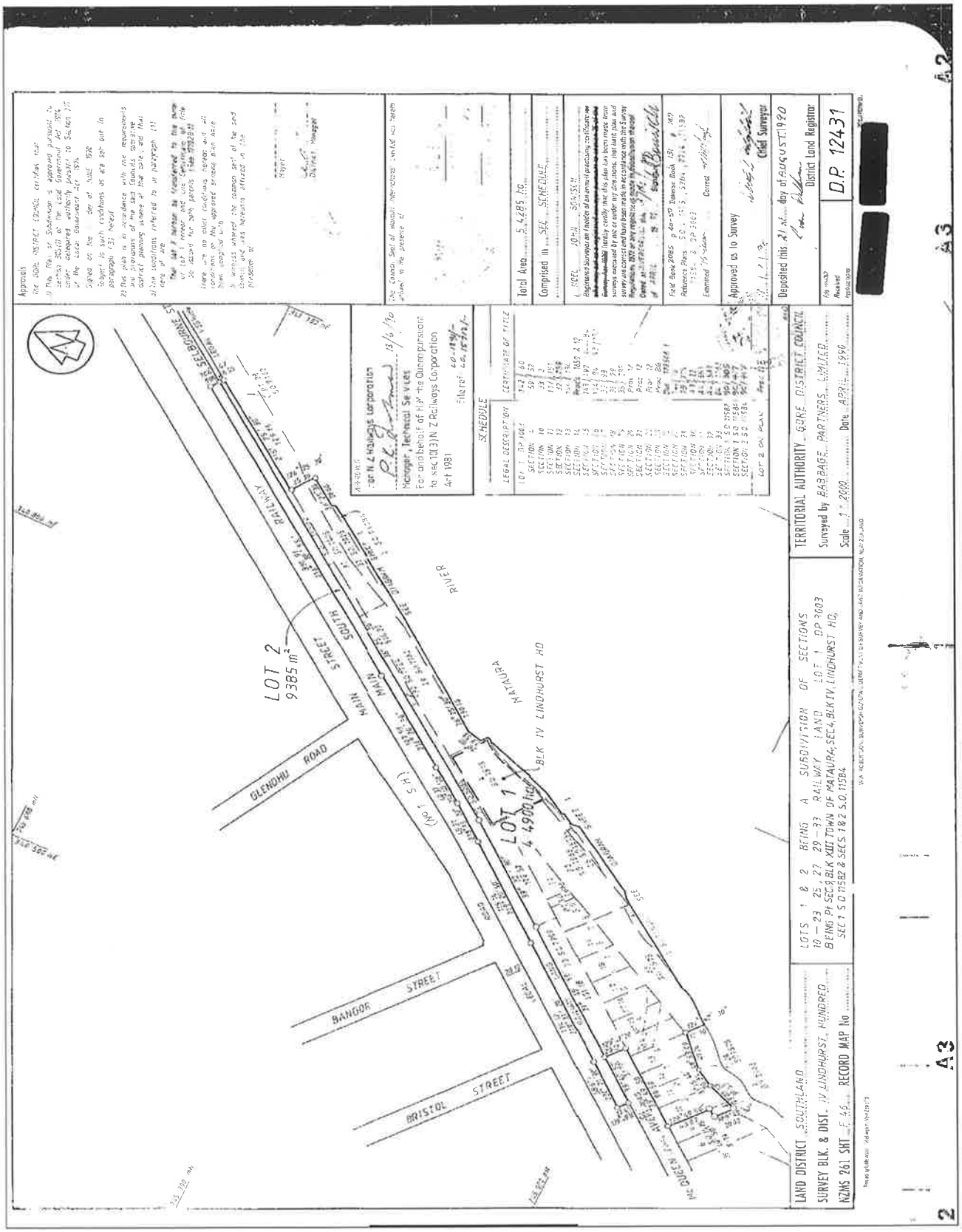
Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Convey water	Part Lot 36 Deposited Plan 134 - CT SL9B/139	A DP 12285	Section 4 Block IV Lindhurst Hundred and Section 27 and Section 29-32 Block XIII Town of Mataura - herein	
Convey electricity	Part Lot 36 Deposited Plan 134 - CT SL9B/139	C DP 12285	Section 4 Block IV Lindhurst Hundred and Section 27 and Section 29-32 Block XIII Town of Mataura - herein	
Pump water	Part Lot 36 Deposited Plan 134 - CT SL9B/139	D DP 12285	Section 4 Block IV Lindhurst Hundred and Section 27 and Section 29-32 Block XIII Town of Mataura - herein	

210046.7 Easement Certificate specifying the following easements - 18.6.1993 at 10.29 am

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Convey water and electricity	Lot 4 Deposited Plan 12954 - CT SL10C/232	C DP 12954	Lot 1 Deposited Plan 12500 and Lot 1-2 Deposited Plan 12431 - herein	

Identifier **SL9C/848**

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GLENDHU ROAD
BANGOR STREET
BRISTOL STREET
RAILWAY
RIVER
NAIAURA
BLK IV LINDHURST HD
LAND DISTRICT SOUTHLAND
SURVEY BLK. & DIST. IV LINDHURST, HUNDRED
NZMS 261 SHT F 46 RECORD MAP No
LOTS 1 & 2 BEING A SUBDIVISION OF SECTIONS
10 – 23, 25, 27, 29 – 33 RAILWAY LAND LOT 1 DP 3603
BEING PT SEC 9 BLK XIII TOWN OF MATAURA, SEC 4 BLK IV LINDHURST HD,
SEC 1 S.O. 11582 & SECS 1 & 2 S.O. 11584
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Surveyed by BAGRAGE PARTNERS LIMITED
Scale 1" = 2000 Date APRIL 1990
Deposited this 21st day of AUGUST 1990
District Land Registrar
D.P. 12431
Approved as to Survey
Chief Surveyor
Total Area 5.4285 ha
Comprised in SEE SCHEDULE
SCHEDULE
Approved
for N.Z. Railways Corporation
Manager, Technical Services
For and on behalf of H.M. the Queen pursuant to section 31(3) N.Z. Railways Corporation Act 1981
13/6/90
A2
A3

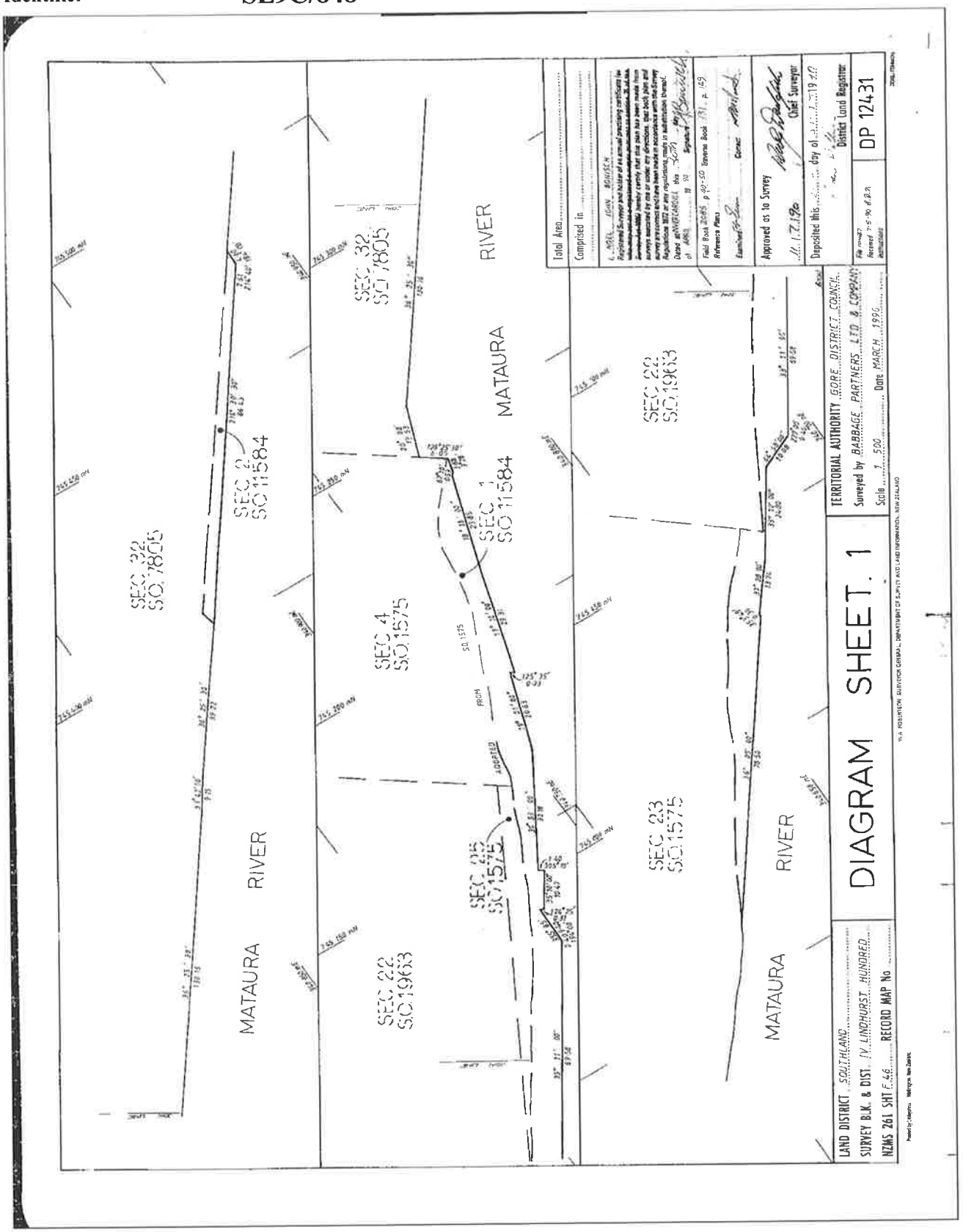
DIAGRAM SHEET 1
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SURVEY B.K. & DIST. IV LINDHURST HUNDRED
NZMS 261 SHT F46 RECORD MAP No
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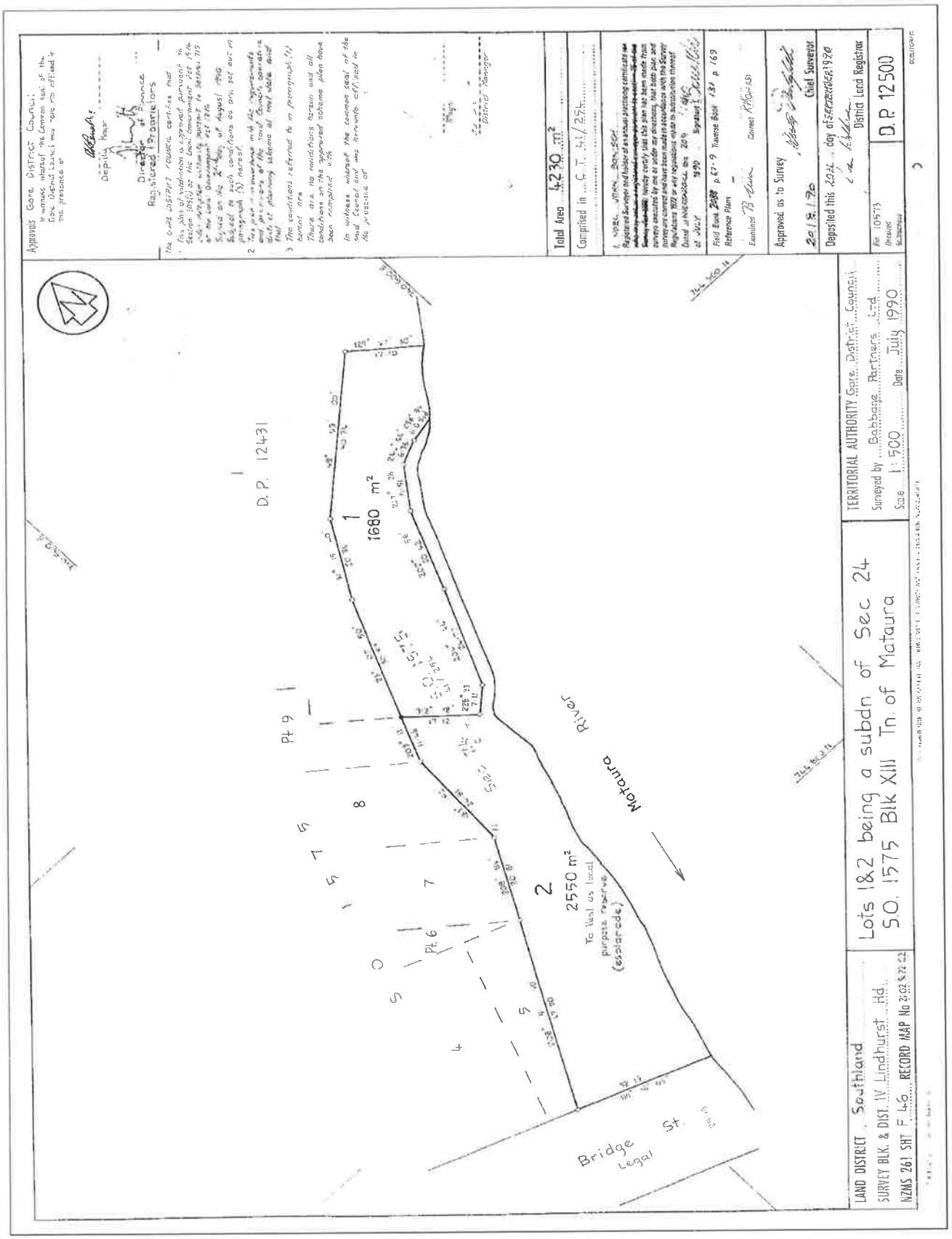
Surveyed by BABBAGE PARTNERS LTD & COMPANY
Scale 1 : 500 Date MARCH 1996
DP 12431
District Land Registrar
Chief Surveyor
Approved as to Survey
Total Area
Comprised in
Field Book 2685 p 40-50 Traverse Book 191 p 149
Reference Plans
SEC 32 SO 7805
SEC 2 SO 11584
SEC 1 SO 11584
SEC 4 SO 15575
SEC 22 SO 19933
SEC 23 SO 15575
MATAURA RIVER
MATAURA
RIVER

Identifier **SL9C/848**



APPENDIX D

Golder Associates – Assessment of Effects Report 2007

Golder Associates

ASSESSMENT OF HYDRO-ELECTRIC DIVERSION EFFECTS ON FISH PASSAGE

NOVEMBER 2007

ASSESSMENT OF HYDRO-ELECTRIC DIVERSION EFFECTS ON FISH PASSAGE

NOVEMBER 2007

on behalf of

Alliance Group Limited

prepared by

Golder Associates (NZ) Ltd

Golder Associates (NZ) Ltd

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Document Quality Assurance

This report has been prepared in accordance with Golder Associates (New Zealand) Ltd quality assurance procedures. All relevant quality control information in relation to biological and/or environmental data is identified within the document. The report has been reviewed and is approved for release as set out below.

	Name	Signature
Project Manager	**Richard Allibone**	
Project Reviewer	**Richard Montgomerie**	
Principal approval for release	**Ian Boothroyd**	

1. Introduction

1.1 Background

Alliance Group Limited (Alliance) operates a meat processing plant at Mataura, Southland and part of plant operations includes the diversion of water from the Mataura River into a small (1 Megawatt) on-site hydro electric generation plant.

Alliance's diversion consent (Consent Number 98031) has a schedule of conditions which set out the requirements for a specific investigation of the hydro-electric plant diversion. Condition 7 of Resource Consent 98031 requires:

7. The consent holder shall carry out an investigation into the effects of the hydro-electric power plant diversion on the Mataura River native fish passage. This investigation shall be carried out in consultation with the following parties:
Arai Te Uru Eel Management Committee
Department of Conservation
Carter Holt Harvey

1.2 Scope of Report

This report presents:

- a brief history of the development of the hydro-electric plant at the Alliance site;
- an assessment of the native fish fauna of the Mataura River;
- the distribution of the fish species with reference to the Mataura Falls and the diversion structure;
- and an assessment of the effect of the diversion structure on upstream fish passage;
- and notes on consultation with other parties;

in order to meet the requirements of Condition 7.

2. Background

2.1 Site Description

The Alliance plant is situated in the township of Mataura, along the true right bank of the Mataura River (Fig. 2.1). The true left bank of the river is occupied by the former Carter Holt Harvey paper mill now an industrial site managed by the Mataura Industrial Estate (MIE). The hydro-electric plant at the Alliance site diverts water from the Mataura River via a U shaped weir and raceway structure (Fig. 2.2). The diversion is upstream of the Mataura Falls water fall (Figs. 2.3 and 2.4). The natural fall in the river provides the hydraulic head for the hydro-electric turbine.

The diversion operates under consent conditions that require a minimum water depth of 0.05 m be maintained over the weir at all times. At the edges of the diversion as the diverted water is channelled along the hydrorace the water flow over the weir top decreases to nil (Figs. 1.2 and 1.5). This leads to the weir being over topped by water at least 0.05 m of water in the centre of the river to no overflow at the side of the diversion structure providing a range of water depths for fish to utilise when moving upstream over the weir.

2.2 Hydro-electric Plant History

The Matuara Paper Mill and the Southland Frozen Meat and Produce Export Company first established the hydro-electric plants on the Mataura River in the earlier 1890s. The Southland Frozen Meat and Produce Export Company was granted consent to take water from the Mataura River in 1890 (Pickering 1949) for hydro-electricity generation. In 1893 the Mataura Paper Mill also began operating a hydro-electric plant. In 1905, after the generation plant had been upgraded, the hydro-electric plant supplied electricity to the processing plant and the town of Gore; and this was extended to supply electricity to Mataura in 1913. The hydro plant continued to supply power to Gore and Mataura until 1924 when the Southland Electric Power Board began supplying electricity to Gore and Mataura from its Monowai Power Station (Pickering 1949). The meat processing plant became completely electrified in 1932. Just when the diversion structure was completed during this development period is unclear; however it is evident that the hydro-electric generation plants at the Alliance site and the paper mill site in Mataura have now been operating for approximately 115-120 years. Diversion structures and the intake canal system are likely to have been in place either to prior or put in place during the last plant upgrades in the 1920 or 1930s.

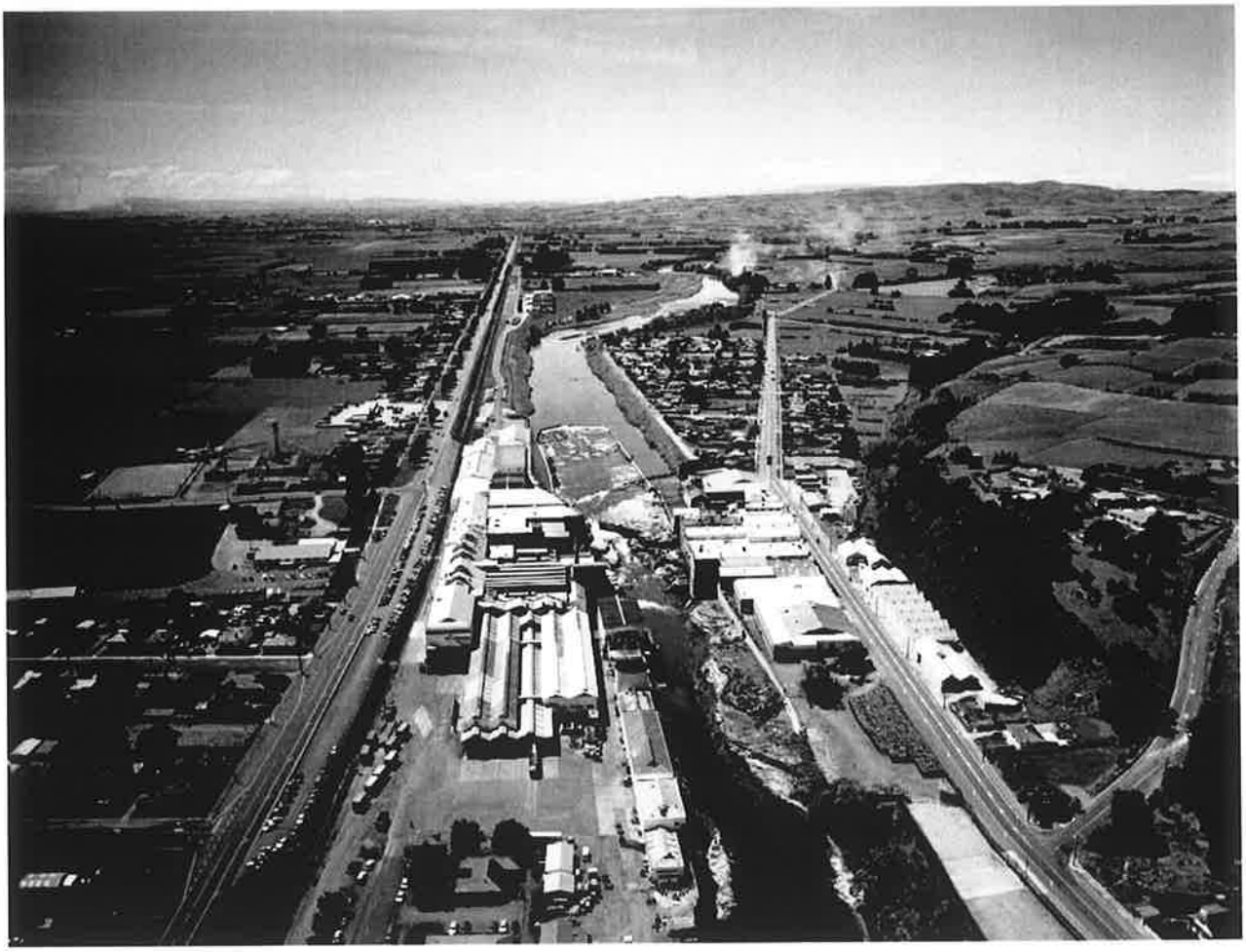

Fig. 2.1: The present day Alliance meat processing plant (left side of picture) and the Mataura River with the Mataura Falls and the upstream U-shaped diversion weir.

