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ENVIRONMENT  
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APPLICANT: Catchment Management Division of Southland Regional Council

# TITIROA TIDE GATES AND WEIR INFRASTRUCTURE

RESOURCE CONSENT APPLICATION TO  
OCCUPY THE COASTAL MARINE AREA WITH A  
TIDE GATE AND A WEIR STRUCTURE AND TO  
DAM AND DIVERT WATER

8 MARCH 2021

FINAL



## TITIROA STREAM TIDE GATES

### RESOURCE CONSENT APPLICATION TO DAM & DIVERT WATER, AND OCCUPY CMA

Catchment Management Division of Southland Regional Council

WSP

Invercargill

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REV	DATE	DETAILS
3	8/3/ 21	Final

	NAME	DATE	SIGNATURE
Prepared by:	Luke McSoriley	8/3/21	
Reviewed by:	Shane Roberts	8/3/21	

This report ('Report') has been prepared by WSP exclusively for the Southland Regional Council ('Client') in relation to resource consent application to dam and divert water, and occupy the Coastal Marine Area ('Purpose') and in accordance with Short form Agreement with the Client dated 6 October 2020. The findings in this Report are based on and are subject to the assumptions specified in the Report and documents contained on ES File S135-033. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.



Our ref: VQ423.54\_006SO

8 March 2021

Bruce Halligan  
Acting Consents Manager  
Environment Southland  
Private Bag 90116  
Invercargill 9810

Dear Bruce

**RESOURCE CONSENT APPLICATION FOR CONTINUED OCCUPATION OF THE COASTAL MARINE AREA ASSOCIATED WITH TITIROA TIDE GATE INFRASTRUCTURE AND DAM AND DIVERT WATER**

Please find attached a resource consent application from the Catchment Management Division of Southland Regional Council (the applicant).

The applicant is applying to Southland Regional Council to replace a coastal permit (AUTH-204122) for occupation of the coastal marine area by a tide gate structure and a weir structure and diversion of water.

The tide gate structure is located in a diversion of the Titiroa Stream upstream of the Tokanui-Gorge Road Highway Bridge. The weir is located across the original Titiroa Stream channel. The purpose of the Titiroa Stream tide gate and weir infrastructure is to ensure the on-going drainage capability and prevent flooding of the surrounding low-lying farmland. Tide gate and weir structures have been present at the site since 1917.

Coastal Permit (AUTH-204122) expired on 29 October 2020 and WSP were engaged to assist with this application on 6 October 2020. A survey of native fish species was required under condition 2 of the AUTH-204122 but was not completed.

As a fish survey could only be undertaken in summer lodgement of a replacement application could not occur prior to the expiry date. The fish survey was completed in January 2021 and an assessment of fish passage is included in this application.

Please feel free to contact me if you have any questions.

Luke McSoriley  
Work Group Manager – Planning

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# Application for Resource Consent under Section 88 of the Resource Management Act 1991 (RMA)

TO: Southland Regional Council  
Private Bag 90116  
INVERCARGILL 9840

## PART A

### Applicant Details:

Catchment Management Division of Southland Regional Council  
Private Bag 90116  
INVERCARGILL 9810  
Phone: 03 2115115

### Consultant Details (Address for Service):

WSP NZ Ltd  
PO BOX 647  
INVERCARGILL 9840  
ATTENTION: Luke McSoriley  
Ph: 027 269 1644  
Email: [luke.mcsoriley@wsp.com.nz](mailto:luke.mcsoriley@wsp.com.nz)

### Consents Applied For:

PERMIT	ACTIVITY	DURATION
Coastal Permit	Occupation of crown land in the coastal marine area by a weir structure	15 years
Coastal Permit	Occupation of land in the coastal marine area by a tide gate structure	15 years
Coastal Permit	Damming and diversion of water	15 years

**1. Are there any current or expired resource consents relating to this proposal?**

Yes. AUTH-204122 approved 29 October 2015 for a coastal permit to dam and divert water, and to occupy the coastal marine area, with tide-gates and a weir expired on 29 October 2020 (refer Appendix D).

**2. Are any other consents required from Environment Southland or other authorities?**

NONE

**3. For what purpose is this consent(s) required:**

Damming and diversion of water in the Titiroa Stream to prevent flooding and allow drainage of the established low-lying farmland upstream of the Dam.

**4. Location of proposed activity:**

ADDRESS: Upstream of the Tokanui-Gorge Road Highway Bridge



LEGAL DESCRIPTION: Section 1 SO 11258 and Part Lot 1 DP 11173  
Statute: River Control Purposes NZ Gazette 1983 p 2020.  
MAP REFERENCE (NZTM): 1276640E, 4836895N

**5. The name and address of the owner/occupier: (if other than the applicant)**

OWNER: Southland Regional Council  
OCCUPIER NAME: Mataura Rating District c/- Catchment Management Division  
PHONE: +64 3 211 5115  
ADDRESS: Private Bag 90116, Invercargill 9810

**6. Please attach a map or a coloured aerial photograph, showing at a minimum, the location of the proposed activities.**

Refer attached report and appendices.

**7. Assessment of Environmental Effects**

Refer attached report and appendices.

**8. Affected Parties**

Refer attached report and appendices.

**9. Correspondence from Council when using a consultant.**

Correspondence about the application shall be directed to the consultant and copied to the applicant via email to ES Catchment Manager – [paddy.haynes@es.govt.nz](mailto:paddy.haynes@es.govt.nz)

**10. Site Visits by Consents Officer.**

The site is a Riverbed adjacent to public road. Consents Staff may visit the site at any time, but there is no specific request for an on-site meeting, unless Consents staff deem necessary.

**OTHER:**

**11. Costs/Deposit**

Deposit paid upon submission to Council.

**12. Checklist**

PAYMENT	Deposit paid upon submission to Council.
WITTEN APPROVAL	See Appendices.
SITE PLAN/LOCALITY PLAN/PLANS	See Appendices.
CERTIFICATE OF INCORPORATION	N/A
PART B FORMS	As Follows:

**PART B**

**a) What is the application for?**

Refer attached report and appendices.

**b) What duration of resource consent is sought?**

20 Years.

**c) What is the name of the water body within which these works will take place?**

Costal Marine Area limit in the Titiroa Stream.

**d) Please describe how the works will be carried out.:**

Refer attached report and appendices.



e) Is any damming or diversion of water required as part of the proposed works?

Yes. Refer attached report and appendices.

f) Please state the proposed date of commencement and completion of works and describe the hours of operation.

Refer attached report and appendices.

g) Describe these features found within the existing environment of the proposed activity along with details of the assessment undertaken to determine the presence of these features.

Refer attached report and appendices.

h) Please provide details on the river form, aggradation or degradation, riverbank erosion, course change by the river and any other work carried out on this stretch of the River?

Refer attached report and appendices.

i) How will the proposed works/structures alter river flows during flood or low flow events?

Refer attached report and appendices.

j) How will the proposed works affect river form? How will the proposed works affect the overall river catchment? Please consider the downstream effects of the proposed works on the river form and behaviour.

Refer attached report and appendices.

k) Are there any structures in/over/next to the water body in the vicinity of the proposed works?

Refer attached report and appendices.

l) Assessment of environmental effects.

Refer attached report and appendices.

m) Monitoring or mitigation measures

Refer attached report and appendices.

n) Minimise the release of silt, sediment, concrete and other contaminants into water.

Refer attached report and appendices.

o) Description of any possible alternative locations or methods for undertaking the activity

Refer attached report and appendices.

p) Evidence of any consultation undertaken for this application.

Refer attached report and appendices.

#### DECLARATION

I/we hereby certify that to the best of my/our knowledge and belief, the information given in this application is true and correct.

I/we undertake to pay all actual and reasonable application processing costs incurred by the Southland Regional Council.

Paddy Haynes

(person authorised to sign on behalf of applicant)

Designation Catchment Manager, ES

Date 8<sup>th</sup> March 2021

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# 1 INTRODUCTION

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## 1.1 PURPOSE OF THIS REPORT

This document comprises an application to Southland Regional Council for resource consent to maintain the diversion and damming of the Titiroa Stream via tide control gates and an earth dam weir. This application has been prepared in accordance with Section 88 of the Resource Management Act 1991 (RMA) and provides a description of the activity with an assessment of the actual and potential effects on the environment, as required by the Fourth Schedule of the RMA.

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## 1.2 BACKGROUND

Southland Regional Council (Environment Southland) via its Catchment Management Division helps communities reduce the risk of flooding and erosion to their properties by carrying out river and drainage works within river catchment rating districts. As part of this work Environment Southland aims to manage and protect the integrity of its assets including stop banks, detention dams, bridges, culverts and tide gate structures. These structures assist in controlling flooding and protecting Southland communities.

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## 1.3 SITE AND ENVIRONMENTAL SETTING

The Titiroa Stream is located on the eastern bank of the lower Mataura River floodplain and predominantly flows through pastureland and remnants of native bush. The tidal gates and weir are located 160m upstream of the Gorge Road Highway, 30km southeast of Invercargill and approximately 4km north of the Fortrose settlement on the Toetoes Estuary. The Stream originates east of Pine Bush, in the Forest Range of the Catlins approximately 15km from the site. The Titiroa Stream has a catchment area of approximately 223 km<sup>2</sup>.

Titiroa Stream is 20-30m wide in the immediate reaches up and downstream of the Gorge Road Highway bridge. It is tidal at this location and lined with Whitebait huts downstream of the road bridge, white baiting also occurs upstream of the road Bridge. The Stream flows through relatively flat productive farmland to the west and south with the farmland rising up to a riverine terrace to the east. The Estuary is considered to have a large riverine component relative to its area as it is also outlet to the Mataura River.

Titiroa Stream is part of the Coastal Catlins surface water management zone, covering four coastal catchments including the westernmost Titiroa Stream and in its lower extent, is part of the Lower Mataura Groundwater Zone under the Proposed Southland Water and Land Plan (pSWLP). The Coastal Plan for Southland (the Coastal Plan) Map 9b shows the tide-gate in its current position.

Titiroa River is subject to esplanade mechanisms ER64 (reserve requirement) under the Operative Southland District Plan (shown [District Plan Map 42A](#)). The site is in the Rural Zone of the SDC District Plan. It is identified as subject to Natural Hazard Overlay (NHO) for flooding, and at the northern extent of the Coastal Environment Overlay, under the District Plan.

The ecosystem values are identified in the RWPS Appendix G as Lowland soft-bed classified waterways, and within the pSWLP Appendix E as being within the Mataura Freshwater Management Unit (FMU).



FIGURE 1: LOCALITY PLAN (SOURCE: TOPOMAPS)



PHOTO 1: VIEW UPSTREAM OF TITIROA STREAM FROM GORGE ROAD HIGHWAY BRIDGE



PHOTO 2: VIEW OF THE TIDAL GATES LOOKING UPSTREAM

## 1.4 TITIROA WETLAND RESERVE

Environment Southland owns large landholdings adjacent the Titiroa Stream as detailed in Figure 2 below.

Environment Southland manages these land holdings for the joint purposes of nature conservation and flood protection. Areas set back from the Titiroa Stream and its margins are leased and grazed for rural land use purposes. These landholdings have 'reserve' status within the Environment Southland's leasehold land management framework. Management of this areas has altered over time to reflect a conservation focus, for example through fencing to exclude stock from the stream margins.

A High Value Area (HVA) Assessment has been completed for the Titiroa Wetland Reserve and is included in this application as Appendix D

The purpose of the HVA assessment programme is to identify, define, describe, rank and record sites containing indigenous biodiversity values. HVA reports provide the landowner with information about the presence, condition and relative value of indigenous biodiversity on your land. The information provided in this report aims to:

- a) Promote the benefits of protecting and enhancing indigenous biodiversity values to landowners and the community in general;
- b) Assist landowners to make decisions about voluntarily seeking legal protection for biodiversity values on their land;
- c) Help assess the state of the indigenous biodiversity at local, regional and national level.

An HVA for the Titiroa Wetland Reserve notes:

*"This site is of outstanding importance for its diversity of habitats and for the diversity and abundance of wildlife that it supports (fish, marsh inhabiting birds, as well as estuarine birds such as terns and waders, including migratory ones)".*

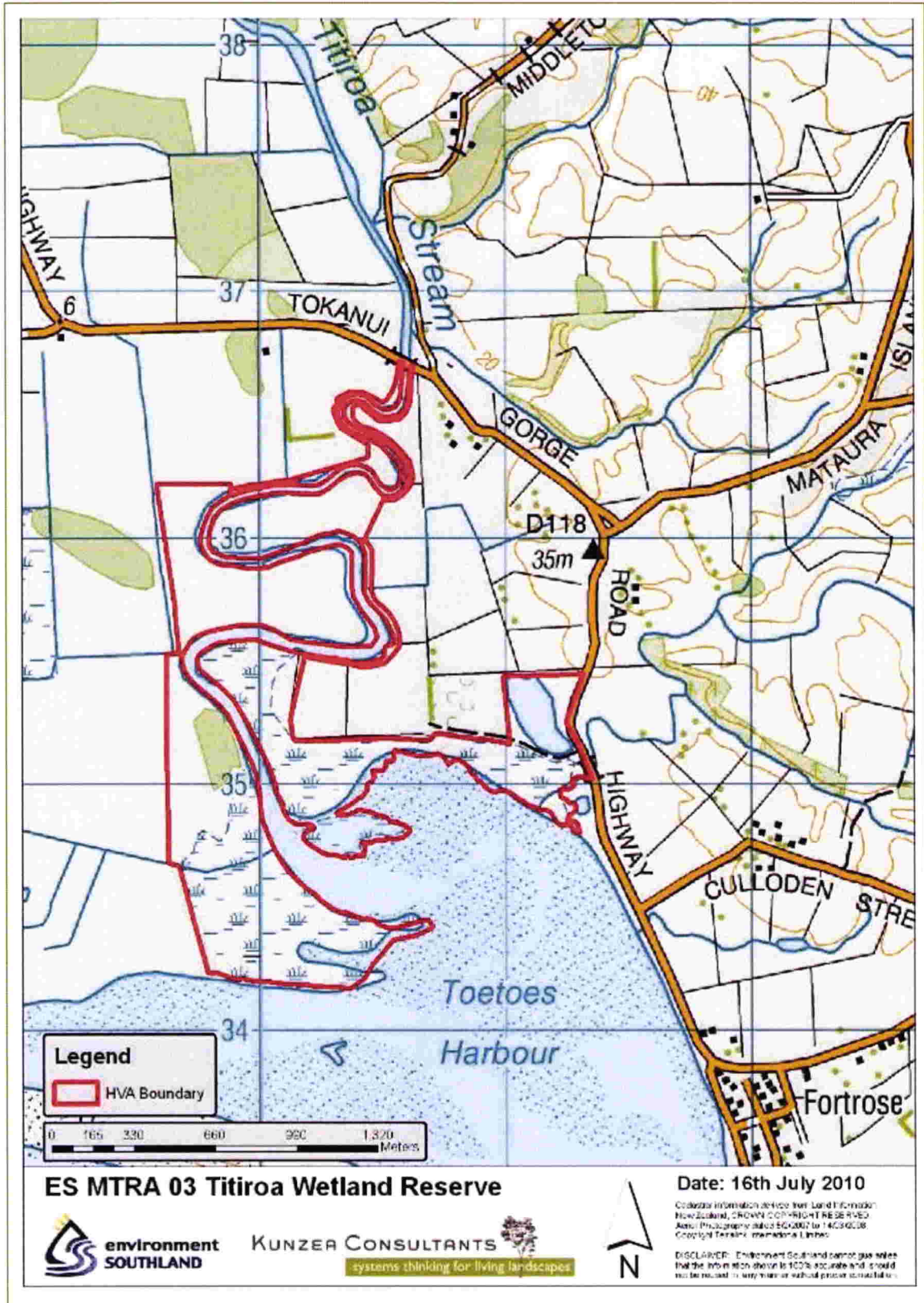


FIGURE 2: TITIROA WETLAND RESERVE

## 2 PROPOSAL

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### 2.1 EXISTING WEIR AND TIDE GATES

The application relates to existing drainage and flood control infrastructure. The existing earthen embankment weir was constructed across the original Titiroa Stream channel to divert the flow of the stream into a diversion channel to the east. The tide gates are located in the diversion channel and are designed to prevent incoming tides from flowing further upstream. The gates close on an incoming tide as water flowing upstream pushes against them. They then open on the outgoing tide as the flow of the river reverts downstream.

The weir is located in the bed of the Titiroa Stream on Crown land and the tide gates are located in the diversion channel on land owned by the applicant. All the tide gate and weir infrastructure is located within the Coastal Marine Area. The purpose of the Titiroa Stream tide gates is to ensure the on-going drainage capability and prevent flooding of the surrounding low-lying farmland. The gates purpose is to prevent tidal inflow which impacts on land drainage. The tide gates influence approximately 11,500 hectares of improved pasture alongside the Titiroa Stream. There has been some form of tide gates in this location since 1917 when they were constructed by the Public Works Department. The tide-gates "lock structure" in place today was constructed in 1988. It maintains an invert level of 1.2m below mean sea level (msl) with a rock-armoured weir constructed to a height of 1.4m amsl to divert the flow through a diversion channel and lock gates. There are three gates, each 2.040m wide by 2.320m high hung vertically with a sill level of 0.7m below msl. The top of the gates are 1.56m amsl and are opened by the tidal flow and Titiroa Stream at least 50% of the time. During flood events the structure may be completely submerged and can be overtopped when storm surge and high tides coincide.

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### 2.2 ACTIVITY

This application seeks a replacement coastal permit for continuation of the existing occupation of the coastal marine area by the tide gates and weir structure. No change in occupation area or extent of the tide gates or weir is proposed by way of this application. As noted above no upgrades, maintenance or changes are proposed to the existing tide-gates or weir. The tidal gates are aging and there will be a need for maintenance works in the future. Maintenance and repair of the structure is permitted by Rule 11.4.1 of the Regional Coastal Plan, subject to conditions.

Reconstruction of the structure is also a permitted activity under Rule 11.4.2 of the Coastal Plan, subject to conditions. Photograph 2 above details the tide gate structure at high tide with its gates shut.

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### 2.3 COASTAL MARINE AREA

In relation to the Titiroa River the boundary of the coastal marine area for the Southland Region is described in Appendix 2 of the Regional Coastal Plan. Schedule 1 of Appendix 2 details the landward boundary of the CMA co-ordinates of the boundary are provided (NZMS260 F47 863988) and it is described as being on the 'Upper side of tidegate pipes'. The tide-gates are located at or downstream of this point and an existing coastal permit was in place for the structure. The site is within the Coastal Marine Area (CMA) and as such the relevant regional plan is the RCP.

## 3 ACTIVITY STATUS

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### 3.1 REGIONAL COASTAL PLAN FOR SOUTHLAND 2013

Exclusive or preferential occupation of Crown land in the coastal marine area is a discretionary activity under Rule 9.1.1 of the Coastal Plan. The existing weir structure is located on Crown land and is located downstream of the CMA boundary. As a result, occupation of the coastal marine area by the weir structure is a discretionary activity under Rule 9.1.1 of the Coastal Plan. We note that the tide gates are not located on Crown land as they are located on land owned by the Southland Regional Council. As such rule 9.1.1 is not applicable to the tide gates. Under Part 3 Section 12 (2) (a) of the RMA 1991 no person may occupy any part of the common marine and coastal area unless expressly allowed by a national environmental standard, a rule in a regional plan or a resource consent. The proposed activity (tide gate) is not expressly allowed by a national environmental standard, a rule in a regional plan or a resource consent.

Section 14 (2) of the RMA 1991 states that no person may dam or divert of water (other than open coastal water) within the coastal marine unless allowed (under subsection 3) by a national environmental standard or a rule in a regional plan or a resource consent none of which currently apply to the activity. Under Section 87B (1) (a) an application for a resource consent for an activity must, with the necessary modifications, be treated as an application for a resource consent for a discretionary activity if Part 3 requires a resource consent to be obtained for the activity and there is no plan or proposed plan, or no relevant rule in a plan or proposed plan. The occupation of the tide gate structure within the coastal marine area and the damming and diversion of water are therefore to be considered as a discretionary activity under Sections 12, 14 and 87B of the Resource Management Act. Overall, the application is therefore considered to be a discretionary activity.

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### 3.2 TIDE GATES AND WEIR AS INFRASTRUCTURE

The Southland Regional Policy Statement (SRPS) definition of Strategic Facilities includes flood and drainage infrastructure managed by the Southland Regional Council. The SRPS definition of Critical infrastructure states:

*“Infrastructure that provides services which, if interrupted, would have a significant effect on the wellbeing and health and safety of people and communities and would require reinstatement, and includes all strategic facilities”.*

The SRPS definition of Regionally Significant Infrastructure states:

*“Infrastructure in the region which contributes to the wellbeing and health and safety of the people and communities of the region, and includes all critical infrastructure”.*

The tide gates are flood and drainage infrastructure managed by the Southland Regional Council and as such are a Strategic Facility under the SRPS. The tide gates are also defined as Critical infrastructure and Regionally Significant Infrastructure under the SRPS. The RMA definition of infrastructure includes ‘drainage systems’ and the weir and tide gates are considered to be structures consistent with this definition. The status of the tide gates as infrastructure is noted here as the SRPS and the regional plans that are required to give effect to the RPS all include objectives and policies recognizing the importance of infrastructure. The relevant infrastructure related objectives and policies are discussed further below.

## 4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

Section 88 of the RMA requires the applicant to assess any actual or potential effects that the activity may have on the environment. Clause 6 of the Fourth Schedule details that information required to be included in the assessment. The proposed activity is a discretionary activity under the Coastal Plan. This assessment of environmental effects has been provided in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

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### 4.1 EFFECTS ON STREAM MORPHOLOGY AND DYNAMICS

When the tide gate and weir were originally constructed, and the diversion channel was formed around 1917 there were adverse effects on stream morphology and dynamics. The original stream channel has been blocked by the weir, a diversion channel has been formed and the tidal gates constructed to restrict incoming tidal waters from flowing further upstream. These effects are on-going and are a direct outcome of the design of the flood and drainage infrastructure. The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland.

This application does not propose any changes to the existing structures and continued occupation of CMA will not give rise to any additional adverse effects on the Titiroa Stream. The tide gate and weir are existing structures and form part of the existing physical environment and must be managed sustainably. These structures are having an ongoing adverse effect on the Titiroa Stream and its natural tidal processes. These adverse effects need to be balanced against the positive drainage and flood protection effects discussed below in Section 4.8.

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### 4.2 LANDSCAPE, VISUAL AMENITY EFFECTS

The application site is not identified as being within either an area of Outstanding Landscapes or Natural Features or a Visual Amenity Landscape in the Southland District Plan. It is identified as being located within the Coastal Overlay in the District Plan and is located in the CMA.

When the tide gate and weir were originally constructed, and the diversion channel was formed the landscape was altered and there were visual effects associated with these works. The tide gate and weir are existing structures and form part of the existing physical environment. No changes are proposed to the weir or tide gate structures. The tide gates and weir are not overly prominent or visible and have only a localised visual effect. This application does not propose any changes to the existing structures and as such the proposed activity will not give rise to any adverse landscape or visual amenity effects.

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### 4.3 EFFECTS ON WATER QUALITY

This application does not propose any changes to the existing tide gate and weir structures and continued occupation of the CMA is not anticipated to give rise to any adverse water quality effects.



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## 4.4 ECOLOGY

The recently lapsed Coastal Permit (AUTH-204122) for the tide gates and weir was processed on a limited notification basis in 2015. The Department Conservation submitted and initially opposed the application in part because the tide gates potentially reduced the ability of fish to migrate from the coast up the Titiroa Stream.

Subsequently following mediation, the Coastal permit was granted for a term of 5 years (less than the duration requested) with a condition requiring monitoring investigations to assess effects on native fish. The monitoring required included a comparison of native fish upstream and downstream of the tide gates and an assessment of flow downstream of the tide gates to determine if water velocities are impacting native fish species.

### 4.4.1 FISH PASSAGE

The applicant engaged Pattle Delamore Partners (PDP) who completed a comparative fish survey both upstream and downstream of the tide gates. PDP also provided an assessment of the flow profiles immediately downstream of the tide gate structure. The purpose of the Assessment was to determine if the tide gate structure is posing a barrier to fish movement. The PDP Assessment is attached as Appendix B.

The PDP Assessment notes that all four migratory species of native fish recorded in the investigation were found both upstream and downstream of the tide gates with both upstream and downstream fish having a similar size range. This suggests that fish migration is not impeded by the tide gates and the presence of large eels upstream of the gates suggests that migration has not been impeded over many years.

PDP conclude that the tide gates have only a minor effect on fish migration and water velocity through the gates should not present too great a barrier to most migrating fish.

### 4.4.2 INANGA SPAWNING

PDP also provide an assessment of the effects of the tide gates on the spawning of inanga in the Titiroa River. They conclude that the tide gates probably have a significant and detrimental effect on spawning migrations of inanga in the Titiroa Stream. They note that it may be possible to mitigate these effects by restoring and /or enhancing inanga spawning habitat nearby.

As noted above at Section 4.1 the original stream channel has been blocked by the weir, a diversion channel has been formed and the tidal gates constructed to restrict incoming tidal waters from flowing further upstream. These effects are on-going and are a direct outcome of the design of the flood and drainage infrastructure. The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland. This application does not propose any changes to the existing structures and continued occupation of CMA will not give rise to any additional adverse effects on the Titiroa Stream.

The tide gate and weir are existing structures and form part of the existing physical environment and must be managed sustainably. These structures are having an ongoing adverse effect on the Titiroa Stream and its natural tidal processes and this includes likely effect on inanga spawning. These adverse effects need to be balanced against the positive drainage and flood protection effects discussed below in Section 4.7. The PDP Assessment suggest mitigation focussed on enhancement and restoration of spawning habitat and this is discussed further below in Section 6.1.

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## 4.5 EFFECTS ON PUBLIC ACCESS

The Titiroa River is large enough in this area to be navigable by small boats. It is unlikely that such boats would pass through the gate structure, but they could be carried around it. The tide gate and weir are existing structures and form part of the existing physical environment. This application does not propose any changes to the existing structure and the proposed activity will not give rise to any adverse effects on public access other than those that arose when the tide gates were originally constructed over 100 years ago.

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## 4.6 HISTORIC HERITAGE

There are no known sites of historic heritage identified shown on the relevant Southland District Plan Planning Maps. There are no known sites of historic heritage identified shown on the relevant map (9b) in the Coastal Plan near the application site. Irrespective no physical works are proposed as part of this application and as such the activity is not likely to give rise to any adverse effects on historic heritage. The activity is not likely to give rise to any significant adverse on historic heritage.

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## 4.7 CULTURAL

The application site is not within a Statutory Acknowledgement area. Ngāi Tahu ki Murihiku have a spiritual and historical association with Southland's coastal environment. The fish survey has also identified the presence of native fish species that are mahinga kai resources. As noted above the occupation of the CMA and the function of the tide gates and weir are having ongoing effects associated with the Titiroa Stream given their function to restrict tidal waters moving upstream. The tide gates are having only a minor effect on fish migration but may impact on inanga spawning. Consultation with iwi through Te Ao Marama Inc is proposed and they have been identified as an affected party. This consultation will assist in terms of determining the cultural values, interests and associations with the site and activity and any potential cultural effects.

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## 4.8 DRAINAGE AND FLOOD PROTECTION

The purpose of the tide gates and weir is to block tidal inflow further up the Titiroa in order to reduce flooding and improve drainage of low-lying farmland upstream of the gates. The tide gates influence approximately 11,500 hectares of improved pasture alongside the Titiroa Stream. The activity has positive social and economic effects through drainage and flood protection.