2.3 Mataura Water Conservation Order

The Mataura River is subject to a Water Conservation Order (WCO) that was applied for by Fish & Game New Zealand and that was granted in 1997. The WCO lists as *protected waters* the Mataura River from its source to the sea and it also protects many of the tributary streams and the Waikaia River. The

outstanding features that the WCO recognised were the outstanding fisheries and angling amenity. The outstanding fisheries are not defined further in the WCO but given the reputation of the Mataura River as highly significant brown trout angling river this is likely to be the fisheries of particular interest. Clause six of the WCO prohibits damming of the Mataura River and Waikaia River. This clause in subclause 3 does recognise the existing diversion weir at Mataura and specifically allows for its continued operation subject to the consent being granted with similar conditions to that of former water permits.

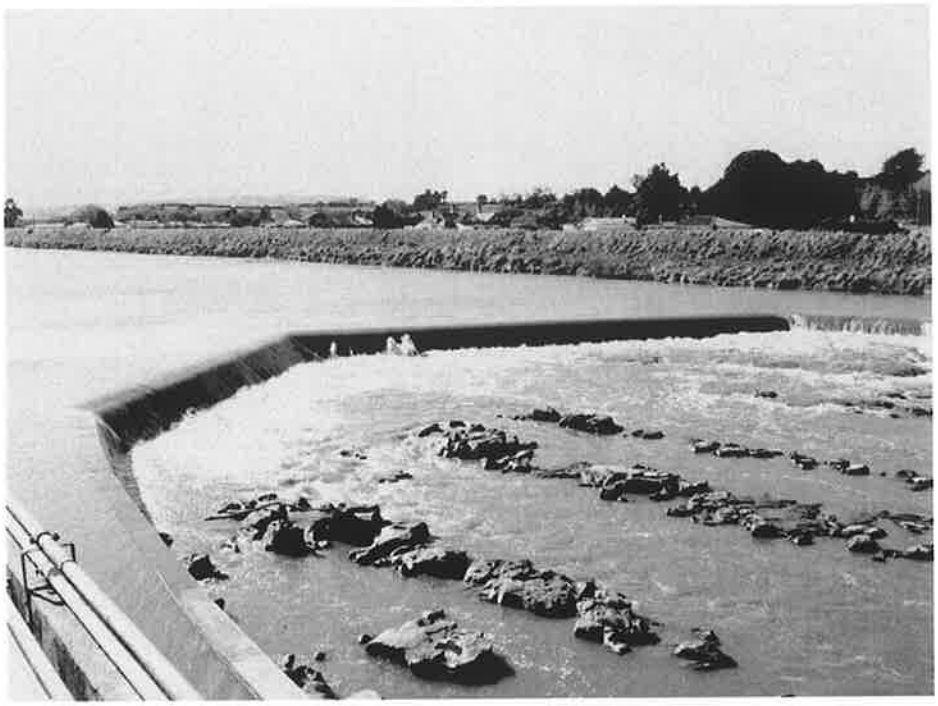

Fig. 2.2: **The hydro-electric diversion weir and top end of the Alliance diversion raceway, note the shallow water over topping the hydro race along the side of race diversion wall.**

Fig. 2.3: **Turbulent water in the lower section of the Mataura Falls and the steep rock banks on the riparian margin.**

Fig. 2.4: The main waterfall of the Mataura Falls.

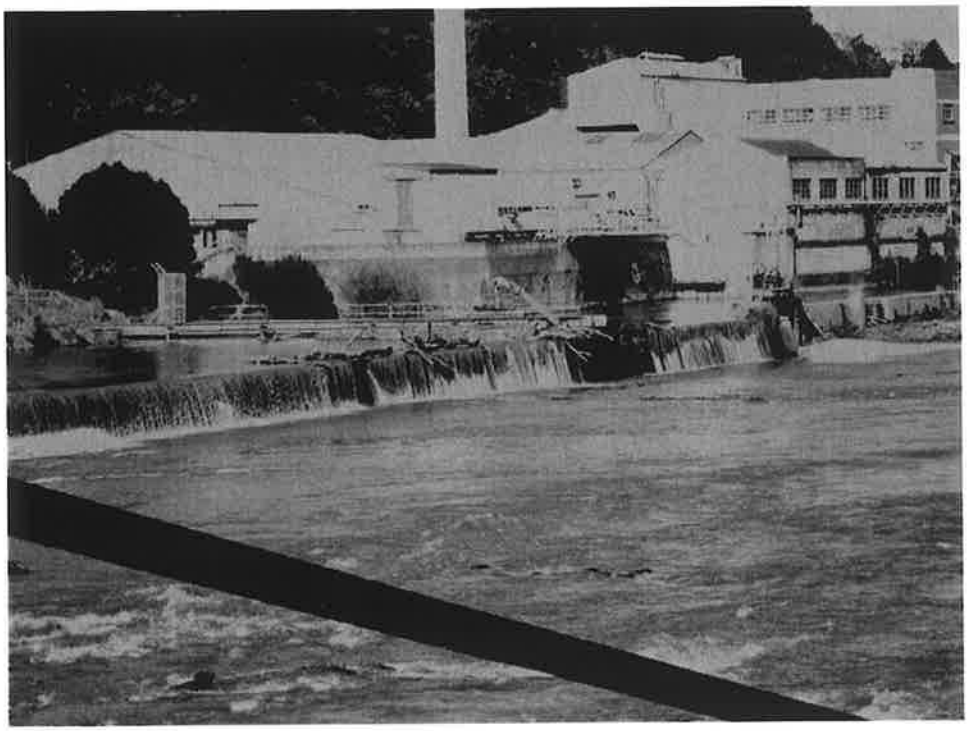

Fig. 2.5: The diversion wall on the Mataura Industrial Estate plant with varying water flows over the weir.

3. Fish Species of Mataura River

3.1 Background

The New Zealand Freshwater Fish Database (NZFFD) records thirteen native fish present in the Mataura River and its tributaries (Table 3.1). Distribution, species present and taxonomic status of the NZFFD records have also been checked with Fish & Game Southland; and the University of Otago, Department of Zoology, to determine if all their records have been submitted to the NZFFD. Additional species occurrence data was provided by Vic Thompson (eel fisherman, manager of Mossburn Enterprises) and non-migratory galaxiid taxonomic and distributional data confirmed with Bob McDowall (NIWA).

The native fish present in the Mataura River catchment can be divided into a number of broad groups using their distribution within the Mataura River catchment:

- Lowland native species
- Widespread native species
- Restricted distribution native species
- Data deficient native species

Table 3.1: Native fish species in the Mataura River.

Scientific name	Common name	NZFFD Records
Diadromous[1] species		
Anguilla dieffenbachii	Longfin eel	50
Anguilla australis	Shortfin eel	6
Cheimarrichthys fosteri	Torrentfish	4
Galaxias argenteus	Giant kokopu	6
Galaxias maculatus	Inanga	4
Geotria australis	Lamprey	4
Gobiomorphus cotidianus	Common bully	14
Gobiomorphus huttoni	Redfin bully	1
Retropinna retropinna	Common smelt	1
Non-diadromous species		
Galaxias gollumoides	Gollum galaxias	30
Galaxias paucispondylus	Alpine galaxias	1
Galaxias sp	Southern flathead	6
Gobiomorphus breviceps	Upland bully	43

Note: [1]Diadromous fish are species that carry out migrations to and from the sea as part of their life cycle.

3.2 Lowland Native Species

This group comprises species with limited migratory ability that have their ranges restricted to the lower reaches and main-stems of the river. The five species that form this group are, inanga, torrentfish, common bully, redfin bully and common smelt. In the Mataura River catchment these five species do not progress upstream past the Mataura Falls at Mataura due to their inability to climb or swim upstream over the falls. This upstream limitation means that fish passage for these species is not going to be affected by the hydro-electric diversion.

3.3 Widespread Native Species

A suite of six native fish (shortfin eel, longfin eel, lamprey, giant kokopu, Gollum galaxias, upland bully) are more wider ranging in the Mataura catchment. Shortfin eel is not abundant but is present in wetlands and ponds through the catchment. Longfin eel is by far the most abundant eel and is present in the main rivers and tributaries throughout the Mataura river catchment (NZFFD). Lamprey is known to range through much of the Mataura River catchment and in particular migrate into the Waikaia River catchment (Jellyman et al. 2002, Jellyman & Glova 2002). Giant kokopu occur in Mataura River tributaries in the lower river downstream of Mataura Falls, and an isolated landlocked population exists at Freshford in the Waikaia River (Rasmussen 1990). It is possible that this fish exists upstream of the Mataura Falls in other areas, either as landlocked populations or migratory individuals. Hanchet (1990) noted that giant kokopu can climb waterfalls and recorded fish up to 120 km inland in the Waikato River system. Therefore the possibility exists that migratory giant kokopu penetrate inland as far as the waterfall at Mataura and may ascend this fall. Gollum galaxias and upland bully are widespread non-migratory fish that occur in many of the Mataura River tributaries through out the catchment. However, movement between the tributaries is believed to be uncommon and neither upland bully nor Gollum galaxias (R. Allibone pers. obs.) are known for their climbing ability and as such the Mataura Falls is likely to represent a significant barrier to upstream movement for these two species of fish.

3.4 Restricted Distribution Native Species

Two native fish species are more restricted in the Mataura River catchment; the southern flathead (an undescribed non-migratory galaxiid species; McDowall 2006) and alpine galaxias only occur in headwater tributaries of the river. These fish are not known to occur in the lower reaches or tributary systems associated with the lower reaches of the Mataura River. It is therefore highly unlikely that these require passage over the Mataura Falls or the hydro-electric diversion weir.

3.5 Data Deficient Native Species

Koaro (*Galaxias brevipinnis*) and black flounder (*Rhombosolea* retiaria), while not recorded in the NZFFD for the Mataura catchment, are present at the Mataura Falls (Vic Thompson pers. obs.). Koaro is known to be an able climber and is capable of ascending very high waterfalls on the wetted edges (McDowall 2000). It is not clear at present if this fish occurs regularly at the Mataura Falls and for some reason is unable to ascend the Mataura Falls or whether it occurs intermittently depending on the size of the whitebait run. The lack of records in the NZFFD for koaro either upstream or downstream of the Mataura Falls would indicate the fish is not common in the catchment. Black flounder is unable to climb or swim up waterfalls of the size of the Mataura Falls and therefore its upstream range is range is limited by the Falls and it is not affected by the hydro-electric diversion weir.

4. Effects of the Hydro-Electric Diversion

4.1 Species of Interest with Respect to Fish Passage

From the distribution and life histories five native fish species are of interest with respect to the fish passage at the hydro-electric diversion. These fish are all migratory (or diadromous) species that are expected to be capable of ascending waterfalls; shortfin eel, longfin eel, lamprey, giant kokopu and koaro. An assessment of the effects of the diversion for each species has been made using available distribution data, published information, observations by Alliance Group staff and other parties at the Mataura site.

4.2 Fish Passage at the Mataura Falls

Prior to completing the assessment of fish passage it is worth noting features of the Mataura Falls that will make upstream fish passage difficult. The bedrock has been eroded by the Mataura River and while the majority of the falls are steep or vertical slopes they are potentially climbable by the fish of interest. A short section of the waterfall face presents a significant barrier. Part way up the vertical rise (Fig. 4.1) a shelf has been eroded into the rock face that appears to extend horizontally around much of the rock face. Fish climbing the waterfall will encounter this ledge and will be unlikely to negotiate the rock overhang above the ledge. Therefore fish passage up and over the Mataura Falls is highly likely to only be possible in areas where the overhang above the ledge has been eroded away or when high flows submerge the ledge. It is likely that the ledge is absent in the highly eroded areas of the main waterfall (Fig. 2.4) but the turbulent high velocity water is also likely to limit successful fish passage. One or two wetted surfaces are present on the outer edge of the waterfall where the ledge and overhang appear eroded and fish passage may be possible. It is also important to note that the waterfall and areas immediately upstream are all bedrock. Little fish cover is available in this section of the river so resting habitat for fish is rare in the main channel. The small side flows present provide better resting areas but also make the fish vulnerable to bird predators if they rest in shallow water.

Fig. 4.1: The edge of Mataura Falls showing the eroded ledge and overhanging rock across the possible fish climbing routes. Note the one wetted area on the extreme right of the picture that provides a potential climbing route.

4.3 Lamprey

Adult lampreys make annual upstream migrations to spawning habitat. Individual adults only make this migration once, and are presumed to die after spawning (Todd 1990). The duration of the freshwater life of adult lamprey is not fully known but individuals in laboratory experiments have lived for 17 months without feeding (McDowall 1990). Anecdotal stories associated with lamprey migrations indicate the fish is capable of climbing steep faces and also of leaving the water and ascending slopes on the riparian margin during rainy nights (Jellyman 1984, Tweed 1987). The long duration of their freshwater life means that lamprey that cannot surmount an obstacle to their migration could remain downstream of the barrier for one or two years.

An abundant lamprey migration is observed at the Mataura Falls most years as the adult lamprey migrate upstream for spawning. Todd (1979) noted that a lamprey fishery existed at the Mataura Falls where fish were taken from just below the Falls. The lamprey migration at the Mataura Falls has been the subject of recent NIWA studies. Jellyman et al. (2002) investigated adult lamprey movements upstream of Gore, well upstream from the Mataura Falls and diversion weir. His study notes that the adult fish elected to move upstream into the Waikaia River rather than the Mataura River at the confluence of these two rivers. The authors commented that adult fish are attracted to odours released by juvenile lamprey upstream as they migrate and implied that the Waikaia River was still likely to contain resident juvenile lamprey. Jellyman & Glova (2002) carried out an assessment of juvenile lamprey (ammocoetes) habitat use in the Mataura River and collected juveniles at numerous sites upstream of the Alliance diversion weir. The juveniles were most abundant at sites in the Mataura River around Gore. This survey shows adult lampreys are climbing both the Mataura Falls and the diversion weir and are continuing upstream to spawn.

Observations at the Alliance plant also suggest that the lamprey migrations are proceeding upstream past the diversion weir. Accumulations of lamprey occur at the Mataura Falls and around the Alliance hydro-electric plant (Fig. 4.2). These lampreys are observed climbing the vertical surfaces including concrete channel walls and getting over into the hydrorace (Fig. 4.2). Observers at the Alliance plant have also noted that the accumulations of lamprey can disappear overnight. This is interpreted as strong evidence that the lampreys are ascending the race and diversion walls and have continued to migrate upstream. A lack of large numbers of lamprey remaining for months downstream of the diversion supports that conclusion that lamprey adults climb both the Mataura Falls and the hydro-electric diversion weir.

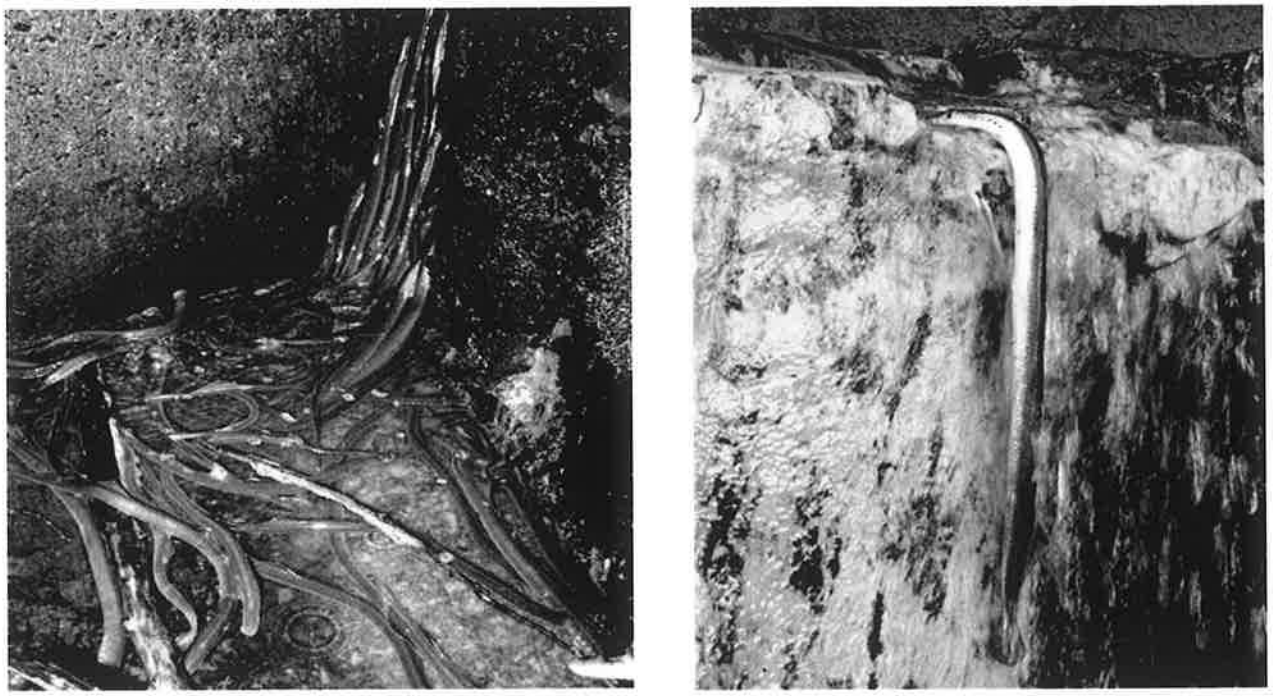

Fig. 4.2: Lamprey (left) congregating in a wetted area of the Alliance hydro-electric diversion and (right) a lamprey ascending the diversion wall.

From the information on upstream fisheries, the abundant presence of juvenile lampreys around Gore and the observations of lampreys at the Alliance plant it is concluded that the diversion weir is not preventing upstream fish passage for adult lampreys.

4.4 Shortfin Eel

The shortfin eel is the rarer of the two eel species in the Mataura Catchment and has been rarely recorded upstream of the Mataura Falls. The rarity of shortfin eels is accepted as a natural phenomenon for the Southland area where the eel stocks are predominately longfin eels. Commercial eel catch sampling in the last 20 years has shown that the catches in the Mataura (and other Southland catchments) is dominated by longfin eels (e.g., Beentjes & Chisnall 1997, Beentjes 2005) generally with greater than 90% of the catch being longfin eels.

Observations of the upstream elver migrations have also found that smaller elvers are more capable of climbing water falls, dam spillways and other potential barriers (Fig. 4.2). This is due to the smaller lighter elvers maintaining better adhesion to the surface being climbed via surface tension than larger elvers. This phenomenon is primarily due to the weight of large elvers reducing the adhesion via surface tension. Therefore the expectation is that the smaller shortfin elvers will ascend higher or steeper vertical surfaces than larger longfin elvers.

Currently shortfin eels are not noted as occurring upstream of the Mataura Falls and the diversion weir. In fact the only stream in the Mataura River catchment known to have substantial numbers of shortfin eels is Low Burn, a tributary downstream of Mataura (Beentjes 2005), although this is based on limited sampling of the commercial catch and NZFFD records. However the expected low abundance of this species upstream of the hydro-electric diversion weir, means that despite the climbing ability of small shortfin elvers it is unlikely that the weir represents a significant barrier.