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## 4.9 CONCLUSION

The activity is having ongoing adverse effects on natural tidal processes in the Titiroa Stream and is also likely to be having an adverse effect on inanga spawning. These effects are on-going and are directly related to the function of the tide gate infrastructure. The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland.

## 5 ASSESSMENT OF ALTERNATIVES

The following alternatives were considered:

1. Do nothing; or
2. Remove infrastructure; or
3. Retain infrastructure.

Maintaining and improving flood protection infrastructure is an important function of the Catchment Division of Environment Southland. This infrastructure has specifically been designed, operates and is maintained to protect people and property from tidal flows.

The intermittent flow control with the tide gates, their continued occupation in the diversion channel and the occupation of the tide gates and weir in the CMA is considered necessary to ensure ES Catchment Division meets its obligations in the Maitara River Rating District.

The tide gates and weir protect upstream farmland from flooding and drainage issues and allow a large land area to be productively farmed.

A do-nothing approach would see the existing infrastructure deteriorate and land drainage fail. Removal of the infrastructure would result in drainage and flood issues upstream and a loss of productive farmland.

The AEE detailed in this application demonstrates that the tide gates and weir are having ongoing adverse effects. However, these effects are associated with the function of the infrastructure which is to specifically prevent tidal flows past the tide gates and these effects link back to construction of the infrastructure over 100 years ago. The tide gates and weir are also having positive environmental, social and economic effects in regard to drainage and flood management. As a result, alternative options 1 and 2 are not considered appropriate and retention of the existing infrastructure is considered the most appropriate option.

## 6 MITIGATION

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### 6.1 DOWNSTREAM LAND MANAGEMENT

The PDP Assessment concludes that tide gates probably have a significant and detrimental effect on spawning migrations of inanga in the Titiroa Stream. They note that it may be possible to mitigate these effects by restoring and /or enhancing inanga spawning habitat nearby.

Environment Southland via its Catchment Management Division owns and manages a significant land area adjoining the Titiroa Stream adjacent and downstream of the tide gates. The area has been identified as the Lower Titiroa Wetland Reserve and is managed with a conservation management focus.

As part of the ongoing management of the Lower Titiroa Wetland Reserve 110 hectares of land adjoining the Titiroa Stream has been fenced and stock grazing prevented. These riparian areas are being managed to enable restoration and enhancement of the stream margins. Marginal grasses and rushes which the PDP Assessment notes as important for inanga spawning are being protected through this management approach.

The applicant's management of the Lower Titiroa Wetland Reserve is consistent with restoration and enhancement of inanga spawning habitat and mitigation of the effects of the tide gate infrastructure.

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### 6.2 PROPOSED CONDITIONS

No physical works are proposed as part of this application and as such there is limited need for conditions of consent.

#	CONDITION
1	The consent holder shall at all times during the term of this consent maintain the structures in good repair, appearance and condition.
2	Monitoring condition (standard wording).
3	Review condition (standard wording).
4	The Titiroa Wetland Reserve shall be managed in a manner that maintains and enhances inanga habitat.

# 7 STATUTORY ASSESSMENT

Clause 2 of the Fourth Schedule of the Act requires an assessment of the activity against any relevant provision of a document referred to in Section 104(1)(b). As the application relates to an existing activity within the CMA the Regional Water Plans and NPS and NES for Freshwater are not relevant considerations.

## 7.1 NEW ZEALAND COASTAL POLICY STATEMENT 2010

The New Zealand Coastal Policy Statement 2010 (the NZCPS) sets out to achieve the purpose of the Act in relation to the coastal environment, identifying and promoting the sustainable management of the coastal environment and its characteristics, qualities and uses. Relevant objectives and policies are discussed below.

***Objective 1 - To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land, by:***

- *maintaining or enhancing natural biological and physical processes in the coastal environment and recognising their dynamic, complex and interdependent nature;*
- *protecting representative or significant natural ecosystems and sites of biological importance and maintaining the diversity of New Zealand's indigenous coastal flora and fauna; and*
- *maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity.*

The activity is having ongoing adverse effects on natural tidal processes in the Titiroa Stream and is also likely to be having an adverse effect on inanga spawning. These effects are on-going and are directly related to the function and purpose of the tide gate infrastructure. The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland. Natural biological and physical processes in the coastal environment associated natural tidal processes have been altered by the tide gates structures since they were originally constructed. The applicant through management of the Titiroa Wetland Reserve is protecting representative or significant natural ecosystems and sites of biological importance and maintaining the diversity of New Zealand's indigenous coastal flora and fauna. The activity is not likely to be having an adverse effect on coastal water quality. The activity is considered partly contrary to Objective 1.

***Objective 6: To enable people and communities to provide for their social, economic, and cultural wellbeing and their health and safety, through subdivision, use, and development, recognising that:***

- *the protection of the values of the coastal environment does not preclude use and development in appropriate places and forms, and within appropriate limits;*
- *some uses and developments which depend upon the use of natural and physical resources in the coastal environment are important to the social, economic and cultural wellbeing of people and communities;*

- *functionally some uses and developments can only be located on the coast or in the coastal marine area;*
- *the coastal environment contains renewable energy resources of significant value;*
- *the protection of habitats of living marine resources contributes to the social, economic and cultural wellbeing of people and communities;*
- *the potential to protect, use, and develop natural and physical resources in the coastal marine area should not be compromised by activities on land;*
- *the proportion of the coastal marine area under any formal protection is small and therefore management under the Act is an important means by which the natural resources of the coastal marine area can be protected; and*
- *historic heritage in the coastal environment is extensive but not fully known, and vulnerable to loss or damage from inappropriate subdivision, use, and development.*

The activity is consistent Objective 6 in that it is enabling people and communities to provide for their social and economic wellbeing.

**Policy 6: Activities in the coastal environment**

*1. In relation to the coastal environment:*

- a. recognise that the provision of infrastructure, the supply and transport of energy including the generation and transmission of electricity, and the extraction of minerals are activities important to the social, economic and cultural well-being of people and communities;*
- b. consider the rate at which built development and the associated public infrastructure should be enabled to provide for the reasonably foreseeable needs of population growth without compromising the other values of the coastal environment;*
- c. encourage the consolidation of existing coastal settlements and urban areas where this will contribute to the avoidance or mitigation of sprawling or sporadic patterns of settlement and urban growth;*
- d. recognise tangata whenua needs for papakāinga, marae and associated developments and make appropriate provision for them;*
- e. consider where and how built development on land should be controlled so that it does not compromise activities of national or regional importance that have a functional need to locate and operate in the coastal marine area;*
- f. consider where development that maintains the character of the existing built environment should be encouraged, and where development resulting in a change in character would be acceptable;*
- g. take into account the potential of renewable resources in the coastal environment, such as energy from wind, waves, currents and tides, to meet the reasonably foreseeable needs of future generations;*
- h. consider how adverse visual impacts of development can be avoided in areas sensitive to such effects, such as headlands and prominent ridgelines, and as far as practicable and reasonable apply controls or conditions to avoid those effects;*

*i. set back development from the coastal marine area and other water bodies, where practicable and reasonable, to protect the natural character, open space, public access and amenity values of the coastal environment; and*

*j. where appropriate, buffer areas and sites of significant indigenous biological diversity, or historic heritage value.*

2. Additionally, in relation to the coastal marine area:

*a. recognise potential contributions to the social, economic and cultural wellbeing of people and communities from use and development of the coastal marine area, including the potential for renewable marine energy to contribute to meeting the energy needs of future generations;*

*b. recognise the need to maintain and enhance the public open space and recreation qualities and values of the coastal marine area;*

*c. recognise that there are activities that have a functional need to be located in the coastal marine area, and provide for those activities in appropriate places;*

*d. recognise that activities that do not have a functional need for location in the coastal marine area generally should not be located there; and*

*e. promote the efficient use of occupied space, including by:*

*i. requiring that structures be made available for public or multiple use wherever reasonable and practicable;*

*ii. requiring the removal of any abandoned or redundant structure that has no heritage, amenity or reuse value; and*

*iii. considering whether consent conditions should be applied to ensure that space occupied for an activity is used for that purpose effectively and without unreasonable delay.*

In regard to the coastal environment this policy seeks to recognise that the provision of infrastructure such as the tide gates and weir are activities important to the social, economic and cultural well-being of people and communities (Policy 6 (1) (a)). The infrastructure has a functional need to be located and operate in the coastal marine area (Policy 6 (1) (e)). Policy 6 (2) (c) in regard to the coastal marine area seeks to recognise that there are activities that have a functional need to be located in the coastal marine area, and that those activities are provided for in appropriate places. The activity is considered consistent with Policy 6.

The proposed activity considered partly contrary to Objective 1 and consistent with Objective 6 and Policy 6 of the NZCPS.

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## 7.2 NATIONAL ENVIRONMENTAL STANDARDS

No National Environmental Standards are considered directly relevant to the activity.

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## 7.3 SOUTHLAND REGIONAL POLICY STATEMENT 2017

The Southland Regional Policy Statement 2017 (SRPS) is a relevant consideration. Objectives and policies relevant to the activity are listed and discussed below.

### Tangata Whenua

*Objective TW.2 - Provision for iwi management plans: All local authority resource management processes and decisions take into account iwi management plans.*

### Coast

*Objective COAST.2 - Activities in the coastal environment: Infrastructure, ports, energy projects, aquaculture, mineral extraction activities, subdivision, use and development in the coastal environment are provided for and able to expand, where appropriate, while managing the adverse effects of those activities on public access and natural character.*

*Objective COAST.3 - Coastal water quality and its ecosystems: Coastal water quality and its ecosystems are maintained or enhanced.*

*Policy COAST.2 - Management of activities in the coastal environment: Ensure adequate measures or methods are utilised within the coastal environment when making provision for subdivision, use and development to:*

- i. protect indigenous biodiversity, historic heritage, natural character, and natural features and landscape values historic heritage;*
- ii. maintain or enhance amenity, social, intrinsic, ecological and cultural values, landscapes of cultural significance to tangata whenua and coastal dune systems;*
- iii. maintain or enhance public access; and*
- iv. avoid or mitigate the impacts of natural hazards, including predicted sea level rise and climate change.*

*Policy COAST.4 - Infrastructure, port, aquaculture and energy projects: Recognise and provide for infrastructure, port, aquaculture and energy projects that must be located within the coastal environment.*

*Policy COAST.5 - Management of effects on coastal water quality and ecosystems: Avoid, remedy or mitigate adverse effects of land-based activities on coastal water quality and its ecosystems.*

### Infrastructure /Transport

*Objective INF.1 - Southland's infrastructure: Southland's regional, national and critical infrastructure is secure, operates efficiently, and is integrated with land use and the environment.*

*Policy INF.1 - Regional, national and critical infrastructure - Recognise the benefits to be derived from, and make provision for, the development, maintenance, upgrade and ongoing operation of regionally significant, nationally significant and critical infrastructure and associated activities.*

In regard to Objective TW.2 consultation with iwi through Te Ao Marama Inc is proposed and the relevant provision of the iwi management plan are discussed below.

Objective INF.1 requires critical infrastructure such as the tide gates and weir to operate efficiently and be integrated with land use and the environment. Policy INF.1 seeks recognition for the benefits to be derived from infrastructure and to make provision for the ongoing operation of regionally significant, and critical infrastructure such as the tide gates and weir. The activity is considered consistent with Objective INF.1 and Policy INF.1.

Policy COAST.2 relates to management of activities in the coastal environment and seeks to ensure adequate measures to protect indigenous biodiversity and maintain or enhance ecological and cultural values. As outlined above the activity is having on-going adverse effects and mitigation is promoted through management of the Titiroa Wetland Reserve. This policy also seeks to avoid or



mitigate the impacts of natural hazards and one of the functions of the tide gates is to drainage management and prevention of flooding.

There is a functional need for structures associated with the activity to be in the coastal environment and coastal marine area. The tide gates and weir are regionally significant infrastructure that has a functional need to be located in the CMA and the activity is considered consistent with Policy COAST.4.

In regard to Policy COAST.5 as outlined above there are ongoing effects associated with the infrastructure. However, these effects are being mitigated via the applicant's management of the Titiroa Wetland Reserve and as such the activity is considered consistent with Policy COAST.5. Overall, on balance when considering all relevant provisions, the proposed activity is not considered contrary to the relevant policies of the Regional Policy Statement for Southland.

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## 7.4 REGIONAL COASTAL PLAN FOR SOUTHLAND 2013

The Regional Coastal Plan for Southland (the Coastal Plan) became fully operative in March 2013. The relevant policies and objectives of the Coastal Plan are listed and discussed below.

*Objective 11.2.2 - Social, economic and safety benefits: To recognise the social, economic, cultural and safety benefits of structures in the coastal marine area.*

*Policy 11.2.10 - Soundness and safety: Any structure in the coastal marine area is to be designed, constructed, and maintained in a manner which ensures that its soundness and safety is not compromised by its use, corrosion, the action of marine organisms, or fluvial or coastal processes.*

*Policy 11.2.16 - Natural character, amenity, landscape, seascape and open space values: Avoid, remedy or mitigate the adverse effects of structures on the natural character, amenity, landscape, seascape and open space values of the coastal marine area.*

*Policy 11.2.17 - Structures and activities to be compatible with their surrounding environment: Encourage structures and activities, including reclamations, to be located, finished, and be of a form, profile, extent and alignment that is not incompatible with the visual amenity, natural character and physical landscape of the area in which it is located.*

*Policy 11.3.1 - Existing structures providing public benefit: Authorise existing structures, and their occupation of the coastal marine area, subject to safety standards, that provide public benefit.*

*Objective 11.6.1 - Adverse effects of new or changing activities: To ensure that new or changing activities on structures do not result in adverse effects.*

*Policy 11.6.1 - New and Changing Activities on Existing Structures including Structures on Structures: Consider new and changing activities on existing structures, including structures on structures, on the same basis as new activities or new structures.*

Objective 11.2.2 aims to recognise the social, economic, cultural and safety benefits of structures in the coastal marine area. As outlined above the tide gates and weir have social and economic benefits through drainage management and control of tidal processes. In regard to Policy 11.2.10 no works are proposed as part of this application. In regard to Policy 11.2.16 and Policy 11.2.17, no physical works are proposed, the structures form part of the physical environment, have been present for over 100 years and as outlines above are no have any significant adverse effects on landscape or amenity values.