4.1 Longfin Eel

Longfin eels are the present throughout the Mataura River catchment and are the main stay of the commercial fishery. The longfin elvers migrate upstream reaching the Mataura Falls in January or February over a period of approximately two weeks (Vic Thompson pers. obs.). These longfin elvers are general larger than shortfin elvers and can weigh several grams. The larger size of the longfin elvers means their ability to climb the Mataura Falls and the hydro-electric diversion weir is less than the shortfin elvers. Weight data collected at the fish pass and trap at Mataura Falls found the longfin elvers weighed around 3 gm (Vic Thompson unpub. data). For such large elvers the ability to climb the steep faces of the Mataura Falls is likely to be limited and it is possible that only the smaller individual longfin elvers climb the waterfall easily. It is apparent from the experimental trap results that longfin elvers are having difficulty ascending the Mataura Falls. It is also likely that high water flows may provide better passage for elvers as the raised water level may increase the water level over the height of the ledge and overhanging rock on the waterfall. If this occurs at the river edge where flows are less turbulent and at night when elvers are most active, then this may provide the opportunity for a significant number of elvers to ascend the waterfall. However this requires high flow events in January and/or February in the two week period when elvers reach the Mataura Falls (Vic Thompson pers. com.) a combination of events that may occur only occasionally.

The ascent of the diversion weir is likely to be easier than the Falls as the height and nature of the diversion weir present less difficulties to the climbing elvers than the waterfall. The relatively rough concrete surface of the weir (without ledges and overhangs) means that the ascent will be unimpeded by surface obstacles. The only difficulty expected to reduce the success of the elvers ascending the weir is the weir shape. Elvers have very limited ability to bend dorso-ventrally and this leads to them having difficulty climbing around a 90° degree turn from vertical to horizontal (R. Allibone pers. obs.; Vic Thompson pers. obs.) as is required around most of the top of the diversion weir. Elver passage is likely at points on the diversion weir where the water flows over the weir as low velocity shallow trickles, but in high velocity areas elvers would be dislodged. At the edge of the diversion weir shallow water sections

are present and some of the variations in weir construction are also likely to provide areas where the water flows are suitable for passage. Rounding off parts of the top of weir to remove the 90° angle is also a potential option to eliminate the problem.

Analyses of the commercial eel fishery have been undertaken for the Mataura River and these analyses have split the catch upstream and downstream of the Mataura Falls (e.g., Beentjes & Chisnall 1997, Beentjes 2005). These analyses found that longfin eels in terms of length and weight have remained relatively stable and small eels of 45 cm are still being caught upstream of the Falls indicating successful elver passage is still occurring. Commercial fishers, however, believe the longfin eel fishery upstream of the Mataura Falls is declining (Vic Thompson pers. com.). From the data available it is not possible to confirm this, especially as the fishery is generally declining around New Zealand, or whether there is a local effect in the Mataura River upstream of the Falls (e.g., land use change). It is also possible the decline is related to fish passage difficulties at the waterfall. As noted above it may require the combination of a moderate flood flow at Mataura Falls during the elver migration to provide fish passage. If this combination is infrequent them recruitment will be periodic and significant declines in the fishery may be experienced between recruitment events. It is also likely that if this is true the commercial fishery upstream of Mataura Falls cannot support the same Catch Per Unit Effort as downstream due to the lower periodic recruitment and if similar levels of fishing effort are being applied up and downstream of the Mataura Falls then a decline upstream would be more noticeable.

In conclusion fish passage for longfin elvers at the Mataura Falls is likely to be restricted at times due to the nature of the waterfall, size of the elvers and volume of water in the river. Elvers that successfully climb the Falls may also have difficulty negotiating the diversion weir where the vertical side meets the horizontal upper surface, although the weir does not represent such a substantial barrier as the waterfall. The continuing commercial fishery data does also indicate that longfin elvers continue to recruit into the upper river,

4.2 Giant Kokopu

Giant kokopu are known from the lower Mataura River Catchment (NZFFD) and the landlocked population at Freshford in the Waikaia (Rassmusen 1990). There are no observations of this fish at Mataura Falls and it is unknown whether all the upstream migrating whitebait disperse into tributaries downstream of the Falls or not.

The climbing ability of giant kokopu is not considered to be as good as that of koaro or banded kokopu and elvers. On occasions giant kokopu individuals have been recorded upstream of significant waterfalls (Hanchet 1990), but they are commonly considered to be the inhabitants of lowland rivers and their tributaries (e.g., Chadderton 1990, Chadderton & Allibone 2000, Bonnett et al. 2002, David & Closs 2001). A factor that counts against the presence of anything but landlocked populations upstream of the Mataura Falls is the migrations of adult fish on freshes and floods at spawning time. It is assumed from movement data that adult giant kokopu undertaken downstream spawning migrations. David & Closs (2002) found that adult giant kokopu undertook long distance downstream movements followed by an upstream movement back to their original territories. Downstream migration of this sort that takes adult giant kokopu over the hydro-electric diversion and the Mataura Falls, will lead to the fish being stranded downstream of the Falls as adult giant kokopu would be unable to climb the Falls. Therefore any populations apart from landlocked ones upstream of the Mataura Falls are likely to consist of juvenile giant kokopu that have not undertaken a downstream spawning migration. This being the case the important populations of migratory giant kokopu are those below the Mataura Falls. The diversion weir will therefore not effect the migration of giant kokopu whitebait and adults from these populations (nor the landlocked population further upstream).

4.3 Koaro

Information on koaro migration and occurrence in the Mataura River is sparse. No adult koaro have been recorded in the NZFFD and no references to this species were found in the published papers reviewed. As such it is not possible to determine the distribution of this fish in the catchment.

Upstream migrating koaro whitebait or post-whitebait stage juveniles have been reported at the Mataura Falls during the operation of an experimental fish pass and trap in the early 2000's (Vic Thompson pers. com.). Koaro are known for their ability to climb very high waterfalls (McDowall 1990), vertical concrete weirs (Allibone pers. obs.) and penetrate far inland (NZFFD). It is expected that the koaro juveniles that successfully ascend the Mataura Falls will be capable of climbing the diversion weir. The range of water depths over the weir and the relatively short height of the diversion will provide wetted surfaces that koaro can easily climb. Further assessment of koaro is not possible given the lack of data with respect to occurrence in the Mataura catchment.

5. Consultation with Other Parties

5.1 Arai Te Uru Eel Management Committee

A phone conversation with Mr Vic Thompson of Mossburn Enterprises as a representative of Arai Te Uru Eel Management Committee was carried out on the 19 October 2007.

This conversation focused on fish passage for longfin eels at Mataura Falls and the diversion weir. Mr Thompson noted the following details:

- Mr Thompson and others ran a trial fish pass at the Mataura Falls on the MIE side of the river in the early part of this decade.
- During the fish pass trials they were able to make a number of observations about the elvers and other fish arriving at the Falls.
- Longfin elvers have an average weight of 3 grams when they arrive at the Mataura Falls.
- Longfin elvers arrive over a two week period, some time in January or February, but the arrival could not be predicted more accurately from there observations at the time.
- Most of the elver run waits until dark to attempt to ascend the Falls.
- On occasions up Mr Thompson believed up to 15% of the elver run would attempt day time ascent of the Falls, this could cause significant mortality due to temperature effects on the elvers in shallow water.
- Shortfin elvers were very uncommon in the run.
- Koaro whitebait was present at the Falls and in the trap on occasions.
- Lamprey was not really an issue of concern.
- Mr Thompson was willing to see physical modifications undertaken to the waterfall to improve passage, however he recognised this may reduce the success of the customary lamprey fishery and may not be acceptable to everyone.
- Mr Thompson was concerned about the ability of elvers to negotiate sharp turns that require dorso-ventral bending as elvers cannot bend their bodies that way.
- Mr Thompson wished to see higher flows coming over the waterfall during the elver migration as he felt this would improve the elver passage around the margins of the river.

5.2 Department of Conservation

Ms Emily Atkinson, the Technical Services Officer – Freshwater for Southland Conservancy was contacted by phone on the 19 October 2007 and the 23 October 2007.

On the 23 October Ms Atkinson was initially briefed regarding the position of Mataura Falls and the hydro-electric diversion weir as she had not visited the site. This discussion included a description of the Fall, the riparian area around the Falls and flows at the site. The discussion then proceeded to determine which species were of concern regarding fish passage at the hydro-electric diversion taking into account that fish had to first ascend the Mataura Falls. It was agreed that all bullies species, torrentfish, black flounder, inanga, and Gollum galaxias were all species that would not negotiate the Mataura Falls and as such were not necessary to include in the fish passage assessment. Lamprey, shortfin eel, longfin eel, giant kokopu and koaro were the fish species that were agreed should be considered. Ms Atkinson was also emailed an aerial photo of the Alliance plant, the Mataura Falls and the hydro-electric diversion so she could make an additional visual assessment of the area of concern and we agreed that if she had further concerns regarding fish passage and the species to be assessed she contact the Golder staff by the 26 October. No subsequent contact has been made by phone or email.

6. Summary

The diversion weir has been operation in some form since the1890's. The weir's location upstream of the Mataura Falls means it only has the potential to present fish passage difficulties for fish species that have already negotiated the Mataura Falls. Five native fish species (lamprey, shortfin eel, longfin eel, giant kokopu and koaro) were identified as species that may encounter the weir during upstream migrations. For lamprey it is concluded that the diversion weir does not present a barrier. For giant kokopu, koaro and shortfin eels the low numbers of these species and low density of populations downstream coupled with their good climbing ability as juveniles lead to the conclusion that the diversion weir also does not represent a concern with regard to fish passage.

Longfin eel fish passage at the Mataura Falls is certainly difficult and large numbers of elvers may be prevented from attaining upstream passage at the waterfall. However the population of longfin eels upstream of the waterfall and diversion weir does indicate that both the waterfall and the diversion weir are being climbed at times. Intermittent recruitment of longfin elvers is a possibility into the upper catchment and a lack of successful recruitment in recent time maybe giving rise to an observed decline in the commercial fishery. The diversion weir may present a physical obstacle to longfin elvers (and any shortfin elvers present) as they attempt to progress from the vertical climb to the horizontal upper surface. Rounding of the lip of diversion weir top to remove the 90 degree angle could significantly reduce this issue.

7. References

Beentjes, M. P. 2005: Monitoring commercial eel fisheries 2003-04. New Zealand Fisheries Assessment Report 2005/39. Ministry of Fisheries, Wellington. 57p.

Beentjes, M. P.; Chisnall, B. L. 1997: Trends in size and species composition and distribution of commercial eel catches. New Zealand Fisheries Data Report 89. Ministry of Fisheries, Wellington. 71p.

Bonnett, M. L.; McDowall, R. M.; Sykes, J. R. E. 2002: Critical habitats for the conservation of giant kokopu. *Galaxias argenteus* (Gmelin 1789). Science for Conservation 206. Department of Conservation, Wellington. 50p.

Chadderton, W. L. 1990: The ecology of Stewart Island's freshwater communities. Unpublished MSc thesis, Department of Zoology, University of Canterbury, Christchurch.

Chadderton, W. L. & Allibone, R. M. 2000: Habitat use and longitudinal distribution patterns of native fish from a near pristine Stewart Island, New Zealand stream. New Zealand Journal of Marine and Freshwater Research 34: 487-499.

David, B. O. & Closs, G. P. 2001: Continuous remote monitoring of fish activity with restricted home ranges using radiotelemetry. Journal of Fish Biology 59: 705-715.

David, B. O. & Closs, G. P. 2002: Behavior of a stream-dwelling fish before, during and after high-discharge events. Transactions of the American Fisheries Society 131: 762-771.

Hanchet, S. 1990: New records of giant kokopu. Freshwater Catch 42: 18-19.

Jellyman, D. J. 1984: Eels surmount climbing challenges. Freshwater Catch 25: 8-9.

Jellyman, D. J.; Glova, G. J. 2002: Habitat use by juvenile lampreys (*Geotria australis*) in a large New Zealand river. New Zealand Journal of Marine and Freshwater Research 36: 503-510.

Jellyman, D. J.; Glova, G. J. Sykes, J. R. E. 2002: Movements and habitats of adult lamprey (*Geotria australis*) in two New Zealand waterways. New Zealand Journal of Marine and Freshwater Research 36: 53-65.

McDowall, R. M. 1990: New Zealand freshwater fishes; a natural history and guide. Heinemann Reed MAF publishing group, Auckland. 553p.

McDowall, R. M. 2000: The Reed field guide to New Zealand freshwater fishes. Auckland, Reed Books. 224p.

McDowall, R. M. 2006: The taxonomic status, distribution and identification of the *Galaxias vulgaris* species complex in the eastern/southern South Island and Stewart Island. NIWA. 41p.

Pickering, B. B. M. 1949: State policy and hydro electricity in New Zealand 1884-1925: A historical study. Unpublished thesis MArts Department of History. Dunedin, University of New Zealand.

Rasmussen, A. G. 1990: Certain aspects of the biology of a landlocked population of giant kokopu (*Galaxias argenteus* Gmelin 1789). Unpublished thesis, Postgraduate Diploma of Science, Department of Zoology, University of Otago, Dunedin. 79p.

Todd, P. 1979: Wanganui lamprey fishery. Freshwater Catch 2: 19-20.

Todd, P. 1990: Lampreys - are they rare. Freshwater Catch 44: 13-14.

Tweed, T. 1987: And the rains came down, and the lampreys went up. Freshwater Catch 33: 10-11.

E

APPENDIX E

Golder Associates – Mataura River – Ecological Summary and Assessment Dec 16

REPORT

December 2016

ALLIANCE MATAURA

Mataura River – Ecological Summary and Assessment

Submitted to:
Doyle Richardson
Alliance Group Limited
PO Box 1410
Invercargill

Report Number: 1656011_7410-002-R-Rev4

Golder Associates

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APPENDICES

APPENDIX A
Report Limitations

1.0 INTRODUCTION

This report[1], prepared by Golder Associates (NZ) Limited ("Golder") for Alliance Group Limited ("Alliance"), presents an ecological summary and assessment, based on historical information as part of a resource consenting renewal process, for the Alliance Mataura plant hydro-electric water take race (hydro-race) discharge consent renewal.

The scope of the project includes a review and assessment of the following:

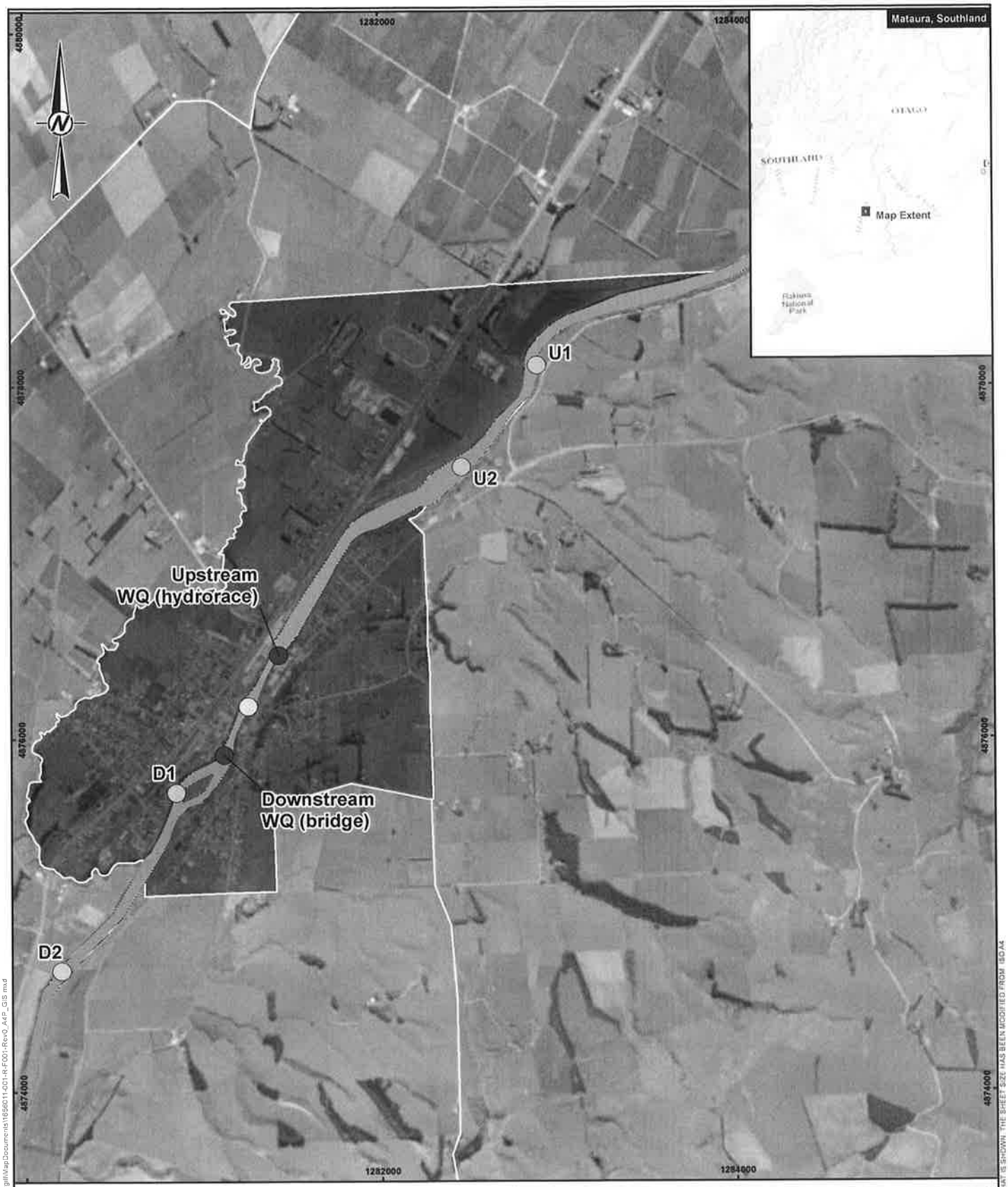
- A summary of the aquatic environment upstream and downstream of the Alliance Mataura plant derived from historic monitoring data and the Land Air Water Aotearoa (LAWA) database.
- A technical review of the 2006 assessment of environmental effects (AEE) report for the sediment discharge from the maintenance of the hydro-race to ascertain if the AEE is still relevant, and if any updates are needed in terms of ecological effects.
- A technical review of the Golder (2007), Ryder (2005) and Holloway (2016) reports on the existing upstream and downstream fish passage issues associated with the natural rock waterfall (falls) and upstream water take weir structure.
- An assessment of the current environmental effects of the downstream fish passage through the Alliance water intake structure based on the Ryder (2005) report.

Site visits were undertaken on 27 April and 8 November 2016 by Golder to visually inspect the Alliance Mataura processing plant hydro-race and turbine, weir structure, the falls, and the aquatic habitat (both upstream and downstream of the plant) to gain a greater understanding of the site. The site visits and discussions with Doyle Richardson (Alliance Environmental Advisor), Frances Wise (Alliance Environmental Manger) and Mark Witham (Alliance Engineering Supervisor) enabled Golder to gain the required understanding of the operation in order to complete the following assessment.

2.0 SUMMARY OF THE EXISTING AQUATIC ENVIRONMENT

Water quality and ecological monitoring is undertaken by Alliance during the meat processing season as a requirement of a discharge permit. Weekly water quality sampling is undertaken upstream (hydro-race) and downstream (Mataura Bridge) of the Alliance Mataura process plant discharge point. Ecological samples are taken annually from two upstream sites, U1 and U2, and two downstream sites, D1 and D2 (Figure 1). The water quality is included within this report to provide contextual information on the current state of the Mataura River upstream and downstream of the processing plant, as the majority of the water quality parameters are not affected by the hydro water take and discharge. The following summary describes the water quality of the Mataura River based on Alliance annual compliance monitoring data (2011 to 2016) and the LAWA database, using data from the Mataura River (200 m downstream of Mataura Bridge) long-term monitoring site.

[1] This report is subject to Golder's Standard Report Limitations which are provided in full in Appendix A.



LEGEND

- Site
- Discharge point
- WQ sampling point
- Mataura (Area Unit)
- Area Unit
- Mataura River

0 500 1,000 Metres

REFERENCE SCALE: 1:30,000 (at A4)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: LINZ NZTopo Series, CC-BY-3.0-NZ.
3. Site features sourced from Fresh Water Solutions Environmental Consultants, Report No. ALLGR-STL_006-Mataura Report 020714-FINAL, Figure 1.
4. Schematic only, not to be interpreted as an engineering design or construction drawing.

CLIENT
ALLIANCE GROUP LIMITED

PROJECT
MATAURA RIVER – ECOLOGICAL SUMMARY AND ASSESSMENT

TITLE
WATER QUALITY AND ECOLOGICAL MONITORING SITES

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-10-03
PREPARED	KC
REVIEWED	RW
APPROVED	JM

PROJECT NO	REPORT	REV	FIGURE
1656011	001	0	01

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2.1 Water Quality

The following water quality parameters are measured upstream and downstream of the discharge point as part of the Alliance water quality monitoring programme:

- Temperature
- Conductivity
- pH
- Total suspended solids (TSS)
- Total phosphorus (TP)
- Dissolved reactive phosphorus (DRP)
- Ammoniacal-nitrogen (NH_4-N)
- Nitrate-nitrogen (NO_3-N)
- Nitrite-nitrogen (NO_2-N)

Water quality analyses are undertaken by Citilab. The test results between 2011 and 2016 are presented in Table 1 (as median value with range in parentheses). Trend analyses using seasonal Kendall tests were performed on the Alliance water quality data to test for any significant trends in water quality parameters over the six-year period. For context, relevant water quality data has also been obtained from the LAWA database for the Mataura River (200 m downstream of Mataura Bridge) and presented with 10-year trend analyses.

Table 1: Summary of Mataura River water quality sampling results undertaken between 2011 and 2016.

	Alliance data		LAWA data
Parameter	**Upstream (Hydro-race)**	**Downstream (Bridge)**	**Mataura River**
Temperature	10.8 (2.3 – 20.0)	10.9 (2.3 – 19.9)	No data
Conductivity	8.5 (4.5 – 14.0)	8.8 (4.3 - 14.0)	No data
pH	7.4 (6.4 - 8.3)	7.4 (6.5 - 8.3)	7.4 (-)
TSS	5.0 (<3 - 480)	6.0 (<3 - 490)	No data
TP	0.02 (<0.02 –0.42) (+)	0.03 (<0.02 – 0.42) (+)	0.025 (+)
DRP	0.01 (<0.005 - 0.05) (+)	0.014 (<0.005 - 0.16) (+)	No data
NH_4-N	0.03 (<0.01 - 0.24)	0.05 (<0.01 - 0.27)	0.035 (+)
NO_3-N	0.84 (0.3 - 1.81)	0.87 (0.35 - 1.85)	No data
NO_2-N	0.004 (<0.002-0.016)	0.004 (<0.002 - 0.017)	No data

Note: Units are g/m^3, except for pH (unitless), Conductivity (µS/cm @ 25°C). For the Alliance data, the difference between upstream and downstream sites are median values with minimum and maximum values in brackets. Symbols in parentheses indicate six-(Alliance data) and 10-year (LAWA) trends (significant improvements = +; significant degradation = -; no symbol = no significant trend.

The differences in temperature, conductivity, pH, TSS, TP, NH_4-N, NO_3-N and NO_2-N are considered minor and not environmentally meaningful as the slight increases are unlikely to result in an ecological response. At both upstream and downstream sites TP, DRP, NH_4-N and NO_3-N data varies seasonally, which is likely to be influenced by river flow as shown in the minimum and maximum values that is typical of most natural freshwater systems. Trend analyses performed on the Alliance water quality data found significant and meaningful improvements in TP and DRP at both upstream and downstream sites. The LAWA data

indicates a similar trend with a significant and meaningful improvement in TP and NH_4-N over the 10-year period to 2014. The LAWA data also shows a significant degradation in pH over the same timeframe, but this change was not considered environmentally significant.

In general, water quality parameters that are most relevant to the hydro water take and discharge are temperature and TSS due to potential effects of water being discharged from the turbine and sediment released from the hydro-race. Statistical analyses, using a Wilcoxon signed-rank test (non-parametric equivalent of a paired t-test), were performed on Alliance's temperature and TSS water quality data to test for differences between the upstream and downstream sites. A significant difference in temperature was observed in 2011 and 2013, with elevated temperature at the downstream site, with the opposite pattern occurring in 2012. Although this difference was found to be significant it is not considered environmentally meaningful, as the differences between sites were low (mean difference in 2011: 0.19°C; in 2012: 0.15°C; in 2013: 0.04°C), and are unlikely to have resulted in a discernible ecological response. With respect to TSS concentrations, the downstream site recorded significantly higher TSS concentrations in 2012, 2013 and 2016. However, the difference between sites during these three years were low (mean difference in 2012: 2.0 g/m^3; in 2013: 0.9 g/m^3; in 2016: 4.3 g/m^3). These increases in TSS concentrations between sites is unlikely to have had a discernible effect on downstream ecological values.

2.2 Ecology

Ecological monitoring samples are taken upstream and downstream of the discharge point during summer low flow conditions. Annual data collected between 2014 and 2016 is used in this section, with all sites depicted in Figure 1 above. The following ecological parameters were measured:

- Periphyton cover %
- Ash-free dry weight (AFDW)
- Chlorophyll *a*
- Heterotrophic growths
- Autotrophic index
- Macroinvertebrate community composition (QMCI, MCI, EPT, Percent EPT and total taxa)

Periphyton cover, AFDW, chlorophyll *a*, and macroinvertebrate community indices are considered the most relevant ecological monitoring parameters for assessing water quality. These are relevant to the hydro water take and discharge to the lower Mataura River, and these are the focus of this section of the report.

2.2.1 Periphyton Communities

Percentage of periphyton cover was variable across sampling sites U1, U2, D1 and D2 with thick mats and filamentous algae increasing in biomass at both upstream and downstream sites in 2014 and 2015. Thin film dominated all sites in 2016. Periphyton cover between 2014 and 2016 has remained below the recommended MfE guidelines of >60 % thick algal mat, >30 % long filamentous algal mat and below the Biggs (2000) recommended thresholds for the protection of aesthetics, recreation and trout habitat and angling.

The difference in mean AFDW between upstream and downstream sampling sites varied amongst years. No difference was detected in AFDW between sites in 2014 and 2016; however, a significant increase upstream of the discharge point was detected in 2015. During the monitoring period, AFDW was below the 35 g/m^2 threshold for protection of trout habitat and angling.

The difference in mean chlorophyll *a* between the upstream and downstream sampling site was also variable amongst years. Significant increases in chlorophyll *a* were recorded upstream of the discharge point in 2014, whereas no significant differences recorded in 2015 and 2016. Mean chlorophyll *a* exceeded the 50 mg/m^2 threshold for protection of benthic biodiversity in 2014 at U1, U2 and D2 sampling sites, but was

below this threshold in 2015 and 2016 at all sites. Mean chlorophyll *a* was below the 200 mg/m^2 threshold for the protection of trout habitat and angling at all sites between 2014 and 2016.

2.2.2 Macroinvertebrate Communities

The macroinvertebrate community monitoring indicated variability in community composition amongst sites and years, but there was no statistically significant difference in QMCI score upstream and downstream of the discharge in any year (QMCI scores were generally in the 'poor' or 'fair' class, with the exception of site U2 which produced an 'excellent' score in 2014).

The number of taxa was highly variable, with a significant increase observed at the downstream sites (D1 and D2) compared with the upstream sites in 2014 and 2015, but there was no significant difference in 2016. Mean taxa number ranged from 12 to 18, indicative of low to moderate diversity.

Mean %EPT taxa varied between 24 % and 77 %, with no consistent differences between the sites. There was no significant difference in % EPT taxa between upstream and downstream sites in 2014, but a significantly lower % EPT taxa downstream of the discharge point in 2015. In contrast, % EPT was significant higher downstream of the discharge point in 2016.

The invertebrate data from the LAWA for the Mataura River (200 m downstream of Mataura Bridge) was consistent with that observed at the Alliance monitoring sites. The LAWA data indicated 'fair' class for the MCI metric (Alliance QMCI = poor to fair), with the number of taxa being 20 (Alliance = 12 to 18) and percent EPT richness 45 % (Alliance = 24 % to 77 %).

2.3 Summary

The Alliance monitoring data has been summarised and compared with the longer term data from Environment Southland State of the Environment monitoring site (obtained from the LAWA database) to summarise the existing aquatic environment. A summary of the key findings are presented below:

- The differences in conductivity, pH, TP, NH_4-N, NO_3-N and NO_2-N are considered minor and not environmentally meaningful as the slight differences between the upstream and downstream sites are unlikely to result in an ecological response. These parameters are also not considered to be associated with the operation of the hydro-race and are only given as background ecological information on the Mataura River.
- Temperature and TSS are the only parameters that are likely to be affected by the operation of the hydro-race. However, the statistically significant differences in temperature and TSS are not considered to be environmentally meaningful and are unlikely to have resulted in an ecological response. Therefore, it is considered that the operation of the hydro-race is unlikely to have a discernible effect on instream ecological values.
- Trend analyses performed on Alliance's water quality data, as well as data obtained from the LAWA database, indicates that concentrations of TP, DRP and NO_3-N have declined over time. Although this is positive for the overall ecological health of the lower Mataura River, these parameters are not associated with the operation of the hydro-race.
- Despite the improvement in the concentrations of certain water quality parameters over time, the LAWA database nevertheless indicates that the Mataura River generally has degraded water quality, being in the worst 25 % and 50 % of all lowland sites in New Zealand for NH_4-N and DRP, respectively.
- The Alliance ecological monitoring data is highly variable amongst sites upstream and downstream of the discharge point and amongst years. However, all ecological monitoring data is below the thresholds for the protection of aesthetics, recreation and trout habitat and angling. Considering the above water temperature and TSS data, the operation of the hydro-race is unlikely to affect the macroinvertebrate community. The poor to fair macroinvertebrate community quality class ranking is likely a reflection of

degraded water quality and/or in-stream habitat as a result of activities in the upper catchment (e.g., intensive agriculture).

3.0 SEDIMENT DISCHARGE FROM THE HYDRO-ELECTRIC WATER TAKE RACE

This section provides a technical review of the Assessment of Environmental Effects (2008) for the discharge of sediment from desilting activities within the hydro-race.

3.1 Background

Alliance jointly with Mataura Industrial Estate (MIE) manage a water take weir structure upstream of both the Alliance Mataura and MIE plant. Approximately 6 to 10 m^3/s of water is diverted into the Alliance 300 m hydro-race located on the true right bank. The water is used for processing supply and electricity generation and then flows back into the river downstream of the plant.

The hydro-race periodically silts up after natural flooding in the Mataura River and requires mechanical desilting. Prior to desilting, the hydro-race is isolated from the river by installing a temporary coffer dam at the hydro-race entrance, the hydro-race is then drained and silt and other debris mechanically excavated. Due to the location of the hydro-race and the logistical issues with removing the silt and depositing it on land, the silt is disposed of onto the bed of the Mataura River; therefore, Alliance requires a consent to discharge sediment into the Mataura River. It must be noted that the hydro-race is only periodically desilted – records show that it was done in 1986 and 2007.

3.2 Technical Review

The hydro-race was most recently desilted between 29 October and 3 November 2007. Upstream (U1) and downstream (D1 and D2) monitoring was conducted on the 2 November to determine if desilting the hydro-race had any environmental effects on the Mataura River. The following parameters were measured and compiled from a different data set from the values within Table 1 above:

- River flow.
- Water clarity using the black disc methodology.
- Turbidity (NTU) and Total Suspended Solids (TSS).
- Sediment gain size analysis from material deposited into the Mataura River.
- Visual observations of water clarity.

3.2.1 Results

During desilting works the river flow ranged between 77 m^3/s to 143 m^3/s. Water clarity was measured and water samples collected when the river flow was 100 m^3/s. Black disc observations indicated a 3 cm decline in water clarity between upstream and downstream sampling locations (upstream > downstream). Turbidity increased by 7 NTU and TSS by 3 g/m^3 between upstream and downstream sampling locations (upstream < downstream).

It was noted that the deposited sediment remained in place until 2 March 2008 when the river flow increased to 290 m^3/s. Additional monitoring of TSS was undertaken between 13 November 2007 and 18 March 2008. The downstream sampling location was slightly elevated – 2 g/m^3 was the greatest difference recorded between upstream and downstream. During peak flows in December and March the upstream and

downstream sampling locations show the same increasing trend in TSS, with a similar TSS maximum (March – 20 and 21 g/m^3 [upstream < downstream]).

Sediment grain size analysis undertaken on material deposited into the Mataura River identified 95.7 % gravel, and only 0.4 % silt and clay. Visual observations in water clarity detected no difference between upstream and downstream sampling locations.

3.2.2 Summary

A summary of the Assessment of Environmental Effects for the discharge of sediment and sediment-laden water from desilting activities within the hydro-race is presented below:

- The difference in the black disc results are considered minimal and are within the tolerances of sampling error; therefore, the slight decrease in water clarity between upstream and downstream sampling locations (upstream > downstream) is not considered environmentally meaningful.
- Turbidity and TSS increased from upstream to downstream sampling locations (upstream < downstream); however, the difference is small and unlikely to be environmentally meaningful.
- The slight elevation in TSS between the upstream and downstream sampling locations (upstream < downstream) between November and March is considered to be minimal. The likely cause of this elevation may not have been caused by the deposited material, as the difference in TSS between upstream and downstream sampling locations remained after the material was washed away in the flood that occurred between 2 to 5 March, as indicated by Figure 13 within the AEE report.
- The sediment grain size analysis further supports that the discharge of sediment from the material deposited into the Mataura River during the 2007 hydro-race desilting was minimal containing only 0.4 % silt and clay material. Therefore, it is considered to have a minimal effect on instream TSS concentrations.
- The information within the AEE report is still considered relevant and up to date with the data presented within the AEE suggesting that the race desilting has a negligible effect on instream values. As discussed in section 2.3, the difference in TSS concentrations between sites were low. The median, minimum and maximum TSS concentrations over the six-year period (2011–2016) from both the upstream and downstream sites are similar, which suggests that TSS concentrations are primarily driven by larger scale processes within the catchment. Therefore, it is considered that the operation of the hydro-race is unlikely to result in increased downstream TSS concentrations, which would have an adverse effect on downstream ecological values.

4.0 FISH PASSAGE

This section provides a technical review of the effects on upstream fish passage of the upstream water take weir structure including the falls and downstream fish passage issues through the Alliance hydro-race take.

4.1 Background

As stated in section 3, a water take weir structure is located above the Alliance and MIE plants that diverts a proportion of the river flow into both Alliance and MIE hydro-races. It is understood that the water take weir was built in the 1890s and the two water races in the 1920s or 1930s. Alliance and MIE diversions are required by resource consent conditions to operate together resulting in a minimum of 0.05 m of water spilled over the crest of the diversion weir at all times when exercising the consent. The falls are located downstream of the water take weir structure and water take race inlets between both Alliance and MIE

plants. The falls extend to the width of the Mataura River with the walls of the Alliance and MIE plants adjoining the true river right and left margins of the rock formation.

A list of native diadromous fish species present in the Mataura River has been obtained from a previous Golder report (Golder, 2007) and summarised below (Table 2). There have been no further native species recorded and entered in the New Zealand Freshwater water Fish Database (NZFFD) since this time. There are eleven known diadromous native fish species found within the Mataura River catchment, that at a particular life stage migrate upstream or downstream.

Six of the eleven diadromous native fish species are considered poor or moderate climbers so have not historically migrated past the falls pre development. Shortfin eels are not commonly found above the falls due to an unexplained natural phenomenon with the eel population above the falls being predominantly made up of longfin eels (Golder, 2007). Both shortfin and longfin eels migrate upstream in a juvenile form called elvers, and hereafter the term 'elvers' will be used to describe both shortfin and longfin juvenile eels. Although a landlocked population of giant kokopu is found above the falls, juveniles are not known to migrate past the falls with koaro only being reported below the falls (Golder 2007). Although data is considered deficient for giant kokopu and koaro, they are considered with elvers and adult lamprey in the following review of the fish passage issues.

Table 2: Diadromous native fish species found in the Mataura River.

Scientific species name	Common name	Climbing ability (poor, moderate, good)
Anguilla dieffenbachii	Longfin eel	Good (elvers)
Anguilla australis	Shortfin eel	Good (elvers)
Cheimarrichthys fosteri	Torrentfish	Poor
Galaxias argenteus	Giant kokopu	Good (juvenile form)
Galaxias maculatus	Inanga	Poor
Geotria australis	Lamprey	Good
Gobiomorphus cotidianus	Common bully	Moderate
Gobiomorphus huttoni	Redfin bully	Moderate
Reptropinna retropinna	Common smelt	Poor
Galaxias brevipinnis	Koaro	Good
Rhombosolea retiaria	Black flounder	Poor

4.2 Effects on Upstream Fish Passage of the Mataura Falls and Water Take Weir Structure

In summary the Golder (2007), Ryder (2005) and Holloway (2016) reports give a detailed description of the native fish populations in the upper Mataura River catchment, the effects of the falls and water take weir structure on the upstream migration of native fish and a native fish trap and transfer methodology promoting upstream migration of elvers and other species during low flow conditions during the migration season.

The falls are considered to be a natural barrier for upstream migration of diadromous species with poor to moderate climbing abilities. Lamprey, elvers, giant kokopu (juvenile) and koaro are able to climb the falls but require certain physical characteristics such as moisture on lateral margins of rock chutes, low velocities, non-overhanging rock ledges and the presence of moss or other similar vegetation to promote climbing (Golder 2007). The falls are not considered a total barrier for climbing species but a partial barrier dictated by river flow and rock surface characteristics such as moisture and variable flow (Golder 2007, Holloway 2016). Observations have been made of elvers and lamprey congregating below the falls and sluice gate structures and then disappearing overnight from which it is thought that they have migrated upstream when conditions become favourable. From observations while conducting the site visits and reviewing the above

reports Golder considers that the falls are a natural barrier to non-climbing native fish species and that climbing species are only able to climb certain parts of the falls when suitable conditions prevail, which is likely to be associated with moderate to high river flow.

The water take weir structure is located above the falls and therefore only lamprey, elvers, giant kokopu (juvenile) and koaro need to be considered, as discussed above native species with poor-moderate climbing abilities are unable to progress past the falls into this part of the river. The water take weir structure was not considered as much of an upstream migration barrier for lamprey, elvers, giant kokopu (juvenile) and koaro based on the climbing abilities of these native fish, slope of the weir face, areas of low water velocity at certain river flows and the coarseness of the concrete surface working as an adhesive with the body of the climbing native fish (Golder 2007). There is limited information in the Golder (2007) and Ryder (2005) reports regarding the seasonal variability of water spilling over the water take weir structure and how this increase or decreases the potential climbing areas on the face of the water take weir structure and any anecdotal evidence or observations of native fish climbing the water take weir structure.

The MIE report (Holloway 2016) has concluded that elver accumulation below the falls corresponds with river flow. It is likely that when river flow increases the potential climbing areas (chutes and rock ledges and low velocity areas on the water take weir structure) also increase. It is considered that this is largely seasonal and dependant on river flow being less than 80 m^3/s during peak migration times. This is further alluded to in the Golder report (2007) that states lamprey have been observed congregating below the falls and within the hydro structure by the plant operators. The lamprey disappear overnight when flow or suitable conditions prevail. Golder considers that there is enough information presented in the three reports above that suggests the falls and water take weir structure are flow-dependant barriers for lamprey, giant kokopu (juvenile), elver and koaro during peak upstream migration times.

An elver trap and transfer plan has been developed for low flows periods (when flows are less than 80 m^3/s). The programme aims to identify the peak elver migration by weekly night inspections from 15 January, then once elvers are located in the area (30 – 50 individuals), inspections are increased to twice weekly. If the twice weekly inspections locate substantial accumulations of elvers, the trap is installed and remains until less than 20 elvers are caught per night over a seven-day period. It is considered that the fish trap and transfer is warranted during low flow conditions when the falls and water take weir structure are considered a barrier to upstream migration. Overall, it is considered that the trap and transfer plan will work well if implemented by someone suitably qualified and experienced in such work.

4.3 Hydro-race Downstream Fish Passage

The Alliance hydro-race on the true river right bank of the Mataura River has a permanent flow of approximately 6 to 10 m^3/s down a 300 m race to a 530 kW hydro-electric turbine. Water is then diverted back into the river below the falls. When the hydro-electric turbine is not in use water is diverted at the entry gate of the turbine and spilled back into the river in the middle of the falls area.