Policy 11.3.1 seeks to authorise existing structures, and their occupation of the coastal marine area, subject to safety standards, that provide public benefit. Objective 11.6.1 and Policy 11.6.1 relate only to new or changing activities and are not considered relevant.

The activity is considered consistent with the relevant provisions of the RCP.

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## 7.5 TE TANGI AU TAUIRA – IWI MANAGEMENT PLAN

The relevant objectives and policies of Te Tangi Au Tauira the Ngai Tahu ki Murihiku Natural Resources and Environmental Iwi Management Plan are as follows:

### Section 3.6 Te Ākau Tai Tonga – Southland's Coastal Environment

*3.6.1.1 Ensure the land, water and biodiversity at the interface of Southland's coastal environment are managed in an integrated way through careful planning and policy instruments which avoid compartmentalising the natural environment.*

*3.6.2.2 Ensure consistency with the policies as outlined in the New Zealand Coastal Policy Statement, with respect to protection, development and use of Southland's Coastal Environment.*

*3.6.2.8 Require that an assessment of environmental effects includes and assessment of the cultural effects and potential cumulative effects on the natural character of the coastal environment.*

### 3.6.3 Structures in the Coastal Marine Area

*3.6.3.1 Any activity within, adjacent to or that may potentially impact on Statutory Acknowledgment areas, including Te Mimi o Tū Te Rakiwhānoa (Fiordland Coastal Marine Area) and Rakiura/ Te Ara a Kiwa (Stewart Island/Foveaux Strait Coastal Marine Area), will require consultation with both Te Rūnanga o Ngāi Tahu, Ngāi Tahu ki Murihiku and Tangata Tiaki gazetted under the South Island Customary and Fishing Regulations 1998.*

*3.6.3.5 Ensure that structures in the coastal environment are soundly constructed, are compatible with the natural character of the surrounding coastal environment and adjacent lands and do not have adverse effects on other people using the coast area. This includes appropriate placement of moorings and anchorages.*

*3.6.3.16 Encourage owners and other stakeholders to maintain existing coastal structures in a reasonable and safe condition.*

### 3.6.4 Coastal Access

*3.6.4.4 Work with stakeholders, local government agencies and others whom have an interest in the coastal environment to promote and provide information relating to values associated with the area and the need to respect the environment through promotion of responsible tourism.*

### 3.6.7 Coastal Water Quality

*18. Avoid inappropriate location and design of infrastructure e.g. outfalls and pipelines which may pose a threat to water quality. Encourage agencies and developers to adopt best practice when undertaking coastal protection so as to avoid any unnecessary discharge to coastal waters.*

### 3.6.13 Coastal Ecosystems

*3.6.13.1. Avoid coastal activities that may disturb, and have a direct or indirect detrimental impact, on areas of significant vegetation and habitats. Direct impacts may be physical*

*damage while indirect impacts may include effects arising from siltation, deposition or displacement over time.*

### *Section 3.7 Ngā Moutere o Murihiku - Offshore Islands*

#### *3.7.1 Retention of Natural Vegetation, Habitat and Fauna*

*3.7.1.7 Encourage continued joint management arrangements and programmes between Ngāi Tahu ki Murihiku and Ngāi Tahu ki Murihiku and the Department of Conservation, Te Papa Atawhai with respect to vegetation clearance, restoration and enhancement.*

#### 3.7.5 Tourism

*3.7.5.5. Ensure consultation with respect to access within areas of interest (including conservation estate) occurs with local rūnunga.*

The application relates to existing infrastructure activity and no physical changes to the infrastructure are proposed. There is a functional need for structures associated with the activity to be in the coastal environment and coastal marine area.

The activity is having ongoing adverse effects on natural tidal processes in the Titiroa Stream and is also likely to be having an adverse effect on inanga spawning. These effects are on-going and are directly related to the function of the tide gate infrastructure. The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland. As such these adverse effects need to be balanced against the positive flood protection effects and related economic and social benefits.

Overall, it is promoted that the works are consistent with the relevant policies of Te Tangi Au Taurira – The Cry of the People - Ngai Tahu ki Murihiku Natural Resources and Environmental Iwi Management Plan.

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## 7.6 MARINE AND COASTAL AREA (TAKUTAI MOANA) ACT

Environment Southland website ([Customary Marine Title](#)) signals four Customary Marine Title applications for coastal waters in Southland have been lodged with the High Court. One application pertains to all of the Coastal waters along the Southland coastline. The contact for this application is identified as:

Te Runanga o Ngāi Tahu on behalf of Ngāi Tahu Whānui

Rachel Brown

Bell Gully

PO Box 1291

Wellington 6140

[rachael.brown@bellgully.com](mailto:rachael.brown@bellgully.com)

TRONT have been contacted and their views have been sought on the application. If or when a response is received it will be provided to the Council.

# 8 CONSULTATION

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## 8.1 AFFECTED PERSONS

Written approvals have been sought from the following persons:

1. Te Ao Marama Incorporated;
2. Department of Conservation;
3. Fish & Game Southland.

At the time of lodgement, the applicant was still consulting with these persons. Written approvals will be provided if or when obtained.

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## 8.2 NOTIFICATION

Notification of an application lies at the discretion of the consent authority.

Section 95A sets out that an application must be notified if the activity will have or is likely to have adverse effects on the environment that are more than minor; if the applicant requests it; or it is required by a rule or national environmental standard.

As outlined above the activity is having on-going effects. The ongoing adverse effects of the structures need to be balanced against the positive flood protection effects and related economic and social benefits. The applicant is promoting mitigation of adverse effects on inanga spawning through ongoing management of the Titiroa Wetland Reserve.

The applicant does not request public notification, the Coastal Plan does not require it and no National Environmental Standards are applicable. Therefore, the RMA does not require that the application be publicly notified.

If a consent authority decides not to publicly notify an application, Section 95B requires that they determine if there are any persons affected by the activity. As outlined above the applicant has identified persons whom written approval will be sought.

# 9 RESOURCE MANAGEMENT ACT 1991

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## 9.1 THE PURPOSE OF THE RMA

Section 5 of the RMA 1991 states sets out the Purpose of the Act which is to promote the sustainable management of natural and physical resources. It requires activities to be managed so that adverse effects on the environment are avoided, remedied or mitigated.

The tide gates and weir are part of the existing physical environment and must be sustainably managed. The activity is having ongoing adverse effects on natural tidal processes in the Titiroa Stream and is also likely to be having an adverse effect on inanga spawning. These effects are ongoing and are directly related to the function and purpose of the infrastructure. The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland. As such the ongoing adverse effects of the structures need to be balanced against the positive flood protection effects and related economic and social benefits. The applicant is promoting mitigation of adverse effects on inanga spawning through ongoing management of the Titiroa Wetland Reserve.

The activity is considered consistent with the purpose of the RMA 1991.

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## 9.2 SECTION 6

Section 6 sets out the Matters of National and the following matters are considered relevant to this application:

- (a) *the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:*
- (b) *the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:*
- (c) *the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:*
- (d) *the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:*
- (e) *the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*
- (f) *the protection of historic heritage from inappropriate subdivision, use, and development:*
- (g) *the protection of protected customary rights:*
- (h) *the management of significant risks from natural hazards.*

In regard to (a), (b) (d) no physical works are proposed and the tide gates and weir are existing infrastructure which has been present in the location for some time. Matters (f) and (g) are not considered directly relevant. The activity is consistent with (h) 'the management of significant risks from natural hazards' given its purpose in controlling drainage and tidal flooding. Regarding (c) the activity through mitigation and ongoing management of the Titiroa Wetland reserve is consistent with protection of significant habitats of indigenous fauna.

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## 9.3 SECTION 7

Section 7 of the RMA sets out those “other matters” that Council is to have particular regard to are:

- *Kaitiakitanga (a);*
- *The ethic of stewardship (aa);*
- *The efficient use and development of natural and physical resources(b);*
- *The maintenance and enhancement of amenity values (c);*
- *Intrinsic values of ecosystems (d);*
- *Maintenance and enhancement of the quality of the environment (f).*
- *Any finite characteristics of natural and physical resources (g).*

The activity is consistent with efficient use of physical resources and no physical works are proposed. The activity is considered consistent with Section 7 of the Act.

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## 9.4 SECTION 8

Section 8 of the RMA requires all persons exercising functions under the Act to take into account the principles of the Treaty of Waitangi. Consultation with Iwi will be undertaken with a copy of the application supplied to provide the opportunity to consider the activity as a potentially affected party. The Titiroa Stream itself is not listed as a statutory acknowledgement under the Ngai Tahu Claims Settlement Act 1998 (NTCSA 1998). As noted above Ngāi Tahu ki Murihiku have a spiritual and historical association with Southland’s coastal environment.

# 10 SECTION 104

Section 104(1) outlines the following matters, which are relevant to Council's consideration of the application:

*"When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to-*

*(a) any actual and 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".*

These matters have been considered and are discussed above.

In regard to Section 104 (1) (ab) the applicant is promoting mitigation associated with management of the Titiroa Wetland Reserve as a measure for the purpose of ensuring positive effects on the environment to offset or compensate for adverse effects on the environment associated with the tide gates and weir.

# 11 CONCLUSION

The activity is having ongoing adverse effects on natural tidal processes in the Titiroa Stream and is also likely to be having an adverse effect on inanga spawning. These effects are on-going and are directly related to the function of the tide gate infrastructure.

The purpose of the Titiroa Stream tide gates and weir is to ensure the on-going drainage capability upstream and prevent flooding of the surrounding low-lying farmland. The adverse effects of the activity need to be balanced against the positive flood protection effects and related economic and social benefits.

As mitigation of the effects on inanga spawning the applicant is actively managing a large area of land downstream of the tide gates and weir. The Titiroa Wetland Reserve is being managed to maintain and enhance the margins of the stream and inanga spawning habitat.

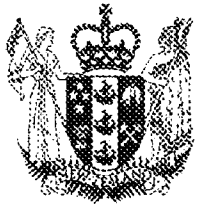
The activity has been assessed against the objectives and policies of the relevant Plans. Overall, on balance when considering all relevant provisions, the proposed activity is not considered contrary to the relevant policies of the NZCPS, the Regional Policy Statement for Southland or the Regional Coastal Plan for Southland.



# APPENDIX A

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## RECORD OF TITLE



**RECORD OF TITLE  
UNDER LAND TRANSFER ACT 2017  
FREEHOLD  
Search Copy**



  
R. W. Muir  
Registrar-General  
of Land

**Identifier** **SL9A/593**  
**Land Registration District** **Southland**  
**Date Issued** 17 February 1989

**Prior References**

GN 159660.1 SL7B/203

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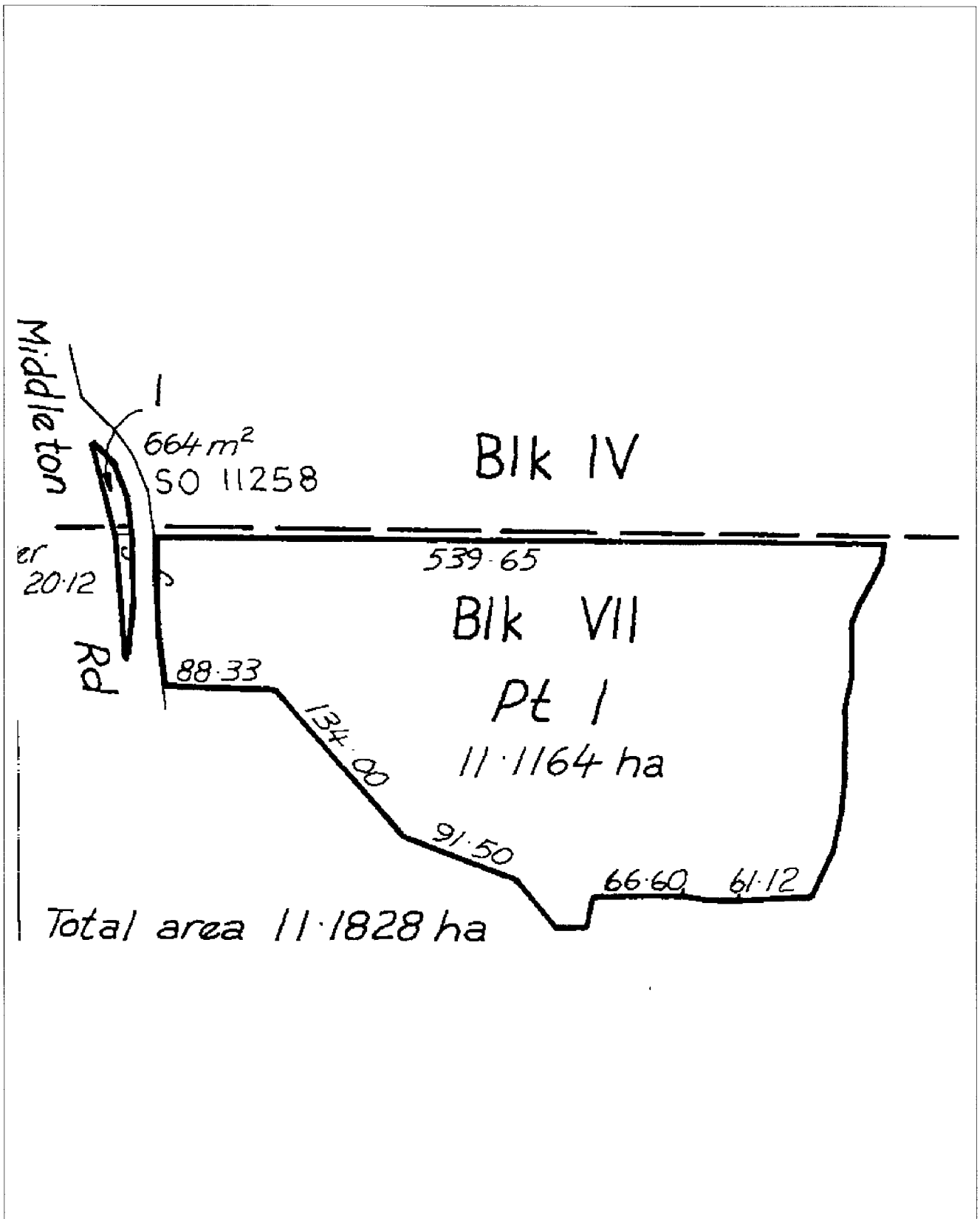
**Estate** Fee Simple  
**Area** 11.1828 hectares more or less  
**Legal Description** Section 1 Survey Office Plan 11258 and Part  
Lot 1 Deposited Plan 11173  
**Purpose** River control

**Registered Owners**

Southland Regional Council

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**Interests**



# APPENDIX B

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## PDP FISH SURVEY AND VELOCITY PROFILES



4 February 2021

Dave Conner  
Team Leader Catchment  
Environment Southland  
Cnr North Road & Price Street  
Waikiwi  
**INVERCARGILL 98011**

Dear Dave

## **TITIROA RIVER TIDE GATES FISH SURVEY & VELOCITY PROFILES**

### **1.0 Introduction**

Pattle Delamore Partners (PDP) was engaged by Environment Southland (ES) to undertake a comparative fish survey, both upstream and downstream of the tide gates located in the lower Titiroa River, as well as an assessment of the flow profiles immediately downstream of the tide gate structure. The purpose of this assessment is to determine if the tide gate structure is posing a barrier to fish movement.

### **1.1 Background**

It is understood that ES previously held a coastal permit (Permit No. 204122), now expired, which authorised the occupation of the coastal marine area (CMA), and to dam tidal waters, with a tide gate structure (see Photo 1, attached). The conditions of the coastal permit required two monitoring investigations to be undertaken:

1. A comparison of native fish communities in sites upstream and downstream of the floodgate structure using the methods outlined in the New Zealand Freshwater Fish Sampling Protocols by Joy *et al.* (2013) and Hicks (2013).
2. An assessment of the flow profile immediately downstream of the tide gate structure to determine whether water velocities exceed the swimming speeds of native fish species in the area.

The Titiroa River is located on the eastern bank of the lower Maitai River floodplain and predominately flows through pastureland and some remnants of native bush. The location of the tide gate structure is approximately 200m upstream of the Tokonui-Gorge Road Highway and approximately 6.5km upstream from the Fortrose Estuary, as shown in Figure 1. The Titiroa River channel immediately downstream of the tide gate is approximately 8m wide.

## 2.0 Fish Community Assessment

### 2.1 Methodology

The Titiroa River in the vicinity of the floodgate structure is not suitable for standard sampling using electric fishing techniques due to the depth and the likely high conductivity of the water; therefore, fish communities upstream and downstream of the structure were assessed using baited fyke nets and baited Gee minnow traps set overnight.

Six fyke nets and six Gee minnow traps were set upstream and downstream of the structure (refer to Figure 2). Nets and traps were set from the banks of the waterway in the remnant channel parallel to the tidegate channel, as outlined in Figure 2.

The two parts of the channel are separated by a rock bund and, although the area available was relatively small, these two areas provided an excellent “side by side” comparison between upstream and downstream communities. This was primarily because they were of similar area and were static (non-flowing) habitats. The upstream area was shallower with deep sediment and dense instream macrophyte beds. The water depth here fluctuated with the operation of the gates, with Titiroa Stream flows backing up when the gates were closed and lowering when the gates were opened. The downstream area was generally deeper with less sediment and little instream macrophyte growth. The water level in this section fluctuated with the tides. Salinity was not measured as part of this investigation.

All nets and traps were baited with small, perforated tins of fish-flavoured cat food, and deployed late in the afternoon of 11 January 2021. Nets and traps were recovered the following morning (i.e., a soak time of about 18 hours). All captured fish were identified, counted, and estimates of their length were recorded. All fish were released back into the water close to where they had been caught.

### 2.2 Results

Longfin eel (*Anguilla dieffenbachii*), shortfin eel (*A. australis*), inanga (*Galaxias maculatus*), and common bully (*Gobiomorphus cotidianus*) were caught both downstream and upstream of the tidegate structure, while redfin perch (*Perca fluviatilis*) were only caught downstream (Table 1).

Many of the small fish (e.g., inanga and juvenile perch) observed in the fyke nets had clearly been consumed by larger fish (eels) caught in the same net and subsequently regurgitated. There is little doubt that counts of small fish were therefore conservative, i.e., many had been consumed and only some regurgitated.

**Table 1: Summary of Fish Survey Results**

Species	Longfin eel		Shortfin eel		Inanga		Common bully		Redfin perch	
	Number	Size (mm)	Number	Size (mm)	Number	Size (mm)	Number	Size (mm)	Number	Size (mm)
<b>Upstream of tide gates</b>										
Fyke 1	8	250-550								
Fyke2	10	300-600			1	65	1	65		
Fyke3	25	250-500			3	65-80	1	65		
Fyke4			1	550	1	65				
Fyke5	15	200-500	2	300	12	65-80				
Fyke6	8	300-500			2	65-80				
GM1					3	65-80				
GM2					3	65-80				
GM3					2	65-80	9	45-80		
GM4							1	65		
GM5					1	65	1	65		
GM6*										
<b>Total</b>	<b>66</b>	<b>200-600</b>	<b>3</b>	<b>300-550</b>	<b>28</b>	<b>65-80</b>	<b>13</b>	<b>45-80</b>	<b>0</b>	<b>0</b>
<b>Downstream of tide gate</b>										
Fyke 1	90	200-600			50	65-120			1	20
Fyke2	15	120-600	4	250-350	15	65-120	2	45-80		

Table 1: Summary of Fish Survey Results

Species	Longfin eel		Shortfin eel		Inanga		Common bully		Redfin perch	
	Number	Size (mm)	Number	Size (mm)	Number	Size (mm)	Number	Size (mm)	Number	Size (mm)
Fyke3	18	200-600			15	65-120			12	20-30
Fyke4	30	150-400	20	150-400	100	65-120	10	45-75	20	20-30
Fyke5	21	150-450	2	300-400	80	65-120	5	45-80	15	20-30
Fyke6	16	400-600	1	250	10	65-120	2	45-80	2	20-30
GM1	1	150			6	65-80				
GM2					1	70	1	50	1	25
GM3							3	45-80		
GM4					24	65-120	3	45-80	3	20-30
GM5	1	150			2	65-80	3	45-80	4	20-30
GM6*										
<b>Total</b>	<b>192</b>	<b>150-600</b>	<b>27</b>	<b>150-400</b>	<b>303</b>	<b>65-120</b>	<b>29</b>	<b>45-80</b>	<b>58</b>	<b>20-30</b>

Notes:

\* =no catch



### 3.0 Flow Profile Assessment

Flow assessments on the Titiroa River were conducted at or near normal flow conditions, as estimated using real time data from both the Mokoreta and Waikawa Rivers, derived from the ES website.

From observing the operation of the tidegates on 11 and 12 January 2021, the Titiroa Stream discharged through the tidegates in the following pattern:

- ∴ On arrival the gates were closed and remained closed after peak high tide and did not open until the water level downstream of the gates fell to a level less than that of that upstream. The gates opened at 4:36pm approximately 121 minutes after high tide.
- ∴ Discharge from the stream through the gates was moderate when the gates first opened but built up as the water level downstream of the gates fell with the ebbing tide. Water velocity downstream of the tidegates appeared to peak at approximately 140 minutes after opening.
- ∴ As the water level upstream of the tidegates lowered, the discharge and water velocity through the tidegates decreased. When the tide had ebbed completely and had begun to rise once more, there was a brief period when no flow was discernible through the gates.
- ∴ As the tide rose, the water level downstream of the tidegates increased, and when the tidal water level just exceeded the water level in the stream the tidegates closed and blocked discharge from the stream. This occurred approximately 140 minutes after low tide. The gates remained closed while the tide continued to rise, and water from the Titiroa Stream built up behind the gates.

The duration of each tide gate opening depends on the height of the tide and the flow and water level of Titiroa Stream upstream of the gates. During our field work visit, the tide gates were open for approximately 380 minutes, i.e., about 51% of the 12.5 hour tidal cycle.

To determine whether water velocities exceed the swimming speeds of native fish species known to be present in the area, the fastest water speeds were targeted. Water velocities were measured over a 40-minute period from when the gates opened.

Assessment of the flow profile was undertaken approximately 2m downstream of the Titiroa tidegate structure using a River Surveyor S5. The maximum water velocity recorded was 1.328 m/s (note this is not a water velocity that is consistent throughout the water column). The average water velocity calculated throughout a series of transects across the Titiroa Stream was 0.3559m/s.

### 4.0 Discussion

All four native migratory species recorded in this investigation were found both upstream and downstream of the tidegates, and the size range of migratory fish upstream of the gates was similar to that downstream. This suggests that fish migration is not impeded by the tidegates, and the presence of large eels (probably more than 10 years old) upstream of the tidegates suggests that migration has not been impeded over many years.

The differences in overall numbers of fish caught upstream and downstream of the tidegates most likely reflects habitat suitability differences between the two areas surveyed. The presence of redfin perch downstream of the tidegates has little relevance to an assessment of the tidegates with respect to fish migration, as perch are an introduced species and do not migrate as part of their normal life-cycle.

Our conclusion is that the Titiroa River tidegates have only a minor effect on fish migration in general; the gates are open for approximately half of the time, and the water velocity through the gates should not present too great a barrier to most migrating fish. During each tidal cycle there are sustained periods when flow through the gates is essentially just “normal” river flow, as well as a period on the rising tide

when there is virtually no downstream flow. Even during the period when water velocity is greatest, native fish may well be able to migrate upstream by swimming near the bottom of the water column.

However, it is likely that the presence of the tidegates prevents or delays the spawning of inanga in the Titiroa River. Inanga are the main whitebait species around New Zealand and spawn amongst marginal grasses and rushes in areas close to the upstream limit of salt water penetration (the "salt wedge") at the very peak of high spring tides during Autumn. Fertilised eggs remain among the damp vegetation but out of the water until a later high spring tide, when they are re-inundated, hatch, and are washed downstream to the sea (about six months later they migrate back into the rivers as whitebait). Investigation of the limits of the salt wedge in the Titiroa Stream concluded that the salt wedge did not penetrate as far upstream as the tide gates (James Dare *pers. comm.*), meaning that inanga spawning would occur downstream of the gates. During autumn maturing (ripe) inanga congregate in shoals upstream, then move downstream to spawn in migrations that coincide with full and/or new moon and very high spring tides, and the presence and operation of the Titiroa tidegates means that inanga in the river upstream of the tidegates may be prevented or delayed from migrating down to the spawning areas.

Overall, the Titiroa tidegates probably have a significant and detrimental effect on spawning migrations of inanga in the Titiroa River, and there is little chance that this can be remediated by modifying the tidegates or altering their operation; the gates are designed specifically to prevent tidal water inundating land upstream of the tidegate structure. It may be possible to mitigate the effects of the tidegates on Inanga spawning by restoring and/or enhancing Inanga spawning habitat in other nearby environments. PDP recommend that ES consult with Department of Conservation (DoC) on suitable locations for this enhancement.

## 5.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Environment Southland. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Environment Southland for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

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Yours faithfully

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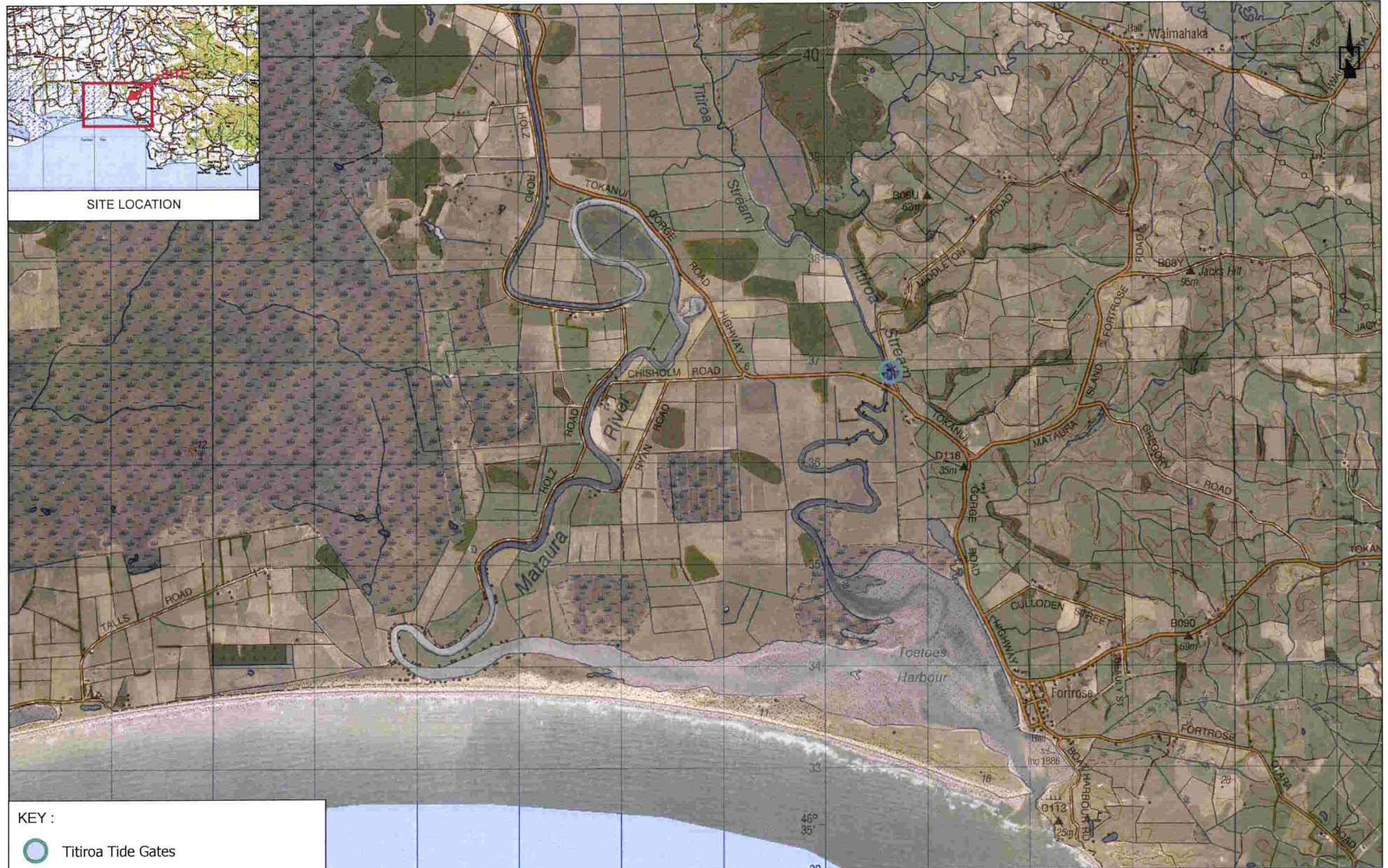
Technical Director – Water Infrastructure



Photo 1: Titiroa Tide Gate Structure Opening, view upstream.