There is potential for native fish species such as longfin eel and lamprey, and potentially shortfin eels and giant kokopu to be either actively or passively entrained into the hydro-race during peak downstream migration in autumn and winter (March to May for eels; July to August for lamprey) due to the high flow rate at the hydro-race inlet. Ryder (2005) gives a detailed assessment of the likely environmental ques (seasonal influences, temperature, rainfall and high flow events, lunar cycles and barometric pressure), which promote the downstream migration of longfin eels. Ryder (2005) also states that peak downstream migration of eels is likely to occur during flood events in autumn. Observations from commercial eel fishers also suggests that downstream eel migrations are greatest during March and April (Vic Thompson, Mossburn Enterprises Ltd, pers. comm.). Golder agrees with the above assessment in terms of when longfin eels are likely to migrate on high flow events, as this usually coincides with the other environmental ques listed above.

The potential for lamprey entrainment into the hydro-race is lower, as it has previously been observed that downstream migrating individuals were mainly present in the mid-river near the surface in the Waikato River (where the velocities were greatest) (James 2008; and references therein). Similar to eels, it is noted that downstream migration occurs during increased river flows (James 2008; and references therein), which

further reduces the potential for entrainment into the hydro-race. In addition, an investigation by Boubée (2003) estimated that mortality for smaller-sized fish during passage through turbines in the lower Waitaki River, based on reasonably low-head (30 m) Kaplan turbines, to be as low as 3 – 6 % for trout fry (30 mm in length) and 5 – 7 % for fingerlings (115 mm in length). Therefore, it is unlikely that passage through the turbine will have a significant effect on downstream migrating lamprey (macrophtalmia [miniature adults]) (80 – 120 mm in length). This is further supported by Mitchell & Boubée (1992), who predicted juvenile lamprey mortality rates at Matahina Dam (Francis turbine) of 3.8 %. That same study estimated that migrant longfin eel females would experience mortalities of 75.5 %.

The predicted mortality of varying sizes of eels (and lamprey) passing through Alliance's open-flume Francis turbine was estimated using the model developed by Larinier & Dartiguelongue (1989):

- $P = 6.54 + 0.218\ H + 118\ TL - 3.88\ D1m + 0.0078\ N$

Where, *P* is the percent mortality rate, *H* (m) is the net head, *TL* (m) is the length of the fish, *D1m* (m) is the entrance diameter of the turbine at mid-height, and *N* (rpm) is the rotation speed.

The predicted mortality rates are shown in Table 3.

Table 3: Predicted mortalities for fish passaging through Alliance's Francis turbine.

Fish length (mm)	Predicted mortality (%)
100	13.9
200	25.7
300	37.5
400	49.3
500	61.1
600	72.9
700	84.7
800	96.5

Note: Predictions based on the model developed by Larinier & Dartiguelongue (1989).

These results predict high mortality for migrant eels (especially larger females) that pass through the turbine. This result is in agreement with previous studies, which show that turbine survival of large New Zealand migrant eels, especially at small turbines, was likely to be nil (Mitchell & Boubée 1992). However, juvenile lamprey have considerably lower predicted mortalities from passage through the turbine. It is acknowledged that mortality rates are related to the angle of the guide vanes at entry to the turbine (mortality increases as the vanes close) (Mitchell & Boubée 1992). However, the blades are usually in a fully open position, with entrance angle being reduced only during periods of low flow (to maintain a minimum water level [0.05 m] over the crest of the diversion weir) (Doyle Richardson, Alliance, pers. comm.). The potential for significant downstream eel migrations during these periods is likely to be very low.

Assessment of giant kokopu and koaro is limited given the lack of data available for the distribution of these species upstream of the falls. Notwithstanding this point, Golder (2007) suggests that there is unlikely to be migratory populations of giant kokopu upstream of the falls. While downstream migration of adult giant kokopu during high discharge events has been observed (David & Closs 2002), as well as the suggestion that there may be a downstream spawning migration (McDowall 2000), such downstream migrations would leave adults stranded downstream of the falls, rendering them unable to migrate back upstream to their original territories. Bonnett et al. (2002) also suggest that "*records of giant kokopu at extremes of elevation and inland penetration do not necessarily represent sea-migratory fish*", as landlocked populations (i.e., with no marine phase) are known to occur and may in fact be reasonably common in certain habitats. The authors of that report also suggest that giant kokopu are mostly a low elevation/coastal species. With respect to koaro, the study by Boubée (2003) also stated that larvae of native species (including koaro) were expected to survive passage through the low head turbines for that scheme. Therefore, it is likely that any

potential koaro (or giant kokopu) larvae passage through the turbine will have a minimal impact on their population.

With respect to trout populations upstream of the falls, it seems unlikely that there would be significant downstream migration or displacement of trout through the turbine. While brown trout are known to undertake significant migrations, these are primarily associated with upstream migrations to suitable spawning areas (Northcote 1992). Considerable that the falls are a barrier to trout passage, there are likely to be two distinct trout populations present in the Mataura system: one upstream and another downstream of the falls. Any trout upstream of the falls will be migrating upstream to spawn, while any resident trout (as well as sea-run trout) downstream of the falls will spawn in suitable reaches of the lowland tributaries.

The proportion of residual flow (relative to Alliance's take of 9.91 m^3/s) will be higher during these higher flow periods (i.e., Alliance take constitutes ~18 % at 55.7 m^3/s [median flow at Tuturau[2]], ~13 % at 71.9 m^3/s [mean flow at Tuturau], and ~2.5 % at 400 m^3/s [maximum flow at which Alliance can take]). The proportion of flow taken by Alliance during the longfin eel downstream migration period (March to May) can be seen in Table 4. As can be seen, there has been yearly differences in mean flow rates for this three-month period over the previous 10-year period. Nevertheless, Alliance's take constitutes approximately 23 % of median daily river flow for the corresponding period over the previous 10 years. It is difficult to accurately predict what increase in river flow over this period is required to trigger downstream migration for longfin eels (Jellyman 2012), as temperature, barometric pressure (amongst others) are also known to be influential. However, it is likely that flows would, on average, need to be well in excess of 39 m^3/s to trigger peak downstream eel migrations. Therefore, this would further reduce the relative proportion of Alliance's take from the river flow (up to 400 m^3/s, above which no water is diverted). Furthermore, Alliance also cease their water take at lower flood flows (below 400 m^3/s) if the river is carrying considerable quantities of debris (MWH 2007). This will further decrease the potential for fish entrainment into the hydro-electric turbine.

[2] The Mataura River flow recording site at Tuturau is located approximately 7.5 km downstream of the Alliance site. River flow statistics (median and mean flow) for Mataura River at Tuturau obtained from Environment Southland (http://envdata.es.govt.nz/?c=flow&tab=hydro, accessed 21 December 2016).

Table 4: River flow statistics from the Mataura River at Tuturau relative to Alliance's take.

Year	Median daily flow from March to May (incl.)	Min – Max daily flow from March to May (incl.)	Alliance take (% of mean daily river flow) from March to May (incl.)
1996	39.4	16.6 – 390.0	25 %
1997	52.5	18.3 – 493.1	19 %
1998	43.9	27.3 – 233.1	23 %
1999	39.4	9.3 – 221.6	25 %
2000	34.9	18.4 – 160.8	28 %
2001	15.5	11.1 – 135.1	* (see footnote)
2002	33.1	17.6 – 513.7	30 %
2003	18.8	12.8 – 74.4	* (see footnote)
2004	55.7	26.5 – 375.3	18 %
2005	42.7	20.4 – 196.7	23 %
2006	49.5	21.0 – 487.8	20 %
2007	29.1	14.6 – 137.3	34 %
2008	25.2	15.4 – 275.0	39 %
2009	32.8	18.1 – 518.2	30 %
2010	27.1	13.2 – 477.5	37 %
2011	58.5	33.3 – 305.7	17 %
2012	42.4	19.2 – 328.2	23 %
2013	15.4	10.3 – 273.2	* (see footnote)
2014	48.5	14.5 – 385.4	20 %
2015	69.7	21.7 – 231.9	14 %
2016	20.2	15.2 – 771.3	* (see footnote)
Median (1996–2016)	**39.4**	**9.3 – 771.3**	**23 %**

Note: River flow data provided by Environment Southland. * When flows drop below 22.01 m^3/s (required to maintain 0.05 m water level over the crest of the diversion weir) flow sharing occurs between Alliance and MIE, which will reduce the proportion of flow that Alliance take.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations have been made based on information reviewed for this report:

- Temperature and TSS are the only instream parameters that may be affected by the operation of the hydro-race. However, the statistically significant differences in temperature and TSS recorded between upstream and downstream sites are not considered environmentally meaningful and are unlikely to have resulted in an ecological response. Therefore, it is considered that the operation of the hydro-race is unlikely to have an effect on instream ecological values.
- The discharge of sediment during hydro-race desilting is considered to have negligible effects on the river, based on TSS and visual observations reported within the 2008 AEE and the low frequency of desilting. Therefore, the information in the 2008 AEE is still considered relevant and up to date.
- The falls represent a natural barrier for fish passage to non-climbing fish species, resulting in naturally low diversity and population densities of native fish species in the upper Mataura River catchment. The

falls and the water take weir structure are considered a barrier to climbing native species during river low flow conditions.

- The Golder (2007), Ryder (2005) and Holloway (2016) reports should be read in conjunction with each other for a greater understanding of the upstream and downstream native fish migration dynamics. The information contained within these reports are all considered relevant and up to date; however, they all focus on slightly different aspects of the hydro plant or native fish migration phase but when considered together information gaps are filled.
- The elver trap and transfer programme should be implemented if elvers and other climbing native species congregate below the falls during their respective peak upstream migration period that may occur during river low flow conditions.
- The Ryder (2005) report is considered correct in terms of downstream migration periods for eels (longfin and shortfin), and that the likely downstream migration peak period is during flood events in autumn. The proportion of residual river flow will be higher during these high flow events, coupled with the fact that the hydro-plant ceases operation at flows greater than 400 m^3/s. Therefore, this will help to minimise the potential for fish entrainment into the hydro-electric turbine.
- It is nevertheless recommended that periodic operational shutdown of the turbine occur during elevated flow events during nights in autumn. This will enable downstream migrating eels that enter the intake race to be safely returned to the river at the flood bypass gate, upstream of the falls. The greatest challenge with this approach is selecting the most accurate triggers for peak downstream eel migration periods. There have been numerous studies showing that eel migration is strongly influenced by rainfall and increases in river flow (Boubée et al. 2001; Watene et al. 2003; Watene & Boubée 2005). Declining temperatures also influence eel migration – with migrations ending with temperatures drop below ~11°C (Boubée et al. 2001). Similarly, barometric pressure and lunar cycle have been shown to influence downstream eel migration (Burnet 1969; Boubée et al. 2001; Boubée & Williams 2006). Notwithstanding these points, migrant eels in New Zealand typically migrate downstream at night during, or soon after, rainfall events (Boubée & Williams 2006, and references therein). This has previously been observed by other earlier studies. For example, Burnet (1969) found that the greatest peak in downstream migrating eels in a Canterbury river occurred when floods coincided with the new moon. In addition, Lowe (1952) found that the greatest catches were observed on rising floods, with catches falling off on subsequent nights. Unsurprisingly, the range of the migration peak has also been suggested to vary with catchment size; small catchments have a more sharply defined peak in comparison with larger catchments (Mitchell & Boubée 1992). This is likely to reflect the time required for eels to move downstream in larger catchments. Attempts have been made to provide hydrogenation operators with management tools to allow the safe passage of migrant eels. For example, Watene & Boubée (2005) trialled the selective opening of the Patea hydroelectric dam spillway gates for 2.5 hours during the autumn of 2000, and captured 51 live longfin eels and 60 live shortfin eels (in addition to eight dead shortfin eels) in a large fyke net set below the spillway. The authors of this study concluded that "*selective opening of hydroelectric dam spillway gates can provide safe downstream passage for migrant eels*". Similarly, Boubée et al. (2001) also demonstrated that rainfall events exceeding a cumulative total of 40 mm over three days accounted for 60 % of migrant eels arriving at Aniwhenua dam. This study also suggested that such an approach can be used as a means of determining when mitigation measures such as flood gate opening need to be implemented. Notwithstanding this point, it is likely that fish are stimulated to move by a change in flow relative to preceding flows, rather than by flows of a particular magnitude, with flows in the order of 2 – 4 times the median or preceding base flow being associated with movement of several species (Snelder et al. 2011). Hay & Kitson (2013) (and references therein) suggest that small increases of 2 – 3 times the preceding flow can result in movements of juvenile and adult eels and lampreys. As a conservative approach, it is recommended that Alliance cease night time generation (ceasing from dusk) during fresh/flood events during March and April, when river flows increase by more than 50 % from the preceding day's flow. This two-month period has been selected based on published information and also on observations from commercial eel fishers that suggests that downstream eel migrations in the Mataura River peak during March and April (Vic Thompson, Mossburn Enterprises Ltd, pers. comm.). Once implemented, nightly shutdowns

should be remain in place for two consecutive nights after the flood peak has passed (i.e., hydroelectric generation can recommence on the second night of a falling limb of a fresh/flood).

- Overall, it is considered that the operation of the hydro-electric turbine, and the associated infrequent sediment removal from the hydro-race, will not have a significant adverse effect on the aquatic ecology and water quality of the Mataura River if the recommended mitigation (listed above) are implemented.

6.0 LIMITATIONS

Your attention is drawn to the document, "Report Limitations", as attached (Appendix A). The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The "Report Limitations" is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

7.0 REFERENCES

Allibone R 2007. Assessment of hydroelectric diversion effects on fish passage. Report prepared for Alliance Group by Golder Associates (NZ) Limited.

Bonnett ML, McDowall RM, Sykes JRE 2002. Critical habitats for the conservation of giant kokopu, *Galaxias argenteus* (Gmelin, 1789). Science for Conservation 206. Published by the Department of Conservation.

Boubée JA, Mitchell CP, Chisnall BL, West D, Bowman EJ, Haro A 2001. Factors regulating the downstream migration of mature eels (*Anguilla* spp.) at Aniwhenua Dam, Bay of Plenty, New Zealand. New Zealand Journal of Marine and Freshwater Research 35: 121-134.

Boubée J 2003. Project Aqua – Migrant fish protection measures: Concept report. National Institute of Water & Atmospheric Research Ltd, Hamilton. NIWA client report: MEE01205. 66 p.

Boubée JAT, Williams EK 2006. Downstream passage of silver eels at a small hydroelectric facility. Fisheries Management and Ecology 13: 165–176.

Burnet AMR 1969. Migrating eels in a Canterbury river, New Zealand. New Zealand Journal of Marine and Freshwater Research 3 (2): 230-244.

David BO, Closs GP 2002. Behavior of a Stream-Dwelling Fish before, during, and after High-Discharge Events. Transactions of the American Fisheries Society 131(4): 762–771.

Hay J, Kitson J 2013. Flow Harvesting: A Review of Policy and Potential Effects. Prepared for Environment Southland. Cawthron Report No. 2408. 41 p. plus appendix.

Holloway 2016. Elver Passage at the Mataura Industrial Estate. Report prepared for Mataura Industrial Estate by Holloway Environmental Services Limited.

James A 2008. Ecology of the New Zealand lamprey (*Geotria australis*) – a literature review. Published by Department of Conservation, Wanganui Conservancy, New Zealand. 26 p.

Jellyman DJ 2012. Section 42A Report evidence presented to the Hearing panel presiding over the Proposed Hurunui and Waiau River Regional Plan and Proposed Plan Change 3 to the Canterbury Natural Resources Regional Plan: Effects of mid-range flow changes on fish migration.

Larinier M, Dartiguelongue J 1989. La circulation de poissons migrateurs: le transit à travers les turbines des installations hydroélectriques (The movements of migratory fish: passage through hydro-electric turbines). Bull. Fr. Pisc. 312-313: 1–90.

Lowe RH 1952. Influence of light and other factors on the seaward migrations of the silver eel (*Anguilla anguilla* L.). Journal of Animal Ecology 21: 275–309.

McDowall RM 2000. The Reed field guide to New Zealand freshwater fishes. Auckland, Reed books. 224 p.

Mitchell CP, Boubée JAT 1992. Impacts of Turbine Passage on Downstream Migrating Eels. New Zealand Freshwater Fisheries Miscellaneous Report 112, Christchurch: Freshwater Fisheries Centre, MAF Fisheries, 47 pp.

MWH 2007. Mataura River Generation. Letter report from MWH to Alliance Group Ltd and Mataura Industrial Estates Ltd. Dated 23 April 2007. MWH Ref: Z1234400.

Northcote TG 1992. Migration and residency in stream salmonids: some ecological considerations and evolutionary consequences. Nordic Journal of Freshwater Research 67: 5–17.

Ryder G 2005. Mataura Industrial Estate Hydro-Electric Power Generation Ecological Considerations for Plant Upgrade. Report prepared for Mataura Industrial Estate by Ryder Consulting Limited.

Sadlier N 2008. Alliance Group Limited, Mataura Plant, Hydro-Race Maintenance Resource Consent Application and AEE Renewal of Consent 204150.

Snelder T, Booker D, Jellyman D, Bonnett M, Duncan M 2011. Waiau River mid-range flows evaluation. NIWA Client Report CHC2011-084. 77 p.

Watene EM, Boubée JAT, Haro A 2003. Downstream movement of mature eels in a hydroelectric reservoir in New Zealand. American Fisheries Society Symposium (33): 295–305.

Watene EM, Boubée JAT 2005. Selective opening of hydroelectric dam spillway gates for downstream migrant eels in New Zealand. Fisheries Management and Ecology 12: 69–75.

APPENDIX A

Report Limitations

Report Limitations

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APPENDIX F

Trap and Transfer
Recommendations – Holloway
Environmental Services

Elver passage at the Mataura Industrial Estate

Holloway Environmental Services Ltd

May 2016

Summary

Holloway Environmental Services (HES) were engaged in December 2014 to investigate elver access requirements to comply with resource consents issued to the Mataura Industrial Estate (MIE). HES gained the required permits, undertook site inspections, and carried out elver transfer on site.

Due to a number of factors trapping was not satisfactory in 2015. However 100 small eels and 8.5 kg of elvers (approx. 3000) were hand captured and transferred to above the weir.

In 2016, the site was monitored and when elvers were located at the areas they accumulated at in 2015, a trap was installed. During the migration period, visible elver numbers were low compared to the previous year. No substantial accumulations of elvers occurred in any location. Despite this, approximately 8.5 kg of elvers and a small number of galaxid were trapped and transferred.

In 2015, elver numbers significantly reduced following a small fresh (elevation of river flow) which resulted in water spillage over the rock faces other than the main falls on the Alliance Group side of the river. In 2016, following equipment failure, Alliance Group was unable to operate their hydro, and as a result there were substantial discharges from the headrace. I hypothesise that there is a flow dependant barrier on the Alliance Group side of the river. Elvers were able to bypass the falls at flows and locations wetted by the 2015 fresh and 2016 headrace spillage.

The Mataura Industrial Estate wishes to continue to provide a "good corporate citizen" approach to elver movement. It is recommended that from January 15th each year, elver accumulation areas are checked one night a week. If elvers are observed to be accumulating, the trap should be installed and operated until the trap ceases to catch elvers. If elvers do not accumulate in any particular season the trap does not need to be installed.

Location

The Mataura Falls are located on the Mataura River within the town of Mataura. The area has been industrialised with the Alliance Group freezing works on the true right bank and the Mataura Industrial Estate occupying the former Carter Holt Harvey paper mill site on the true left bank. Both industries operate small hydro-generation sites and, to provide additional head, a weir was constructed across the full width of the river immediately above the falls. This weir also forms the river side of the hydro head races on each side of the falls. There is a minimum flow requirement at the weir and as this is approached both industries are required to reduce their take to maintain the flow. At the minimum flow, no generation can occur. The headrace has a near-vertical downstream face and slightly overhanging cap stone along the MIE headrace. The centre of the weir provides the minimum flow requirements.

The falls themselves are the result of a layer of hard rock (cap rock) overlying softer material. The softer material has been eroded resulting in an overhang of the harder rock.

The falls have always disrupted fish passage. As a result of the accumulation of fish, especially lamprey, below the falls, the site was an important food gathering location to Maori. It has generally been considered that the changes made to the river as a result of industrialisation, and particularly the weir, further reduced fish passage. However Allibone (2007) considered that the weir was passable under some flow conditions.