Photo 2: Eels Captured in Fyke Net



KEY :  
○ Titiroa Tide Gates

SOURCE:  
1. AERIAL IMAGERY LINZ

FIGURE 1: TITIROA TIDE GATES LOCATION

SCALE : 1:50,000 (A4)  
0 0.5 1 2  
KM



KEY :  
Sampling Sites  
● Downstream Sites  
● Upstream Sites

SOURCE:  
1. AERIAL IMAGERY: LINZ

FIGURE 2: SAMPLING SITES



# APPENDIX C

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## HIGH VALUE AREA ASSESSMENT

## High Value Area assessment report



**Site name: Lower Titiroa Wetland Reserve**  
**HVA site ID: ES MTRA 03**

Survey Dates: 21st/22nd April and 27th/28th May 2010

Survey Completed by: Robin Mitchell (Kunzea Consultants Ltd.)

**Note:** Environment Southland is the brand name of Southland Regional Council



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## **Purpose**

The purpose of the High Value Areas (HVA) assessment programme is to identify, define, describe, rank and record sites containing indigenous biodiversity values.

This report provides you, the landowner with information about the presence, condition and relative value of indigenous biodiversity on your land. The information provided in this report aims to:

- Promote the benefits of protecting and enhancing indigenous biodiversity values to landowners and the community in general;
- Assist landowners to make decisions about voluntarily seeking legal protection for biodiversity values on their land;
- Help assess the state of the indigenous biodiversity at local, regional and national level.

## **Background**

Since the arrival of Polynesian settlers to New Zealand about 750 years ago, and later that of European settlers, there has been substantial pressure on the indigenous flora and fauna of our country. The main changes that have occurred are deforestation, draining of wetlands, and the modification of tussock grasslands. For example, the national extent of indigenous forest cover has been reduced from 85% in pre-polynesian times to approximately 23% today, and 90% of wetlands have been lost over the same time period. The introduction of pest plants and animals has added to the pressure on our native biodiversity and the proper functioning of ecosystems; they also threaten the productivity of pasture, crops and forestry<sup>1</sup>. Now, it is in the lowlands, where the land is most productive and valuable, where many of our rarest ecosystems and species are found. This makes the fragments of native ecosystems that have been kept by private landowners of a very high value.

In the vicinity of Waituna, as a consequence of Maori fires, much of the lowland forest was removed and replaced by manuka scrub or red tussockland. European settlement and associated agricultural development further reduced the extent of forest and also reduced wetland extent through extensive drainage works, replacing them both largely with pasture. Marginal areas often retain a degree of naturalness even though they are modified by weeds, partial drainage, stock grazing and other agricultural activity.

## **Legal Description**

The land parcels in which the HVA is found are:

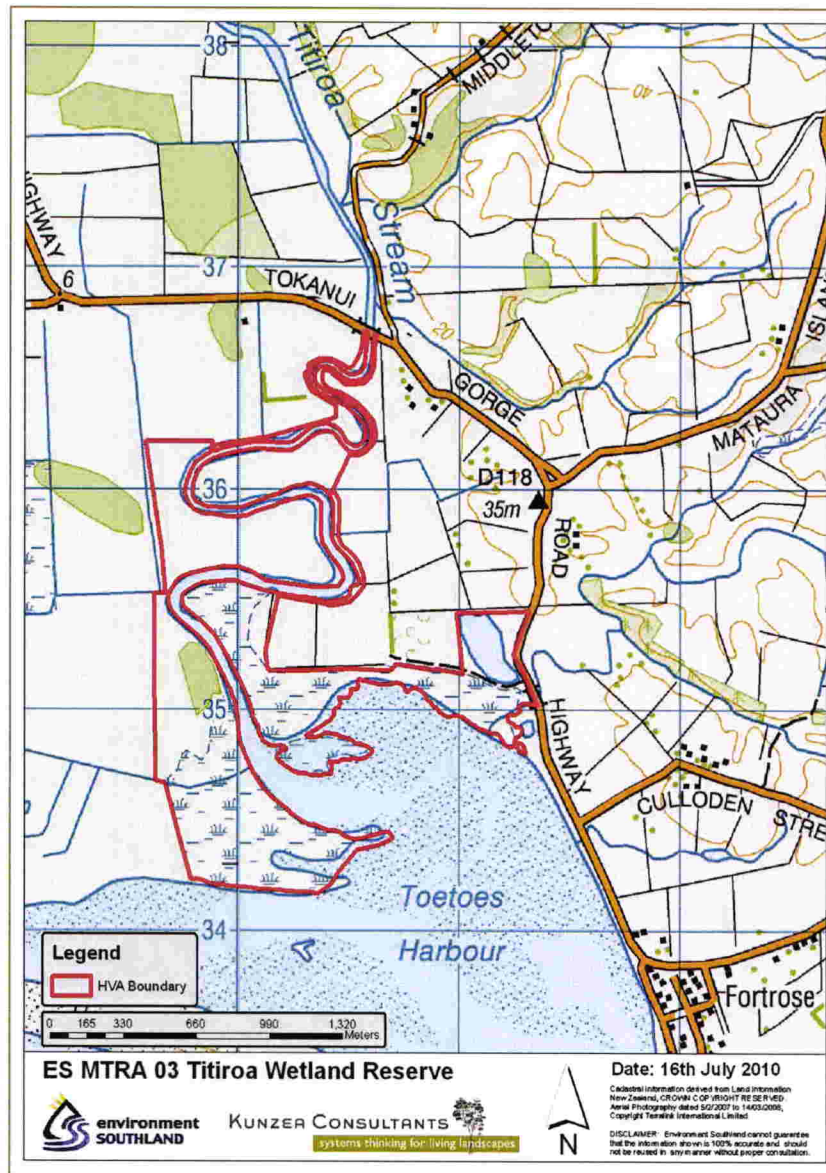
- Part sections 1, 5, 8, 9, 10, 18, 19 and 21 Block VII, Toetoes SD.
- Section 7 Block VII, Toetoes SD.
- Lots 1, 3, 4, 6 and 7 DP 11228.
- *Note that the island in Toetoes Harbour that sits just at the mouth of the Titiroa Stream on the true left is part of the reserve but does not have a parcel number and has not been included within the reserve on the ES GIS system either.*

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<sup>1</sup> Ministry for the Environment, *State of New Zealand's Environment*. Report released 2007.

## Location and Access

- The HVA is located on either side of the lower Titiroa Stream and also includes parts of the edges of Toetoes Harbour;
- Access to the HVA is gained in three points; either from the bridge over Titiroa stream, or by following the east fork of Ryan Road to its end and keeping walking, or by following the track in the SE corner of the reserve that leaves the Tokanui-Gorge Road Highway;
- NZTM 2000 grid reference for the bush fragment in the centre-west of the reserve: E 1275788; N 4835267.



**Figure 1:** LINZ ‘Topo50’ series topographical map showing the HVA location. Note that the parts of the reserve along the margins of Toetoes Harbour are part of the internationally important ‘RAMSAR<sup>2</sup>’ designated Awarua wetland site.

<sup>2</sup> Ramsar wetlands refer to those wetlands that are recognised as internationally important by being designated under the Ramsar intergovernmental convention on wetlands (1971) that takes its name from the Iranian place where the treaty was signed. The treaty embodies the commitments of its 160 member countries to maintain the ecological character of their wetlands of international importance. New Zealand has 6 Ramsar sites that total 55,000 ha.

## General Habitat Description

Figure one above shows the HVA boundary overlaid onto LINZ Topo50 series topographical maps. Note that this boundary represents the area surveyed that lies between the grazing land on the landward side and the high tide mark on the river or estuary side. This boundary may disagree slightly with the existing boundary in the ES GIS database, but it is accurate in terms of the land area that is actually managed as a reserve; i.e. that which is fenced off from the adjacent farmland.

See appendix one for a map showing approximate boundaries of the six vegetation units identified within the HVA overlaid onto aerial imagery. Appendix three displays the photographs that illustrate the diversity of habitat types within the HVA.

Part of the site has been previously surveyed by Geoff Walls in 2002 as part of his Southland Conservancy-wide wetland survey. His survey was limited to the south-western part of the HVA and was very brief. Nonetheless, he identified that the surveyed area was worthy of protection to be included with the wildlife reserve which protected the estuarine area on the opposite side of the Titiroa Stream mouth at the time.

### *River Catchment*

The HVA drains directly into either the lower Titiroa Stream, or, Toetoes Harbour.

### *Ecological District (ED)<sup>3</sup>*

The HVA is situated in the Waituna ED.

New Zealand is divided into 85 ecological regions and 268 ecological districts. An ecological district is a part of New Zealand where geological, topographical, and climatic factors, as well as biological features and processes all interrelate to produce a characteristic landscape and range of biological communities. The ecological district framework (McEwen, 1987<sup>4</sup>) has been widely used by ecologists as the basis for organising ecological research and environmental management initiatives.

The Waituna ED is the southern-most ecological district in mainland New Zealand. The Waituna ED is a small flat area characterised by a low coastal relief and a climate that is cool, cloudy and windy with a rainfall of 1000-1200mm per annum. The soils are largely poorly drained and deep acid peat on flatter parts with strongly leached soils on surrounding gently undulating areas, as well as small areas of alluvial soils, coastal dunes and sand flats. Accordingly, it contains proportionately more wetland than any other ecological district.

The pre-human vegetation cover of the district has been postulated to have been dominated by a mosaic of mostly lowland rushland-tussockland-shrubland, with large expanses of lowland kererupodocarp-hardwood forest localised to more favourable sites. Today, the native vegetation is concentrated nearer to the coast and is dominated by wire rush-tangle fern peat bogs and regenerating manuka shrubland. Some patches of other habitats persist, including flax and red tussock swamps, as well as several variants of lowland podocarp-hardwood forest. Truly coastal ecosystems such as estuarine salt marsh, sand-dune and gravel beach were naturally limited in their distribution and survive relatively intact.

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<sup>3</sup> For more information, navigate to: <http://www.mfe.govt.nz/publications/ser/metadata/env-class/page11.html>

<sup>4</sup> McEwen, W. M. (editor), 1987. *Ecological regions and districts of New Zealand*. Third revised edition in four 1:5000,000 maps with one booklet to accompany each map. New Zealand Biological Resources Centre Publication No. 5 (in four parts). Department of Conservation, Wellington.

### *Land Environment New Zealand (LENZ)<sup>5</sup>*

Land environments provide an indication of potential ecosystem character at any given place in New Zealand. The LENZ classification system is recently derived from many years of research and compliments the ecological districts and regions system described above. It is based on computer modeling of a range of climatic, substrate and landform attributes to classify a series of unique land environments. Individual land environments can occur over a substantial area depending on the local variability of defining factors such as climate. This report quotes the 'level four' land environment, of which there are 500 nationally, giving more localized information than the ecological district type does.

The level four LENZ environment prevailing where this HVA occurs is L5.1b. The L5.1b environment is a sub- category of the southern lowlands; occurring on flat, low elevation floodplains along rivers in Southland, such as the Oreti and Mataura. Climatically, the environment is characterised by cool temperatures, low solar radiation, moderate vapour pressure deficits, low monthly water balance ratios, and low annual water deficits. Soils are recent, imperfectly drained and mainly of high fertility from fine deposits (both windblown & river-transported) derived from erosion of greywacke rocks. Dominant historic ecosystems of this land environment would have been mostly marshes and swamps populated by sedges, rushes and grasses with patches of floodplain podocarp-hardwood forests and mixed shrublands.

The LENZ map shows a significant area of the SW of the HVA to be classified as L3.1a. This land environment is associated with peat soils and because during my survey I did only encountered a much smaller area of peat based soils (associated with unit 2) within the reserve I have made the assumption that this is a mapping error owing to lack of ground-truthing information.

### *Ecosystem types*

This ecosystem types of this HVA are **estuarine salt marsh, riparian marsh, flax swamp and floodplain forest**. This high diversity of ecosystems in a relatively small area is a key feature that contributes to the value of this reserve.

### *Vegetation type – 'units'*

Each vegetation type represents a recognisable plant community, or species assemblage that is called a 'unit'. In reality, the vegetation units defined here are a classification of the range of subtle variation amongst the plant communities in existence at the site; as such, their boundaries are approximate because for the most part no sudden boundaries exist, and, because small patches of some habitats exist within others that are too small to be mapped.

The syntax of the names listed below has particular meaning and follows the conventions of the 'Atkinson system' that is the standard for naming mapped vegetation types in New Zealand<sup>6</sup>. Areas are approximate. A brief description of the structural variation within each vegetation unit follows its name.

- **Unit 1:** Kamahi - [kahikatea] / (black mapou) - (totara) Forest. (8 ha)

This area of regenerating forest occurs in remarkably close proximity to the estuarine zone of the lower Titiroa stream. It is regenerating all around its periphery and the areas of scrub (unit 5) to its

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<sup>5</sup> For detailed information on LENZ classifications, navigate to:  
[http://www.landcareresearch.co.nz/databases/LENZ/products\\_techguide.asp](http://www.landcareresearch.co.nz/databases/LENZ/products_techguide.asp).

<sup>6</sup> The 'Atkinson system' is published in Volume 23 of the New Zealand Journal of Botany, 1985 (pages 361-378), and is downloadable from: <http://www.royalsociety.org.nz/publish/nzjb>.

west will probably one day become incorporated into a larger area of regenerating forest that will grade into the flaxland (unit 2) that occupies the wetter area to the south-west.

The stature of the forest is low with the average canopy height being around 10 metres, and die-back due to wind exposure of a historically higher canopy is apparent. The canopy achieves around 60% cover, with kamahi being the most common species, totara/kahikatea being subdominant and rimu/matai also being significant components. The sub-canopy is dense and diverse with good representation of all the canopy species, as well as a good diversity of coprosma species (including the threatened *Coprosma pedicellata*); miro and kohuhu are also common. The ground layer achieves around 50% cover and is dominated by the kiokio and hounds tongue ferns as well as the hook sedge. Good regeneration of canopy species is evident in the ground layer, but possum damage is evident in the sub-canopy.

➤ **Unit 2:** [Cabbage tree]- [toe toe] / lowland flax Flaxland (3 ha)

The flaxland occupies a swampy area that appears to have a peaty substrate (all the other units in this HVA have a mineral soil substrate). Flax creates a canopy of between 50 and 70% cover with a few individuals of cabbage tree, toe toe, gorse (<1% cover) and mingimingi being conspicuous minor components that together make up around 5% of the total canopy cover. In spaces between the flax clumps are patches of rushes (*Juncus edgariae*), a few shrubs of kohuhu and swamp coprosma, as well as the swamp kiokio fern. Most of the inter-clump space has a ground layer comprised of pasture grasses and cutty grass with occasional patches of moss and standing water.

This area would appear to have been continuous with the extensive flaxland to the west that is outside of the reserve area and is now separated from this unit by an access way defined by two parallel drains.

➤ **Unit 3:** Reflexed salt grass / [slender club rush] – [remuremu] – [shore cotula] Grassland (8 ha)

The grassland tends to occupy on areas of better drained substrate (gravel and sand based rather than soft estuarine mud) where they occur on the edges of the Toetoes Harbour. This habitat grades into unit 4 below and the two often form a complex pattern in areas of the harbour edge.

The unit is not species diverse; it is dominated by the exotic reflexed salt grass but there are some patches of coastal turf remaining. The turf is dominated by shore cotula with slender club rush and remuremu also being common species.

➤ **Unit 4:** [saltmarsh ribbonwood] / [holy grass] - oioi Rushland (55 ha)

This unit contains a range of subtly different species assemblages which are all characterised by the abundant presence of oioi (*Leptocarpus similis*) and close proximity to tidal saline waters. In areas around or below the high tide mark, there are extensive fringe areas covered almost entirely by dense oioi clumps, particularly on the eastern side of the Titiroa Stream mouth. In the upper tidal zone, patches of the salt marsh ribbonwood shrub are also common, as are patches of holygrass (together comprising an average of around 20% canopy cover throughout this zone).

As the tidal influence reduces, the abundance of salt marsh ribbonwood decreases and mingimingi tends to accompany or replace it as the main shrub species; flax is also an occasional component. Occasionally, on slightly raised ground, there are patches where the shrub diversity increases to include some kohuhu, manuka and lancewood. In transitional areas around the edges of unit 4 zones, where it grades into unit 6 sedgeland, gorse becomes an apparent component (achieving up to 5% cover in places but normally occasional at less than 1% cover) and patches of *Juncus* species, cutty grass and exotic pasture are interspersed with the matrix of oioi.

➤ **Unit 5:** mingimingi - manuka / (kohuhu) - (cutty grass) Scrub (1.5 ha)

The three small scrub areas all occur in proximity to floodplain forest patches and their species composition suggests affinity to the forest ecosystem. It is likely that these areas have the potential to regenerate into podocarp-hardwood floodplain forest (similar to that of unit 1) in the long-term.

An unbounded 'recce' plot was measured in the northern most fragment of scrub (in the O'Neil block) which showed the canopy to average 4 metres in height and be dominated by mingimingi and manuka. Other species in the canopy included kohuhu, lancewood and weeping mapou. The ground layer reflects the regenerating nature of this unit as it is a mixture of cutty grass patches (10% cover overall) and litter with young individuals of forest species such as broadleaf. Interestingly, forest birds such as fantails were already being attracted to this area.

**Unit 6:** [mingimingi] / cutty grass – (holy grass) Sedgeland (30 ha)

This unit has the highest abundance of exotic species and occupies areas of marshy land with mineral substrate that does not receive water with a significant saline component. It occurs either adjacent to the river above the estuarine zone, or, as a transitional habitat between farmland and more intact habitats with less cover of exotic plant species such as units 1 and 4.

It is comprised of a variety of species assemblages that grade into each other in complex patterns. The broad assemblage that covers most of the area is a cutty grass dominated sedge sward (comprising between 30 and 60% cover) accompanied by grasses such as holy grass, creeping bent and yorkshire fog (together comprising between 20 and 40% cover) with exotic herbs such as birdsfoot treefoil and buttercup making up most of the balance of cover. In localised areas different components of this broad assemblage become locally dominant; notably holy grass and rank pasture grasses. There are also frequent patches where rushes of the *Juncus* genus (mostly the native *edgariae*, but also the exotic *procernis* species) increase in abundance, largely replacing cutty grass. In places the mingimingi shrub becomes a conspicuous component, achieving up to 20% cover in localised patches. Gorse infestations are a localised issue throughout this unit and the upper 300 metre stretch of river edge has a serious infestation of reed sweet grass.

The area surrounding the lake at the eastern part of the HVA is mostly rank pasture. Gorse achieves 5% cover in this zone and cattle have access throughout it.

***Size and Shape - edge effects***

The dimensions of size and shape of a native vegetation fragment can strongly influence both its current and future habitat states. This is because these dimensions largely determine a fragments' resilience to external influences that are collectively called edge effects (e.g. drying and weed invasion from peripheral drained land).

Edge effects can make the environmental conditions within the peripheral zone of a native habitat fragment unsuitable for many of the 'desirable' species (i.e. those representative of a good quality example of the ecosystem type) which are able to flourish within a less disturbed 'core' zone. Therefore, edge effects often artificially create two or more distinct zones within a fragment. If a fragment is small and/or narrow enough, then no core zone will exist at all, and any mature habitat still existing will not be able to persist into the future.

Owing to the convoluted shape of this HVA, the edge effects are high. The main edge effect of concern is that of weed invasion (gorse in particular) - either from the marginal areas of the reserve that have lower value habitats recently retired from rough-grazing land, or, from existing farmed areas. Fortunately, in comparison to the edges on the landward sides, the estuarine edges have a positive effect because they create conditions that are unfavourable to many invasive species.

### ***Adjacent Land use***

Low intensity stock grazing is the predominant surrounding land use. The river is very popular with white-baiters, and much of the reserve, including the estuarine zone, is used for duck-shooting.

### ***Landscape context – ecological connectivity***

The diversity and abundance of species able to be present and to persist within any fragment of native habitat is partially dependent on some form of 'ecological connectivity' with other nearby sites which share similar environmental conditions.

The level of connectivity required to allow the areas of scrub to succeed to forest exists because of the forest fragments persisting in the O'Neil and Walsh blocks. These are the southern-most part of a chain of forest fragments strung along the lower Mataura River floodplain area and its immediate environs. Several other significant forest areas exist around the eastern and northern edges of the Toetoes Conservation Area.

In terms of its capacity to attract shorebirds, the estuary area benefits from its proximity to other estuarine areas along the South Coast.

There is enormous opportunity to enhance the connectivity of this reserve to other adjacent areas of native habitat on the floodplain in order to restore the sequence from peat bog through to estuarine salt marsh – see management recommendations.

### ***Ownership and Management***

This HVA is part of the ES leasehold land that is managed for the joint purposes of productive farmland, nature conservation, and, as flood protection for other areas of the Mataura floodplain.

The northern parts of the reserve (those dominated by unit 6) were extensively grazed by cattle until the year 2000 when stock were excluded. Other areas of the reserve have had limited ingress by cattle but were never considered 'productive areas'. Fire was frequently used as a clearance tool in the area until approximately 80 years ago and would have had an impact on peripheral parts of the reserve, particularly on the western (windward) side.

The entire area is now managed for nature conservation, as well as the recreational/cultural activities of white-baiting and duck-shooting. Recently the white-baiting has attracted a financial interest and the associated increase in activity could cause conflict with the nature conservation aims.



### ***Current Protection***

This HVA as an entire unit has no legally-binding protected status as a nature reserve under either the Reserves Act, or, the Conservation Act. Instead, it has 'reserve' status within the ES leasehold land management framework; as such it is not saleable. However, the harbour edges have international protected status under the RAMSAR convention (see boundary illustrated in Appendix one).

## **Significance of the Habitat in District and National Contexts**

### **Significance within the ecological district – site evaluation criteria**

#### ***Qualitative significance definition within the RMA***

Section 6(c) of the Resource Management Act 1991 requires that areas of '*significant*' indigenous vegetation, or habitats for indigenous fauna, should be protected.

Significance was not defined either qualitatively or quantitatively in the Act; its definition has evolved since 1991 through case law and ecological practice. Whaley et al. (1995)<sup>7</sup> lists the following nine criteria by which to decide if a natural area is significant:

1. Representativeness;
2. Diversity and pattern;
3. Rarity and special features;
4. Naturalness and intactness;
5. Size and shape;
6. Inherent ecological viability and long-term sustainability;
7. Buffering/surrounding landscape/connectivity;
8. Threat and fragility (threat processes and agents, effects of proposed modification);
9. Management input (nature and scale/intervention necessary/restoration potential).

In my opinion, Whaley et al.'s list is the one which most fully meets the conceptual and practical requirements of a robust definition of significance. In appendix five, I have provided brief definitions for each of these criteria which attempt to represent the majority view of practising ecologists in New Zealand, as I perceive it. Nevertheless, the precise qualitative definition of significance for natural areas in New Zealand is currently a matter of wide, and sometimes deeply divided, debate.

#### ***Application of quantitative significance assessment method in use by ES for wetland sites***

Environment Southland's 'wetland evaluation card' assesses all of the nine criteria listed above, based upon information recorded in the HVA survey forms (part 1 - general and part 2 - wetland specific) and in the 'wetland record sheet'. The wetland evaluation card's output is a numerical score for each of three information categories. Together, these three scores summarise a site's significance (i.e. its ecological value or importance) in the context of its ecological district.

The advantages of this system are that it gives a quick guide to absolute site value, and, if other sites have been surveyed and assessed using the same method, these scores can be used to directly compare and rank the relative importance among such sites. It should be noted that direct comparison is not always reliable if the sites being compared are within different ecological districts.

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<sup>7</sup> Whaley, K. J., Clarkson, B. D., & Leathwick, J. R. 1995. *Assessment of criteria used to determine 'significance' of natural areas in relation to section 6(c) of the Resource Management Act (1991)*. p. 34 in Landcare Research Contract Report LC9596/021.

The three summary categories are listed below, along with; the criteria from the list above which they each assess, their maximum scores and score meaning, as well as the actual score (in bold) for this HVA:

- Representative assessment:
  - Criterion 1 & parts of criteria 4, 5 & 7;
  - Max. score of 8 (meaning a very highly representative and good quality example).
  - **This HVA score: 7**
  
- Ecological quality assessment:
  - Criteria 2, 3, 4, 5, 6 & 7;
  - Max. score of 45 (meaning very high total ecological quality).
  - **This HVA score: 40**
  
- Management assessment:
  - Criteria 8 & 9;
  - Max score of 14 (meaning good output per dollar spent).
  - **This HVA score: 11**

**Note, these are by far the highest scores that I have assigned to any wetland HVA so far surveyed. This site is of outstanding importance for its diversity of habitats and for the diversity and abundance of wildlife that it supports (fish, marsh inhabiting birds, as well as estuarine birds such as terns and waders, including migratory ones).**

#### ***Representative value within the ecological district***

Representativeness (criterion one from the list above) is often considered by New Zealand ecologists to be the most important single criterion for any assessment of site importance. This is based on the notion that a reserve system should contain the full range of natural ecosystems historically characteristic of an area. Representativeness alone does not take into account the condition of a site, or its level of modification.

Precise figures for former extent and currently protected extent are not available within the Southland Protection Strategy<sup>8</sup> for all of the vegetation types present in this HVA, so representative value is difficult to assess. In addition to this, if the vegetation types within the HVA are fitted into the broad habitat classes given in the Southland Protection Strategy, then representative values from low (for the freshwater rushlands – unit 6) to very high (for the lowland forest – unit 1) result. In my opinion, considering the fact that nowhere else in the district does such a variety of habitats exist within such close proximity so as to preserve natural vegetation sequences the site as a whole deserves a **representative value classification within the Waituna ecological district of very high**.

#### ***Representative value at the national scale***

The Threatened Environment Classification<sup>9</sup> (TEC) was developed by Landcare Research to classify the whole of New Zealand in terms of where areas of rare and poorly protected indigenous ecosystems are most likely to occur. Each TEC category relates to an approximate percentage of how much indigenous vegetation cover remains within each land environment and how much of it is protected.