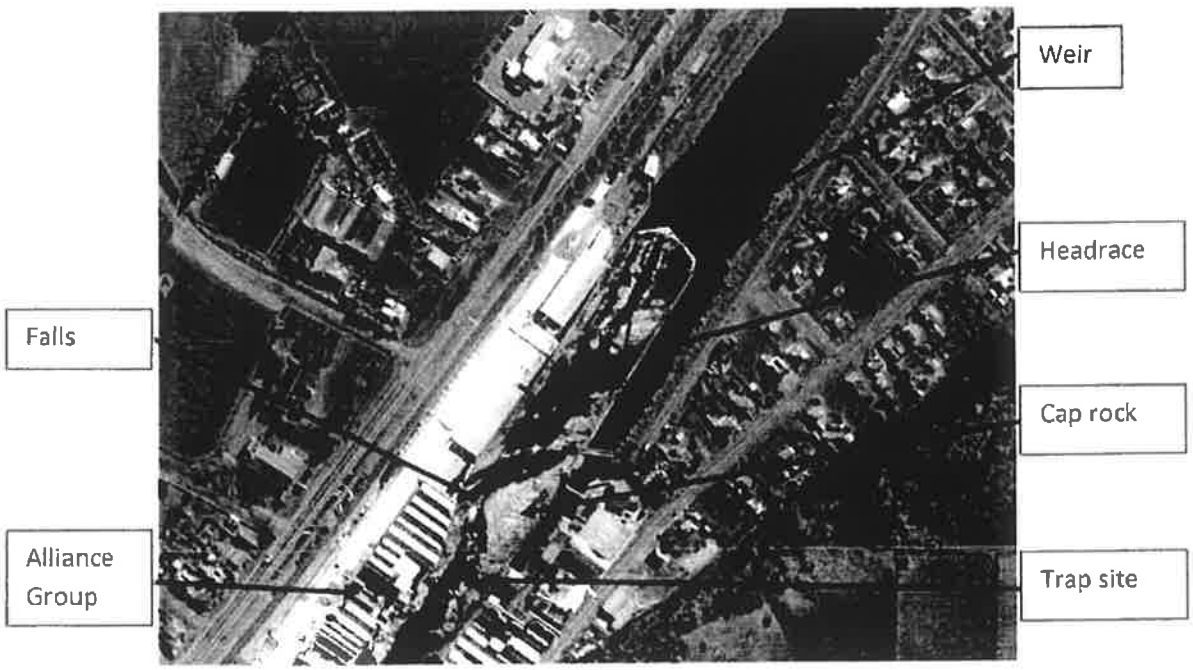


Figure1 Vicinity of Mataura Falls

Both sites have a number of discharges into the river, in addition to the hydro outfalls, at a number of locations up both banks. These are a mix of natural run-off from the sites and surrounding area, and discharges of water taken from the river.

At the trap site, there is a vertical cap rock face of 2.5 to 3 metre high falling to a shelf of rock. There is a discharge down the face of the cap rock (Figure 2) originating from leakage from the headrace wall. Approximately 5 metres to the true left of this discharge is a sluice gate from the headrace, which also exits onto the rock shelf. The sluice gate is imperfectly sealed and has variable leakage. The rock shelf has a number of depressions and fissures which contain water sourced from both the sluice gate and the discharge down the cap rock. The shelf also receives the debris from a screen-cleaner in the headrace. This debris accumulates in a pool of water until removed by sufficiently high flows and provides a daytime refuge for eels and unfortunately rats. There are two main and a number of small flows off the rock shelf onto a gently sloping rock face forming the true left riverbank.

Consent and Permit Requirements

Consents were issued by Environment Southland to Carter Holt Harvey Limited (CHH) for the operation of the hydro plant and ancillary takes. These consents have been transferred to MIE. They contain the following requirements:

Consent 203311 enables the operation of the hydro electric generation facility in the former paper mill. The consent requires that:

9. By 1 August 2008 the consent holder shall have constructed an adequate passage for native fish species, particularly elver and lamprey.

Consent 94335 requires that:

5. The consent holder shall maintain an eel pass to enable elver passage above the weir or hydro race.

Over the years since the issue of the original consent, a number of solutions have been considered. None of these attempts were particularly successful and were stymied by the closure of the paper mill. G.J. Patterson as MIE purchased the former mill site, and has initiated consideration of the elver passage requirements as required by consent.

Resource consents only set a requirement for fish passage / transfer. They do not authorise capture or transfer of fish. MIE did not hold special permits under the Fisheries Act from the Ministry of Primary Industries (MPI) or approvals under the Conservation Act for the capture, handling or transfer of native fish. HES applied for these on behalf of G.J. Patterson as MIE, and these were granted on 11 February 2015.

To enable activities prior to granting the special permits, the Hokonui Runaka provided a Customary Authorisation to undertake an enhancement programme within the Mataura Mataitai Reserve, which encompasses this site.

The Allibone (2007) report was presented to Environment Southland (ES). As a consequence of that report, ES agreed to a cessation of fish passage related activity by Alliance Group in December 2008. While MIE could rely on the same report to cease fish passage related activities, they wish to ensure that they contribute to the maintenance of a viable eel population above the falls.

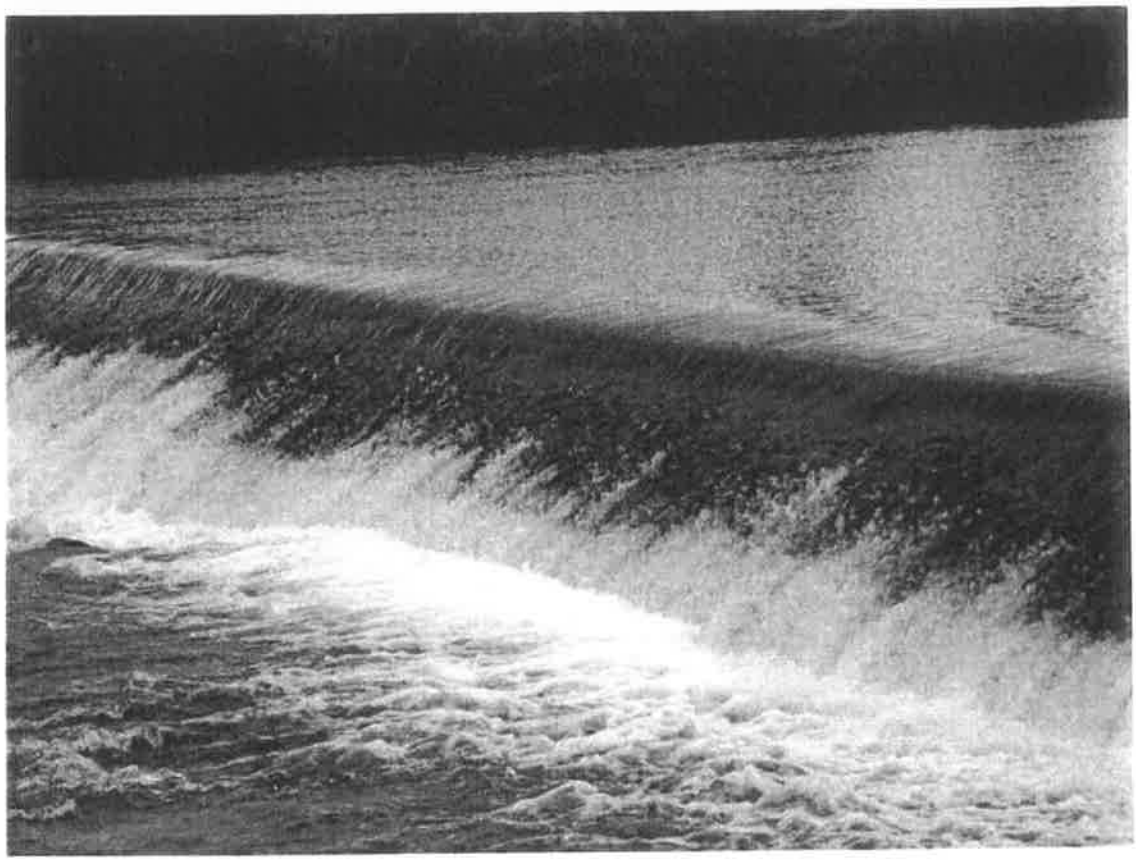


Figure 2. The weir showing laminar flow over the cap and turbulent flow in the lower slope

Previous works

There is a small flow over the cap rock face adjacent to MIE. This flow largely originates from a fissure in the wall of the head race. Adjacent to this fissure CHH built a concrete ramp up the headrace wall. This was not effective as very few elvers were able to climb the cap rock face and those which did and climbed the concrete ramp did not go over the edge of the headrace wall. Water supply to the concrete ramp was dependant on a pumped supply which is no longer available.

In previous seasons some spat ropes have been hung down a small flow over the edge of the cap rock in an attempt to encourage more elvers on top of the cap. The spat ropes cover a vertical fall of approximately 3 metres. Information on spat rope does indicate success in providing access through culverts which form a velocity barrier. They have also been successful in enhancing access into culverts where there is a small drop into a plunge pool from the culvert exit. There do not appear to be any records of the successful use of spat rope to provide access up a significant vertical drop, as has been attempted in this location. During the 2015 migration period a small number of elvers climbed the wetted rock face. Inspection on a number of occasions did not find elvers climbing in the spat rope, but 2 dead elvers were located in the rope. By 2016 the ropes had substantial algal and rooted plant covering. Few elvers were observed accumulating at the base of the rope and none located above it.

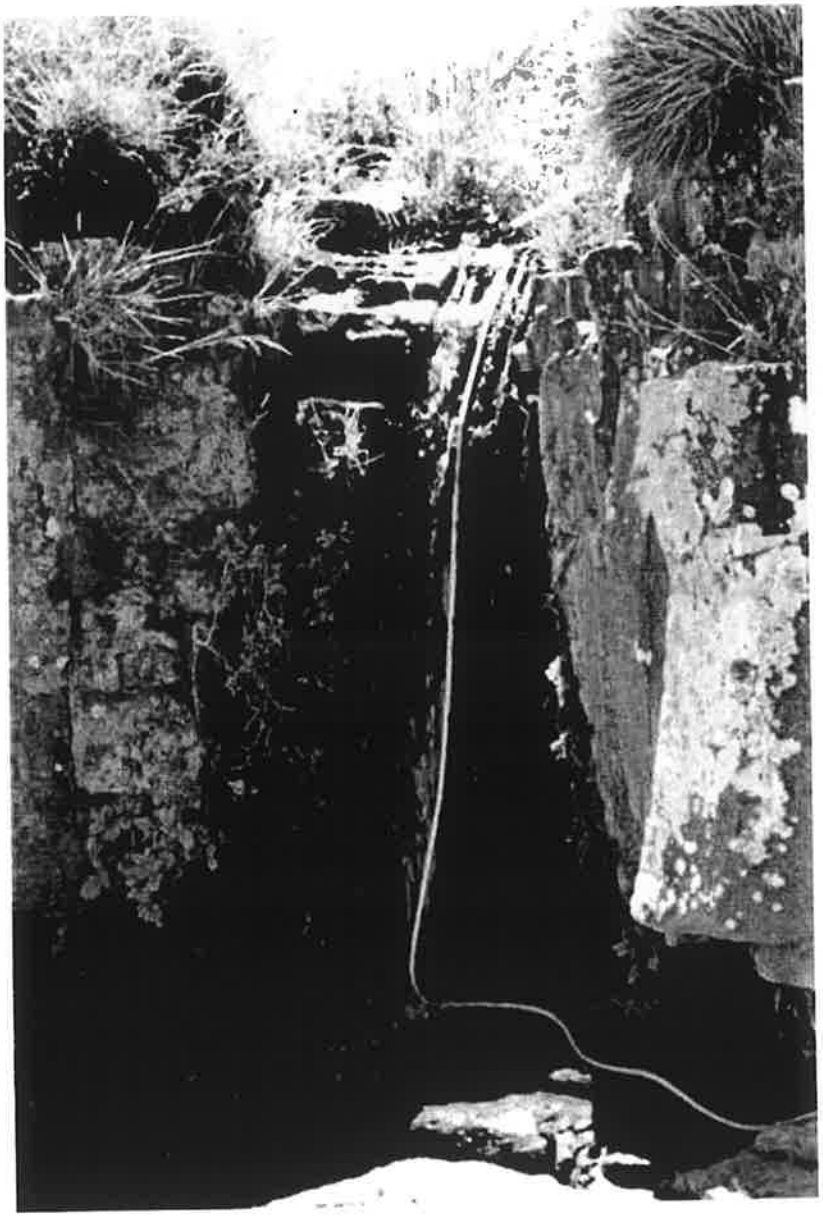


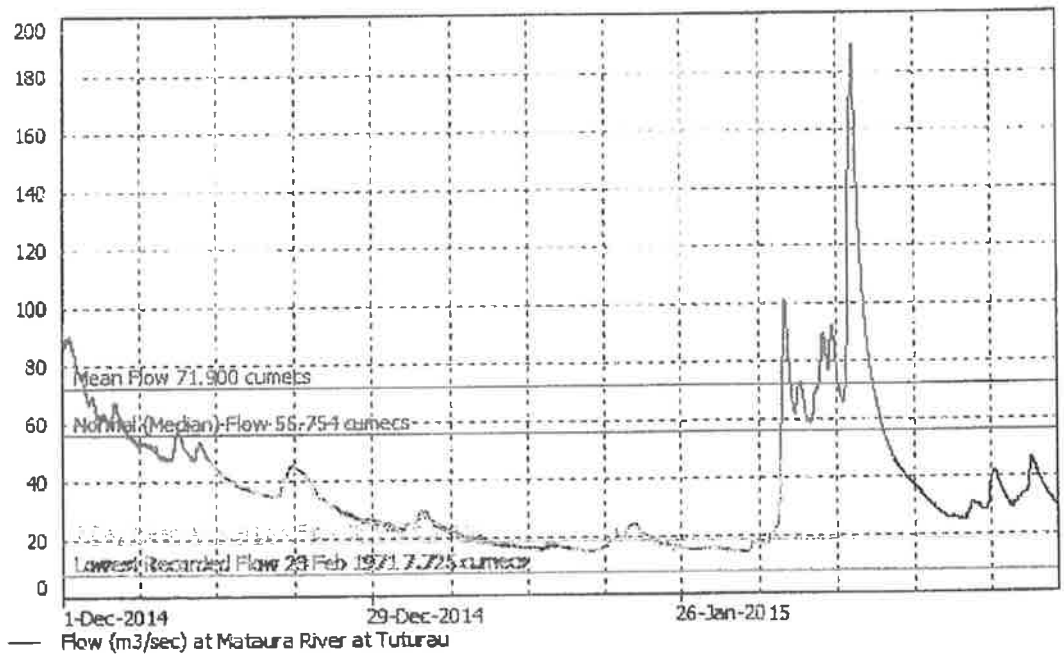
Figure 3. View of the cap rock and small discharge from the headrace. The hose supplied water to the trap, and the spat ropes are visible on the left hand side of the photo.

Hydrology

The closest water level recording site on the Mataura River is at Tuturau, approximately 7.5 km downstream. There are no significant tributaries entering between the MIE and the water recorder site. Thus, the Tuturau water recorder site adequately represents the hydrology at MIE.

In the 2015 season, the river was above the mean flow in early December 2014 (Figure 4) and then steadily receded until the end of January 2015. Between 2nd February and 12th February a series of rain events resulted in elevated flows, peaking at 190 cumecs.

Flows above 75 cumecs result in water flowing over the cap rock, making access over the cap rock to the falls, difficult during the day. I determined that safe access in the dark was not possible at these flows.



Source: Environment Southland Website

Figure 4. 2015 Mataura river flow at the Tuturau flow recorder site.

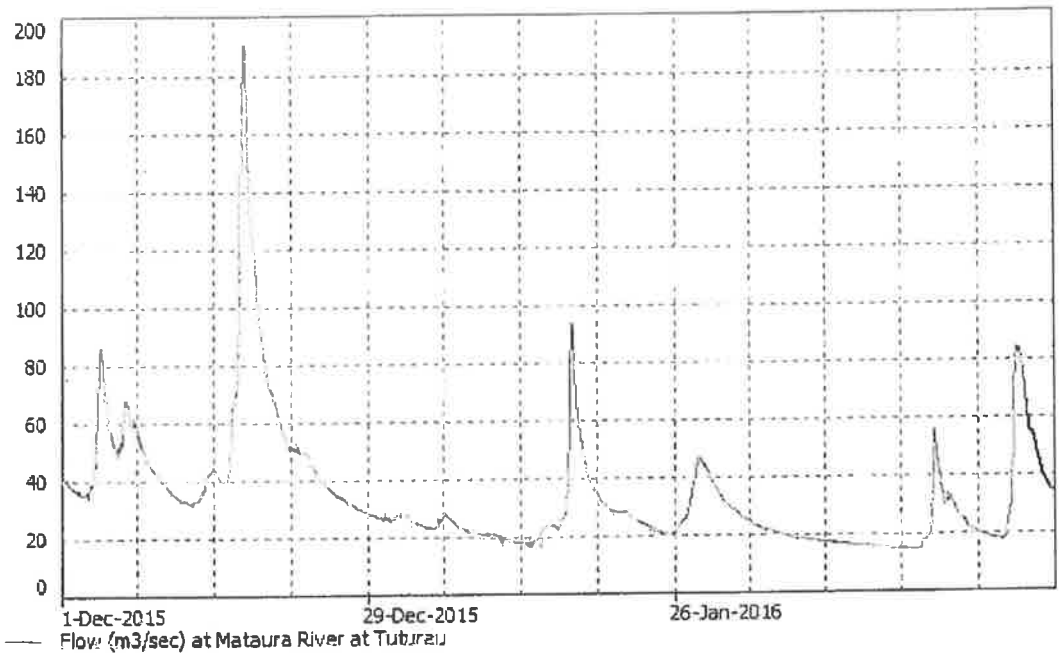


Figure 5. 2016 Mataura river flow at the Tuturau flow recorder site.

The 2016 season started with an elevated December flow, but a number of minor freshes occurred throughout the season, the trap was removed for 2 nights (26th & 27th) during the February 80 plus cumec flow.

In late 2015, Alliance Group suffered a failure of their hydro plant. The need to source replacement parts from overseas meant that for the duration of the 2016 elver migration period Alliance Group was spilling water at a number of locations from the headrace to the cap rock on their side of the river. Consequently there were a number of flows over the cap rock and downstream shelves, which would not normally occur at low flows (Figures 6 & 7).

There was no change to the hydrology on the MIE side of the river.

Figure 6. Alliance Mataura showing flows from the headrace through sluice gates and overflows

Figure 7. Alliance Mataura downstream of the falls showing flows across the rock shelves as a result of the hydro race discharges

Night inspection

The site was inspected at night from late December in both seasons.

In 2015, one adult lamprey was observed as well as a number of elvers and small eels. By mid January, there were substantial accumulations of small eels and elvers in the discharge flows and pools on the shelf below the cap rock. Following the high flows of late January 2015, the small eels disappeared and only elvers were located in the flows and pools at the trap site.

All discharge points from the headrace and side of the weir were regularly inspected. No elvers or eels were located at any discharge point other than the leak feeding the discharge over the cap rock containing the spat rope. All the discharges further upstream from this leak, discharged into the river between the falls and weir.

Few elvers were seen to climb the discharge over the cap rock using either the spat rope or the adjacent damp moss. On 2nd February 2015 I watched the small pool at the top of the spat ropes for a period of 45 minutes. During this time six elvers were seen to successfully climb the face. On the 24th of February 2015, a number of elvers were noted in the pool on top of the cap rock. On this occasion no elvers were seen leaving the river and the number in the pools on the rock shelf at the bottom of the sluice gate was greatly diminished. Sampling these noted a number of shortfin elvers.

In 2016, small numbers of elvers were located in all the 2015 accumulation points below the cap rock. However numbers were small and I estimated less than 10% of the 2015 numbers. Only 1 small eel was located at any time unlike the 2015 season where 90 were captured in one night.

The weir - headrace walls were also accessed on a number of occasions in 2016 when the river was low. Two elvers were located one night at the junction of the headrace wall and the weir. Adult eels were also observed both in the top of the headrace and immediately below the weir. There was also no evidence of elvers accumulating below the weir.

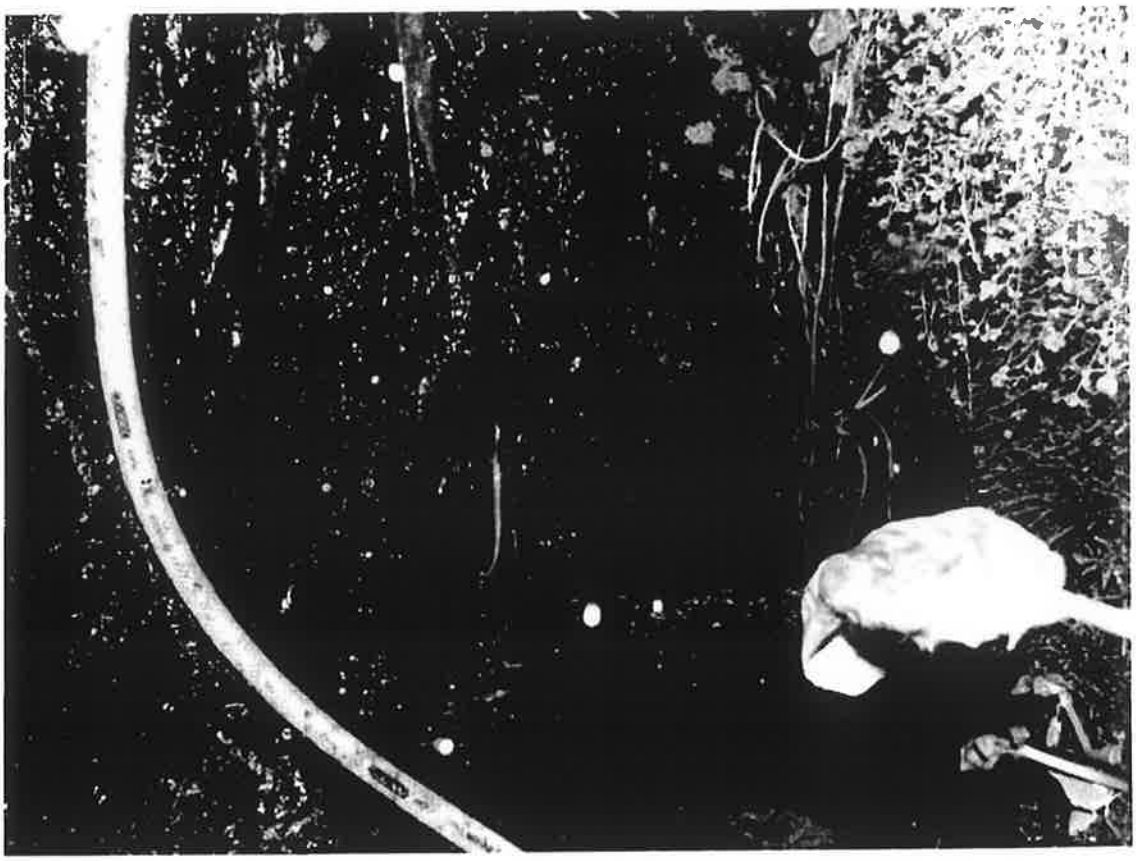


Figure 8. Elvers climbing on and adjacent to the spat rope up the discharge down the cap rock. A number of elvers climbed to a small niche just visible at the top of the photo. Few appeared to go past here on the spat rope but a number were seen climbing in the moss mats.

Trapping

MIE had operated a small trap adjacent to the sluice gate discharge. This consisted of a small box receiving water via a hose from the headrace. A short section of tube containing a section of spat rope provided both an entry for elvers and the discharge point for the water from the box. During inspections a small number of elver were seen to enter the box. However as the discharge tube regulated the water level in the box, elvers were able to enter and leave without hindrance. During inspection on the 31st December 2014 an elver was found entangled and dead in the spat rope leading into the trap. Use of this trap was discontinued once the new trap was available as the water supply was transferred to the new trap.

The MIE engineer constructed a new trap for the site. However, due to the late start to the programme, and holiday periods, the initial prototype was not available until the start of February 2015, when it had to be promptly removed due to elevated flows. Trapping recommenced on 13th February 2015. No elvers were located in the trap over the following 3 days. Consequently 20 elvers were captured and placed in the trap. The following day only 4 were still present requiring modification to the trap. The trap ramp was made from treated ply and Boubee (pers. com.) noted that treated wood ramps are not attractive or effective for elver movement. Hence my request to source a brush ramp covering. The brush required for the trap finally arrived once the elvers had ceased accumulation.

Prior to the 2016 season HES constructed a trap utilising polyethylene brushes with two bristle densities. These are similar to the brushes used at other location in NZ for elver trapping. The trap was installed on 3 February2016 and was operated until early March 2016 (cover photo). The trap was removed for the 26th and 27th of February due to elevated flows which put the trap site at risk.

Hand capture

Given the accumulations of elvers below the sluice gate leakage and the discharge over the cap rock in 2015, elvers were captured in a hand net (200 x 120 mm opening). The net was generally placed in the flow below eel /elver accumulations and the accumulated elvers disturbed resulted in them collecting in the net. Captured eel / elvers were held in a bucket of fresh water during capture process.

At the cessation of capture, small eels were removed from the catch, counted and weighed. The elvers were weighed and a subsample of just over 20 taken for analysis. Elvers and small eels were then released (generally 01:00 to 02:30 am) at varying locations along a beach on the True Right Bank (TRB) above Alliance Mataura from the access point to the Tannery site. No location was used twice.

There were no accumulations of elvers sufficient to warrant attempt at hand capture in the 2016 season.

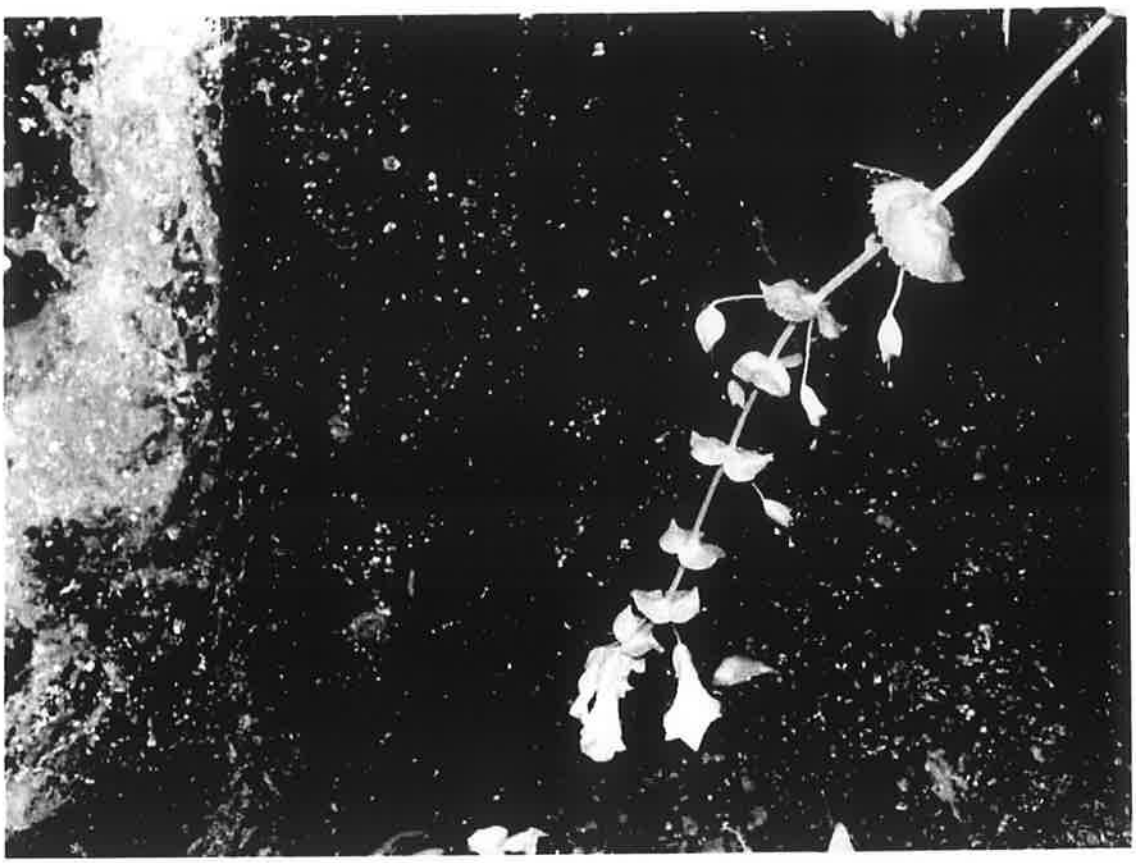


Figure 9. Elvers accumulating at the right hand side of the sluice gate in 2015. Note the strand of spat rope which was not used by the elvers

Analysis

When the catch was sufficiently large to enable sub sampling (visual assessment but approximately 400 g total catch) a random subsample of 20 – 25 elvers was taken. The sub sample of elvers was sedated with a lethal dose of clove oil. Individual elvers were randomly removed from the container and individually weighed, measured, and the species determined. Once 20 elvers had been sampled, a total weight of the 20 sampled elvers was taken. All sub sampled elvers were then frozen for delivery to NIWA in compliance with the transfer permit requirements.

Results

In 2015 hand netting resulted in the capture and transfer of 104 small eel with an average weight of 76 g. There were 9.1 kg of elvers captured and transferred. This was approximately 3200 elver at an average weight of 2.85 grams. Shortfin elvers were captured later in the season, and by cessation of capture these shortfins represented 4.4 percent of the total captured.

There were substantial numbers of small eels accumulating at the base of the trapping area discharges in late January. However following the elevated flows of early February, very few were located. There are two potential explanations for this.

Trapping in the Waiau River has also noted a substantial pulse of small eels which is much shorter in duration than the elver migration. This pulse may have occurred in late January in the Mataura River and coincidently finished at the same time as the elevated flows. Alternatively the small eels were accumulating in the area due to an inability to continue to move upstream. The elevated flows may have enabled the small eels to overcome the barrier to migration and move up river while the elvers were unable to move upstream. This is suggestive of a size discriminatory barrier such as an elevated velocity barrier where no eels can reach it at low flows but only larger eels are able to cross it once access is enabled by higher flows.

Trapping in 2015 was not successful due to the very late start in developing the trap and very late supply of some required components.

Only one lamprey was noted in the area at the commencement of night inspections. No other fish species were caught or seen in the area during the inspections. Downstream of where the trap site discharges enter the river is a group of rocks. These were home to a number of large longfin adults. None of these were observed to come up river to the area where the elvers and small eels exited the river.

One rat was noted on one night. This was in a small alcove located between the sluice gate and discharge down the rock face. It is possible that the rat could have taken elver along the margins of the wetted areas in this location, but this hopefully would be insignificant predation.

In 2016, in contrast to the previous year, all elvers were trapped and no hand capture undertaken due to low elver accumulations. The trap captured approximately 8.5 kg representing 3480 elvers. The average size was smaller (129.3 mm) compared to the elvers captured in 2015 (138.4 mm). The average elver weight was also lower in 2016 (2.58g) compared to the 2.85 g in 2015. A number of Galaxids were also captured in the trap, and these were transferred with the elvers.

Only one small eel was captured in 2016. The large eels remained in the rocks below the capture site and again were not seen outside this location in 2016. Again a rat was seen on 3 occasions in locations where it could potentially take elvers.

The lack of elver accumulation, smaller average size and absence of small eels reinforces the view that there is a flow –dependant barrier at the falls. This is negated by elevated flows, probably in the vicinity of 60 – 80 cumecs, or release of water from the Alliance Mataura headrace as occurred this year.

Conclusions

The trapping and monitoring programme has shown that at certain flows the Mataura Falls, and the weir are not a barrier to elver and small eel migration. This agrees with the Allibone report, and hence Mataura Industrial Estate could also rely on this report to cease any further activity in relation to native fish movement.

However, MIE wishes to ensure that a viable eel population is maintained in the river and consequently wish to ensure that migratory movements are not limited in years of low flow. I therefore recommend that monitoring occurs during the elver migration period and, if accumulations are located, trapping in undertaken.

Recommendations.

To ensure that elver movement is not restricted during low flow conditions I recommend that MIE implement an annual monitoring programme.

1 From 15th January annually, a weekly night inspection is undertaken after 11:30 pm. The areas where elver accumulations have been located previously are closely inspected by spotlight. Once elvers are located (30 – 50) in the area inspections should occur twice weekly.

2 If twice weekly inspections locate substantial accumulations of elvers (hand netting can capture >200 g in an hour), then the trap is installed. If no accumulation of elvers occurs, then inspections continue until elvers numbers fall away.

3 Once elver accumulations occur the trap is installed and operated until there is 7 days capturing less that 20 elvers per night. Small catches of elvers can be released in the upper headrace if suitable sites remain each year. Larger catches (>1kg) should be released at night along the beach below the tannery site on the TRB.

Construction of access to above falls

Mataura Industrial Estate held a consent to enable cutting into the overhang to form a ramp. This will improve the ability of elvers and possibly, depending on slope, other species to reach the top of the cap rock which forms the falls. However access to this area still results in the fish being downstream of the weir. Therefore any construction of access up the cap rock then requires further construction of access to the headrace. The nearest location in the headrace is immediately upstream of the hydro intake. It is my opinion that elvers that are released or exit into the head race immediately above the turbine, while in full operation, are at risk of being swept back through the turbine. Thus elvers should not be transferred to the headrace in the immediate vicinity of the hydro intake when it is operating as the water velocity is likely to exceed the elver swimming ability.

However upstream of the access bridge is a trash rack. By 2016 this had accumulated substantial amounts of debris to the extent that water flow was restricted to less than 50% of the channel width. This provided an area of low flow, sediment and debris accumulation. Small numbers of elvers were released here and rapidly buried themselves in the sediment. Upstream the reduced water velocities also resulted in sediment accumulation against the headrace walls and this also provided a suitable release location. Thus this area is potentially suitable for a second mechanism to enable elver movement from the section of river above the falls and below the weir.

While this is a potential area for consideration any elvers which climbed the cap rock, then have to be conveyed or attracted a considerable distance upstream and try to locate the mechanism to get them into the headrace a considerable distance upstream. Fluctuation water levels as a result of the hydro operation and river level variation make the successful development of a mechanism to elevate elvers to the headrace unlikely. Hence I do not see any value in attempting to cut a ramp into the cap rock.

Required works.

To enable improved operation of the trap the current water take discharge pipe needs to be replaced with a 35mm hose connection. The sandbags used again this year have suffered from weathering and will need to be replaced.

References

Allibone R, 2007. Assessment of hydroelectric diversion effects on fish passage. Report for Alliance Group by Golder Associates (NZ) Ltd.

Appendix1

Location of the release beach in relation to the capture location

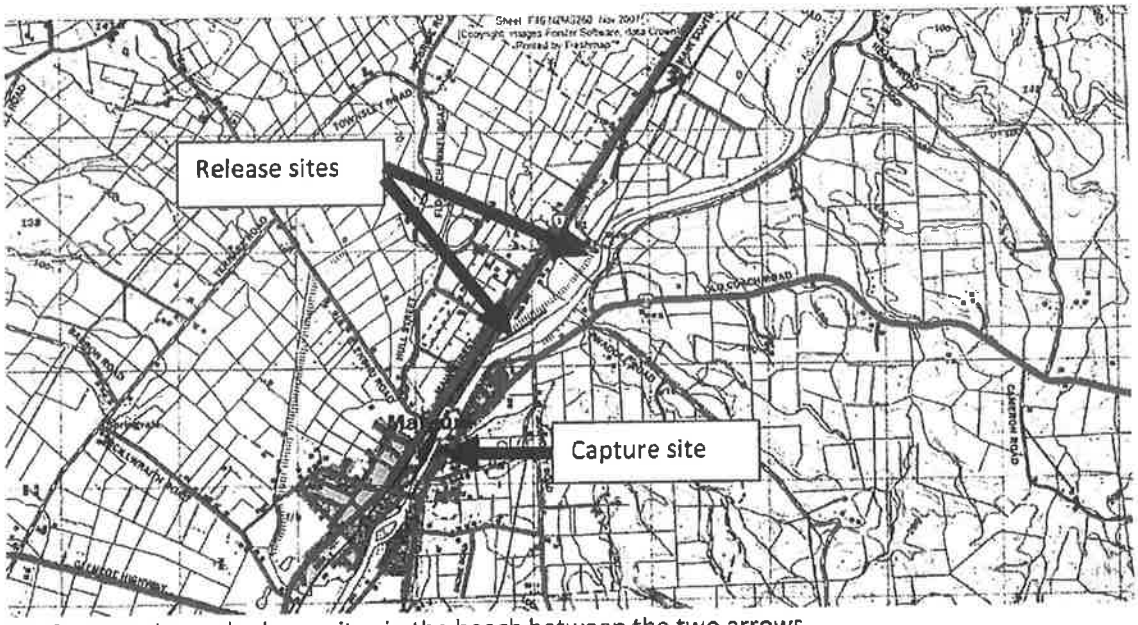


Fig Capture site and release sites in the beach between the two arrows.

G

APPENDIX G

Further Report on the Proposed Trap and Transfer System – Holloway Environmental Services

HOLLOWAY ENVIRONMENTAL SERVICES

Elver trap and transfer at the Mataura Falls

Information for Alliance Group Limited on elver trap and transfer operations at the Mataura Falls and Weir

James D R Holloway
M. Agr. Sc. (Hons.)
14/12/2016

1 The trap.

The trap capture system (brush ramp, water supply, stainless steel entry device) is based on the final trap design developed by the late Colin Sinclair of Meridian and Jacques Boubee and Don Jellyman from NIWA for the Mararoa weir. They spent some 8 years trying various designs, and this was the final iteration. The Mataura trap is not an in-water trap as used at the Mararoa weir, Consequently I am using a solid trap body similar to the one used at the Wairere station, demonstrated during an Environment Waikato/ NIWA elver workshop.

Fig 1. The trap in situ. The corrugated pipe discharges leakage water from the sluice gate which would otherwise travel over the rock channel where the trap is sited. The sticks to the right are the dumped trash rack debris.

The trap functions by attracting the elvers up the brush via a flow of water. At the top the elvers go over a lip and into the trap. The water level in the trap is such that the elvers are unable to climb out. The trap has a lid to maintain dark conditions and prevent entry by potential predators.

2 Spares.

The major risk for the trap is total loss from a flood, and consequently during any rain events a close watch is kept on the hydrograph. A flow of 120 cumecs at Tuturau results in a water level over the sandbags below the trap but not yet at the base of the trap container. I will commence trap removal at the 70 – 80 cumec range. Other items such as taps and fittings are easily replaced in Invercargill.

3 Transfer protocol.

To transfer elvers the trap is partially dewatered and the elvers captured with a dip net, weighed and put in a ¾ full 20 l bucket. A maximum of 2 kg of elvers are placed in each bucket. Buckets are then carried to the vehicle and delivered to the release location. A daily catch exceeding 8 kg will require multiple trips to the release site, however given the distance the elvers need to be carried by hand, there is no alternative. Very small numbers (<30) can be released into the upper head race where sediment and debris has accumulated. This provides sufficient cover for small releases. No evidence of stress such as failure to travel on release or foaming has been seen.

4 Rats

Rata are potential predators of elvers especially while climbing the shallow water films on rocks. Having seen rats in the vicinity of elvers, I simply nail a rodent bait onto the trash rack debris over the elver monitoring period.

5 The Alliance Group side.

I have not had the opportunity to inspect the Alliance Group side of the falls area. Consequently a daylight inspection of the area below the headrace wall upstream of the hydro discharge should be undertaken when the flow is below 40 cumecs. This will identify accessible areas and any access concerns. Once an elver accumulation is observed on the MIE side, then the Alliance Group side should be inspected. This needs to occur approximately 2 hours after sunset. This will identify if any similar accumulations are located on the true right bank.

6 Monitoring and trapping.

From 15th January each year, a weekly night inspection is to be undertaken after 11:30 pm. The areas where elver accumulations have been located previously are closely inspected by spotlight. Once 30 – 50 elvers are located in the area inspections should occur twice weekly.

If twice weekly inspections locate substantial accumulations of elvers, then the trap is installed. If no accumulation of elvers occurs, then inspections continue until elvers numbers fall away.

Once elver accumulations occur the trap is installed and operated until there is 7 days capturing less that 20 elvers per night. Small catches of elvers can be released in the upper headrace if suitable sites remain each year.

If elver capture falls away earlier than environmental conditions suggest they should, then spotlight monitoring should continue until 5 days after the next no-moon period

7 History

The falls have always disrupted fish passage. As a result of the accumulation of fish, especially lamprey, below the falls, the site was an important food gathering location to Maori. It has generally been considered that the changes made to the river as a result of industrialisation, and particularly the weir, further reduced fish passage.

Previous fish passage work by Alliance Group Limited.

As required by the Alliance consent (98031) Allibone (2007) undertook an investigation into native fish passage and considered that the weir was passable under some flow conditions, however identified an issue with elver passage over the weir. The Allibone report was presented to Environment Southland which satisfied the requirements of Consent 98031.

Previous fish passage works by CHH and MIE

There is a small flow over the cap rock face adjacent to MIE. This flow largely originates from a fissure in the wall of the head race. Adjacent to this fissure CHH (paper mill owners) built a concrete ramp up the headrace wall. This was not effective as very few elvers were able to climb the cap rock face. Those which did reach the cap and located and climbed the concrete ramp did not go over the edge of the headrace wall. Water supply to the concrete ramp was dependant on a pumped supply which is no longer available. A number of attempts using pipe fish ladders, similar to the Matahina Dam structure, were also tried as a

mechanism to deliver elvers to the concrete ramp. None provided any improvements and all were too vulnerable to elevated river flows.

In previous seasons some spat ropes have been hung down a small flow over the edge of the cap rock in an attempt to encourage more elvers on top of the rock face. The spat ropes cover a vertical fall of approximately 3 metres. Information on spat rope does indicate success in providing access through culverts which form a velocity barrier. They have also been successful in enhancing access into culverts where there is a small drop into a plunge pool from the culvert exit. There do not appear to be any records of the successful use of spat rope to provide access up a significant vertical drop, as has been attempted in this location. During the 2015 migration period a small number of elvers climbed the wetted rock face. Inspection on a number of occasions did not find elvers climbing in the spat rope, but two dead elvers were located in the rope. By 2016 the ropes had substantial algal and rooted plant covering. Few elvers were observed accumulating at the base of the rope and none located above it.

Construction of access to above falls

Mataura Industrial Estate held a consent to enable cutting into the overhang to form a ramp. This potentially could improve the ability of elvers and possibly, depending on slope, other species to reach the top of the cap rock which forms the falls. However access to this area still results in the fish being downstream of the weir. Therefore any construction of access up the cap rock then requires further construction of access to the headrace.

Upstream of the access bridge over the MIE headrace is a trash rack and in 2016 this had accumulated substantial amounts of debris to the extent that water flow was restricted to less than 50% of the channel width. This provided an area of low flow, sediment and debris accumulation. Small numbers of elvers were released here and rapidly buried themselves in the sediment. Upstream the reduced water velocities also resulted in sediment accumulation against the headrace walls and this also provided a suitable release location. Thus, this area is potentially suitable for a second mechanism to enable elver movement from the section of river above the falls and below the weir.

While this is a potential area for consideration any elvers which climbed the cap rock, then have to be conveyed or attracted a considerable distance upstream and try to locate the mechanism to get them into the headrace a considerable distance upstream. Fluctuation water levels as a result of the hydro operation and river level variation make the successful development of a mechanism to elevate elvers to the headrace unlikely.

The ramp may also enable faster passage of lamprey, damaging the value as a mahinga kai site. Hence I do not see any value in attempting to cut a ramp into the cap rock.

APPENDIX H

Draft Trap and Transfer Plan

DRAFT Mataura Elver Trap and Transfer Plan

Trap design

- The trap capture system (brush ramp, water supply, stainless steel entry device) is based on the final trap design developed by the late Colin Sinclair of Meridian and Jacques Boubee and Don Jellyman from NIWA for the Mararoa weir
- There shall be a continuous flow of water up the length of the brush ramp
- The water level in the trap is to be maintained so that trapped elvers are unable to climb out
- The trap will have a lid to maintain dark conditions and prevent entry by potential predators

Inspections

- From 15 January annually, when flows are below 80 m^3/sec, undertake a weekly night inspection at the base of the falls after 11:30 pm where elvers accumulation have been noted previously at the trap site shown in Figure 1
- Once elvers are located (30 – 50 of them) in the area, inspections are increased to twice per week

When to install the trap

- If the twice weekly inspections locate substantial accumulations of elvers (hand netting can capture >200 g in an hour), then the trap is installed

If numbers of elvers, as per the above, are not observed

- If no accumulation of elvers occurs, then inspections continue at least until the end of February and until elvers numbers decline

Inspecting the trap and transferring elvers

- Each night that the trap is installed it will be inspected
- If elvers have been captured, the trap will be partially dewatered and the elvers captured with a dip net
- Elvers will be weighed and placed in a 20 L bucket which is ¾ full and taken to the release locations. A maximum of 2 kg will be placed in each bucket.
- Small catches of elvers (<30 individuals) will be released in the upper headrace where sediment and debris have accumulated
- Larger catches will be released at night along the beach below the Alliance tannery site on the true right bank

When to remove the trap

- If installed, the trap is operated until there is 7 days capturing less than 20 elvers per night

- If elver accumulations decline earlier than environmental conditions suggest they should, then spotlight monitoring will continue at least until the end of February, until five days after the next new moon as per the tasks under 'Inspections' above
- Due to risk of the trap being washed away, the trap will be removed at flows above 75 m^3/sec

Predators

- A bait station (targeting rats) will be located in the vicinity of the trap

Reporting

A report will be prepared and provided to Environment Southland by 30th April each year. The following details will be reported:

- The date inspections started
- The date that inspections increased to twice per week
- Date the trap was put in
- Daily flow records during trapping
- Weight of elvers relocated
- Transfer location

Suitably qualified and licensed person

The person implementing the Mataura Elver Trap and Transfer Plan is to be suitably qualified and licensed with a special permit from MPI to take, transfer and release fish under the *Fisheries Act 1996* and a transfer and release permit from MPI under the *Conservation Act 1987*.

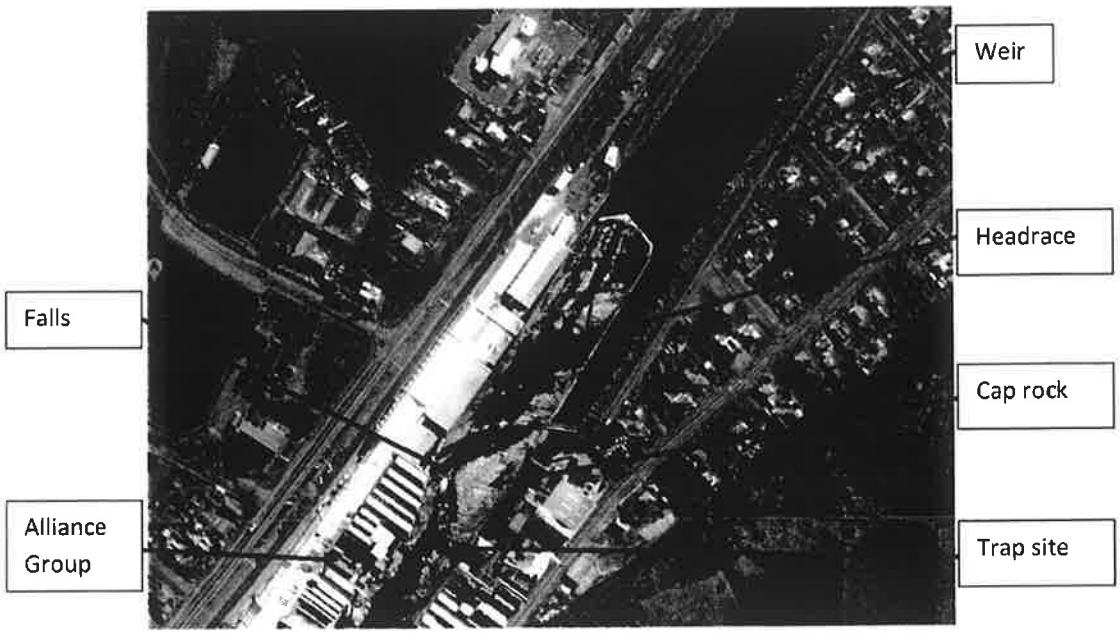


Figure 1 Mataura Elver Trap Site

APPENDIX I

Proposed Conditions

Proposed Conditions

Water and Discharge Permit

Details of Permit:

To dam, divert and use water from the Mataura River for hydroelectric power generation and to discharge water from the hydroelectric power plant into the Mataura River.

Location:

Site locality: Mataura

Map reference: F46:911:382

Receiving environment: Mataura River

Catchment: Mataura

Expiry Date:

Insert date (25 years from commencement of this consent)

Schedule of Conditions

1. This consent shall expire on the *XXXXX (25 years from commencement of this consent)*

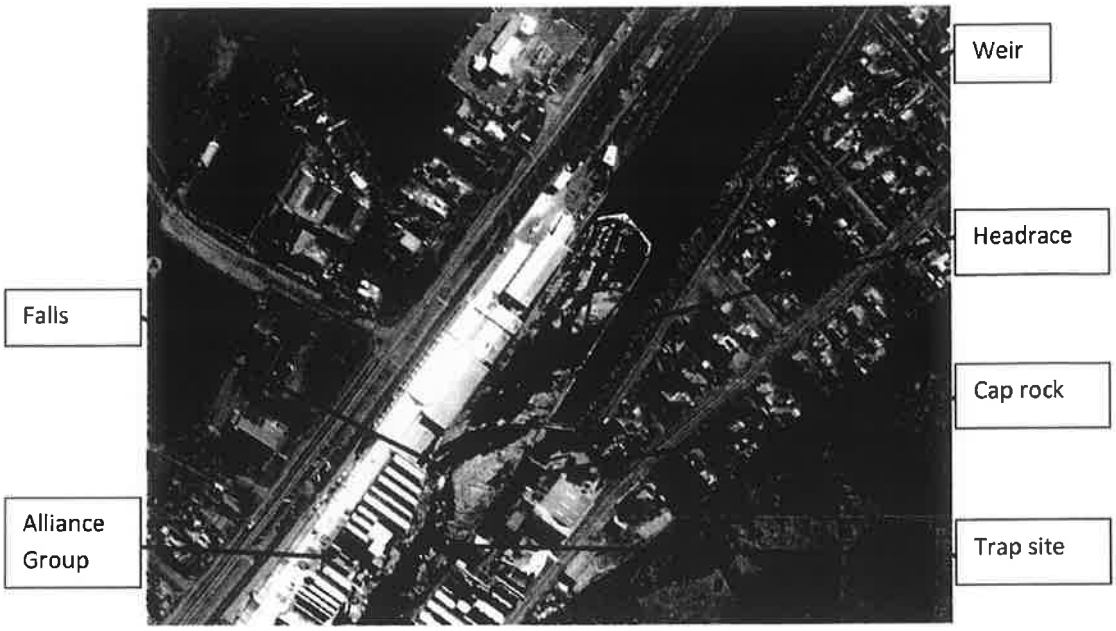
2. The flow at the centre of the existing weir on the Mataura River shall not be lesser in depth than 0.05 metres due to the exercise of the consent.

3. The consent holder shall maintain a monitoring system to provide immediate warning to its staff that overflow of the weir has reached 0.05 m.

4. No alteration to the existing weir or diversion channel shall be carried out by the consent holder without the written approval of the Council's Environmental Compliance Manager.

5. When the reduction in water demand for power generation is necessary to comply with condition 2, the following operating condition shall apply:
    i. Once the usage of water by Mataura Industrial Estate consent no. 203311, or any subsequent replacement consent authorising water demand for power generation has been reduced so that it is the same as the consent holders; further reductions in water usage necessary to comply with condition 2 of this permit shall be obtained by a parallel reduction in water usage through the generators of both consent holders (*XXX* and 203311).

6. Commencing on the 15th January each year for the duration of this consent, when river flows in the Mataura River are recorded as being below $80m^3/s$, the consent holder shall undertake a weekly night inspection for elvers at the base of the Mataura Falls after 11.30pm at the 'Trap Site' marked on the figure below:



7. If the weekly inspection indicates that elvers have accumulated in the area (at least 30), weekly night inspections shall be increased to twice per week.

8. In the event that the twice weekly inspections identify substantial accumulation of elvers, identified by hand netting capturing greater than 200 grams, then the consent holder shall be required to install the trap at the location marked "trap site" above. The design and monitoring requirements of the trap and transfer system shall be submitted to the Southland Regional Council at least 30 working days prior to 15th January 2018 and thereafter only if amended.

9. In the event that the twice weekly inspections, do not indicate an accumulation of elvers (identified by hand netting less than 200 grams in an hour), then the consent holder shall be obligated to continue twice weekly inspections to at least the end of February and until such time as elver numbers decline. Once the number of elvers has declined, the consent holder shall be able to cease weekly inspections until the following 15th January.

10. Once the trap is installed in accordance with condition 8, then the consent holder shall be required to undertake nightly inspections. If elvers have been captured, the trap will be partially dewatered and the elvers captured and transferred upstream in accordance with the design and monitoring requirements submitted by the consent holder in accordance with condition 8.

11. The consent holder shall ensure that the trap and transfer process remains operational until such time as there is seven continuous days capturing less than 20 elvers per night. Due to the risk of the trap being washed away, it shall be removed at flows above $75m^3/s$.

12. During the operation of the trap the consent holder shall ensure that a predator bait station, targeting rats in particular, is located in vicinity of the trap in order to prevent predation of the accumulated elvers.

13. The consent holder shall ensure that a report is prepared and provided to the Southland Regional Council 30th April each year, reflecting the requirements set out in conditions 6 to 12 of this consent. This report shall be submitted to the Council's Compliance Manager and shall contain the following details:
    - The date inspections started
    - The date that inspections increased to twice per week
    - Date the trap was put in
    - Daily flow records during trapping
    - Weight of elvers relocated
    - Transfer location

14. During the months of March and April each year, the consent holder shall be obligated to cease generation of the hydroelectric power plant during the hours of 7pm to 6am when flow conditions in the Mataura River increase by more than 50% of the preceding day's river flow. The flow will be based on a reading taken at 4pm each day from the Tuturau Environment Southland Flow Gauging Site. Once activated, the nightly shutdown periods will remain in place until the flood peaks, and for two consecutive nights after the flood peak has passed.

15. The consent holder shall pay the Southland Regional Council an administration charge and monitoring charge, under Section 36 of the Resource Management Act, in advance, payable on the first day of July each year.

16. The consent holder may, in accordance with Section 127 of the Act, apply to the Council for a change to the conditions of this consent in the month of June each year.

17. The Council may, in accordance with Section 128 and 129 of the Act, serve notice, at 12 monthly intervals from the date of commencement of this consent, of its intention to review the conditions of the consent for the purpose of:

    i. dealing with any adverse effects on the environment which may arise from the exercise of this consent;
    ii. responding to findings of the investigation into the effects on native fish species passage; and
    iii. complying with the requirements of a regional plan.

Discharge of Sediment Permit

Details of Permit:

To discharge contaminants and water (namely sediment) to the bed of the Mataura River associated with the maintenance and clearance of the hydro-race.

Location:

Site locality: Mataura

Map reference: F46:911:384

Receiving environment: Mataura River

Catchment: Mataura

Expiry Date:

Insert date (25 years from grant)

Lapse Date:

Insert Date (25 years from grant)

Schedule of Conditions

1. This consent will expire and lapse if not yet given effect to on *XXXX (25 years from grant*).
2. The consent holder shall, at least one week prior to any exercise of this consent, notify the Southland Regional Council and the following parties:
    i. Department of Conservation
    ii. Te Ao Marama Inc
    iii. Fish and Game New Zealand, Southland Region
    iv. Wyndham Angling Club
    v. Public Health South
    vi. South Island Eel Industry Association
3. Works are to be carried out generally as described in the application. In particular, the location of the discharge shall be the area of the river bed immediately adjacent to the hydro-race wall. On any occasion that the consent is being exercised while the bed of the river is inundated at this location, then the consent holder may complete the work, while taking all practical steps to minimise any discolouration of the river.
4. The discharge shall only contain natural river sediment. No oils, greases or other contaminants shall be discharged into the river.
5. Following exercise of this consent, the consent holder shall, if requested, provide an annual report to the Southland Regional Council outlining sediment discharges that have occurred, and comment on the effects of the discharge to the Mataura River. This report shall be submitted to the Council's Compliance Manager.
6. The Southland Regional Council may serve notice of its intention to review the conditions of this consent, in accordance with the conditions of this resource consent and sections 128 and 129 of the Resource Management Act 1991, during the period May to July each year, for the purposes of:
    i. dealing with any adverse or cumulative effects on the environment, which may arise from the exercise of the consent;
    ii. complying with the requirements of a regional plan.

APPENDIX J

Water Right

TELEGRAMS: "CATCHMENT"
P.O. BOX 408

WATER RIGHT No 390

SOUTHLAND CATCHMENT BOARD
143 SPEY STREET, INVERCARGILL, N.Z.
TELEPHONE: 89-129

RIGHT IN RESPECT OF NATURAL WATER

PURSUANT TO SECTION 21 (3) of the Water and Soil Conservation Act, 1967, a right is hereby granted by the SOUTHLAND CATCHMENT BOARD
to Southland Frozen Meat and Produce Export Company Limited
of (ADDRESS) P.O. Box 839, Invercargill.
(OCCUPATION) Meat Processors for a period of ten (10) years
from 10 November 1978

DETAILS OF RIGHT

Purpose for which right is granted to divert water for hydro power generation.

Location of diversion - Mataura River - Map Ref: S178:783:303.

Legal description of land at site where diverted - Sect. 32 Blk XIII Town of Mataura

Rate 1,250,000m^3 (per day ~~or~~)
mum Rate (per minute or).

CONDITIONS OF RIGHT

(a) ~~GENERAL CONDITIONS — The general conditions listed on the back of this form shall, unless amended by the Board, apply to this Water Right.~~
(b) SPECIAL CONDITIONS (if any) —

(1) This water right is to be exercised within five years of the granting of the right.

(2) This Right is not to be exercised unless there is at least 0.05 metres of water passing over the centre of the existing weir on the Mataura River.

(3) The company to have installed and operating prior to exercising this Right equipment to provide immediate warning to its staff that overflow of the weir has ceased.

(4) The company shall share in the maintenance of an adequate fish ladder in terms of the fish pass regulations at weir at all times.

(5) No alteration to the existing weir or diversion channel shall be carried out by the company without the express written permission of the Board.

(6) When a reduction in water demand for power generation is necessary to comply with special condition (4) the following operating rules shall apply - and the Southland Frozen Meat and Produce Export Co. Ltd. shall comply in meeting its obligations under the rules set out

(a) When there is insufficient water to meet special condition (4) one of the N.Z. Paper Mills turbines shall be progressively reduced in water demand to meet that condition.

(b) Should it be necessary to shut down the generator referred to in condition (6) (a) the next step is for the usage of water by the larger remaining turbine to be reduced until both N.Z. Paper Mills and the Southland Frozen Meat water demand for power generation is the same.

(c) Any further reductions in water usage necessary to meet special condition (4) shall be obtained by a parallel reduction in water usage through the generators by both companies.

(7) Special Condition (6) shall not affect the rights held by both companies for processing water, or for any future rights granted for that purpose.

(8) The Board reserves the right to review this right as a result of any decision of the Town and Country Planning Tribunal in an

Stephen West

From: Claire Hunter <claire.hunter@mitchelldaysh.co.nz>
Sent: Tuesday, 14 November 2017 8:56 AM
To: Stephen West
Cc: Doyle Richardson
Subject: Alliance - Hydro Application Limited Notification

Hi Stephen
Alliance has received a copy of the notification report for its hydro plant application.

After reviewing the report we thought it was necessary to clarify a matter with you. The notification report records that Alliance proposes to shut down the hydro plant during certain conditions and couple this with monitoring. However as stated in the further information response (31 July 2017) Alliance is instead proposing a monitoring regime to assist in better informing what (if any) mitigation is actually necessary. As such, until it is determined which course of action is appropriate via the monitoring that is proposed (refer to the further information response dated 31 July 2017), Alliance is no longer proposing to shut down the hydro plant during certain conditions. The advice from PDP is that this is unnecessary as it is not known if this will assist in mitigating any effects until such time as adequate monitoring has been undertaken. As stated in the further information response, the condition that is drafted to establish and undertake the monitoring is intended to replace condition 14 in Appendix I to the AEE.

Hopefully this clears up the intention of the proposed monitoring regime which is set out in the further information response. Please feel free to contact me to discuss this further however.

In addition to the above, we don't seem to have received a copy of the report directly from you? Are you able to please send us all the information that was sent to the affected parties as part of the limited notification package?

Thanks,
Claire

Claire Hunter
Senior Consultant

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www.mitchelldaysh.co.nz