Under the TEC, the HVA is classified as within a Category 2 (i.e. chronically threatened), because between only 10% and 20% of the indigenous vegetation in this environment remains and what

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<sup>8</sup> Southland Protection Strategy, 1999. A report to the Nature Heritage Fund Committee by M. A. Harding.

<sup>9</sup> Threatened Environment Classification: Guide for Users (Version 1.1, August 2007), Landcare Research New Zealand Ltd 2007.

remains is sparsely distributed in the landscape. As a result of this level and pattern of habitat loss, the risks of species loss is severe and any further habitat loss will greatly exacerbate these risks.

Furthermore, all remaining wetlands in the Waituna ecological district provide important opportunities for wetland protection in a national context, to help redress and compensate for New Zealand having lost at least 90% of all its original wetland ecosystems. This extremely high rate of wetland loss nationally is why all remaining wetlands are also classified as a national priority for protection (number two) within the national statement of priorities for protection of biodiversity on private land (MfE 2007)<sup>10</sup>.

## **Ecological Features and Values**

In summary, this HVA has a wealth of ecological features and is highly valuable. Its value is high for three main reasons:

- The estuarine zone forms part of one of the five most important wading bird habitats in New Zealand; it is also known to be important habitat for rare and vulnerable fish fauna.
- The HVA as a whole has a very high ecological diversity comprised of both floodplain and estuarine ecosystems with many intact ecological gradients between the vegetation units described.
- The HVA has habitats suitable for supporting several threatened and rare species. The *Coprosma pedicellata* shrub was observed in unit 1 and the grass *Deschampsia caespitosa* is expected to be present, as are the marsh and spotless crakes.

## **State of the Habitat**

In summary, the state of the habitat is good.

The plant community condition is variable among the units, with unit 6 being the poorest as it is recovering from historic grazing and has a serious (but limited extent) reed sweet grass infestation. Other units are in good condition with threat weed invasions being limited to mostly sparse infestations of gorse at the edges and the reflexed salt grass that has replaced areas of coastal herbaceous turf. The forest of unit one is clearly reduced from its former extent (presumably by fire, grazing and wind damage) but it appears not to have suffered logging, and despite reasonably high possum populations, it is recovering well.

### **FAUNA**

This site has been included within the RAMSAR wetlands list because of the estuarine habitat that it protects which provides feeding and breeding grounds for significant numbers of many shore-bird species, including migratory waders.

During the survey, a high diversity of land and shore birds were observed including: eastern bar-tailed godwit (a late-staying migrant), royal spoonbill, white heron, oystercatcher, pukeko, kingfisher, bellbird, kereru, silver eye, fantail, harrier hawk and terns. A good population of fernbirds was confirmed to be present also. The habitat was confirmed to be suitable for marsh crake and Australasian bittern; it is

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<sup>10</sup> Ministry for the Environment, 2007. *Protecting our Places: A Statement of National Priorities for Protecting Rare and Threatened Biodiversity on Private Land*. Wellington.

also suitable for many other migratory birds such as the turnstone, red-necked stint and pacific golden plover, but the survey was made after these species would have left on their northerly migration.

The estuarine and brackish waters of the estuary and lower river are known to be important habitats for the maintenance of fish populations for a variety of native species; furthermore, rare or vulnerable species such as giant kokopu, banded kokopu and lamprey are likely to be present but no fish survey was undertaken.

## **IDENTIFIED THREATS**

### ***Hydrological regime integrity***

Because the hydrological regime is dominated by the fluctuations associated with the sea tides and river floods, its integrity remains high. Without the artificial drainage network that surrounds the HVA, its constituent habitats would undoubtedly spread further into the floodplain, but this drainage does not unduly affect the remaining wetlands protected by the HVA reserve.

### ***Weeds***

Weeds are defined as troublesome or unattractive plants growing in an undesired area<sup>11</sup>. Weeds in New Zealand have major economic and ecological impacts and cost millions of dollars annually to control. In natural ecosystems they may cause irreversible damage to the habitats they invade by smothering or displacing indigenous vegetation<sup>12</sup>.

Table 1 provides information on the abundance and location of weeds present in the HVA that are considered a threat.

Common Name	Scientific Name	Comments
Broom	<i>Cytisus scoparius</i>	Occasional patches at edges.
Gorse	<i>Ulex europeaus</i>	Serious infestations occur to the west of unit 1 and in unit 6 to the east of the southern fragment of bush in the O'Neil block. It is also slowly encroaching into unit 4 from the east on the opposite side of the river from unit 1 bush. There is a source population of concern alongside the main highway at the eastern extremity of the reserve, and along the track that travels west from this point.
Reed sweet grass	<i>Glyceria fluitans</i>	Dominates where it becomes established. Very difficult to control but its spread south into higher value habitats will be limited by salinity.
Tree lupin	<i>Lupinus arboreus</i>	Occurs around the southern side of the lake and outwards from there. Should be monitored.

**Table 1:** Weed species identified that are a threat to the HVA.

Gorse is the biggest threat to habitats of high value so it should be controlled wherever it is present within the HVA, both where it forms extensive patches and where it is only occasional at present. Re-invasion risk is high from non-reserve areas not actively managed as farmland in the area west of unit 1.

Reed sweet grass reduces habitat quality for invertebrates and fish and should ideally be removed but it is very persistent. A practical goal is to limit its spread along the river-banks southwards from its current extent. Eradication would require major works with diggers.

<sup>11</sup> Weeds, [www.dictionary.reference.com](http://www.dictionary.reference.com)

<sup>12</sup> Weeds, [www.landcareresearch.co.nz](http://www.landcareresearch.co.nz)

### ***Pest animals***

Pest animals can be defined as species that have been introduced to New Zealand and that have a negative impact on native plants and animals and/or production areas. The major threats to our terrestrial flora and fauna come from possums, rats, mustelids (stoats, ferrets, weasels) and ungulates (deer, goats, pigs)<sup>13</sup>.

No pest animal control currently occurs at the site. Control of rats and mustelids would increase the populations of native birds such as fernbirds. Control of possums in unit one would speed regeneration there but the efficacy of control inside the bush alone would have to be questioned since the source population in the surrounding landscape will be high.

### ***Grazing/fencing***

Many natural areas in Southland are located on or near areas accessible to stock. When stock have access to an area they damage the vegetation by selectively grazing palatable species, thereby preventing regeneration. Other side effects can include pugging of the soil, and changes in the water quality of wetland and riparian areas.

The HVA is fenced on all sides, except for the eastern most area of unit 4 between the stream and the north-south running drain approximately 100m to the west of this stream. This situation should be remedied.

Cattle sign was also seen in the southern most area of unit 6 and its adjacent area of unit 4; presumably they had come through the gate somehow that exists in the western reserve boundary fence here.

### ***Other threats***

Vehicle tracks were observed crossing the estuary to an elaborate maimai that exists on the eastern side of the salt marsh island in the north-eastern part of the harbour. Vehicles disturb wildlife and can easily destroy the nests of ground nesting shore birds. Vehicle access is not necessary to facilitate the harbour's use for duck-shooting and should be prevented and discouraged.

## **Management Recommendations**

ES has committed itself to managing this HVA, among others, for its natural values. Many positive steps have already been taken, however, owing to the reserves' very high values it deserves more action.

### ***Some key recommended actions for the future follow:***

- Attempt to educate of the surrounding lessees as to the high values of this area (this may help prevent further incursions of cattle into sensitive salt marsh areas);
- Fence to exclude stock from the far eastern part of the reserve (see grazing/fencing section above);
- Develop the eastern part of the reserve adjacent to the highway as a picnic area and bird-watching site, ideas could include:
  - Installing a hide and environmental interpretation of the estuary and its birdlife – there are many interesting stories to tell about the trans-global migrations of the birds that feed there in summer;

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<sup>13</sup> Pest animals, [www.doc.govt.nz](http://www.doc.govt.nz)

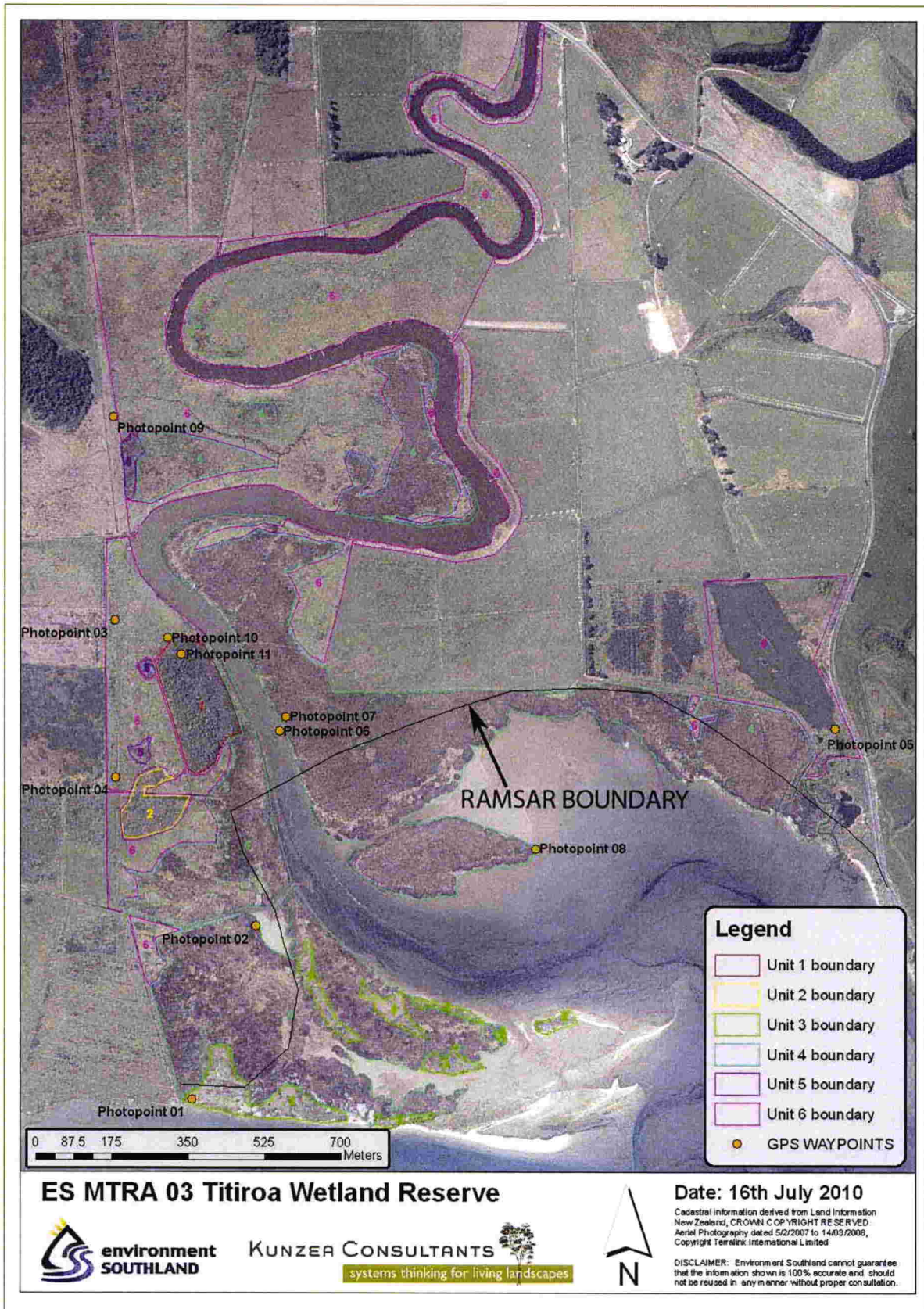
- Restore/beautify the lake area to act as a picnic site;
- Encourage local enthusiasts to start monitoring the bird populations;
- Control localised serious infestations of gorse around the periphery by helicopter and manually in sensitive wetland habitats (see notes in table 1 above);
- Control reed sweet grass so as to at least limit its spread southwards
- Fill in drains within the reserve that serve no purpose for farmland improvement (those immediately west and north of unit 1, as well as through the middle of unit 2) in order to restore natural hydrology;
- Instigate legal protection of the remainder of the reserve not already protected by RAMSAR status;
- Consider expanding the reserve in two areas in order to create linkages with other nearby reserves:
  - Link with O'Neil bush (south block);
  - Link with Walsh bush by incorporating the flaxland in between (currently classed by ES as 'potential wetland').

## **Conclusion**

This HVA is of outstandingly high ecological, scenic and cultural/recreational value; it is certainly the highest value of any of the reserves that ES manages in its floodplain leasehold lands. Accordingly, it deserves to receive its fair share of any management resources available. The values increase in a southerly direction as one approaches the estuarine zone and its adjacent floodplain.

An opportunity exists to harness the scenic and wildlife values of the reserve for the enjoyment of a greater number of Southlanders and tourists alike by developing environmental interpretation and bird watching facilities. The potential exists to expand the reserve to the west in order to further increase the ecological values conserved by connecting together close-by areas of existing reserve that are currently isolated from each other.

# Appendix 1: Aerial photograph of the HVA with photo-point locations and HVA unit boundaries highlighted



N.B. Refer to appendix two for photo-point coordinates. Selected photographs are presented in appendix three.

**Appendix 2: GPS waypoint list for HVA survey photos (coordinates are in NZTM 2000 format)**

GPS Waypoint ID	Full size Jpeg file number	Photo number in report	Photo angle (magnetic bearing)	Easting	Northing
Photo-point 1	1316	1	062	1275814	4834247
Photo-point 2	1317	2	064	1275961	4834644
Photo-point 3	1318	-	126	1275637	4835345
Photo-point 4	1320	3	043	1275638	4834983
Photo-point 5	1367	-	305	1277286	4835098
Photo-point 6	1368	4	118	1276014	4835091
Photo-point 6	1369	-	215	1276014	4835091
Photo-point 6	1370	5	295	1276014	4835091
Photo-point 7	1371	6	090	1276028	4835123
Photo-point 8	1373	-	258	1276600	4834822
Photo-point 9	1374	7	096	1275632	4835809
Photo-point 10	1375	8	128	1275757	4835304
Photo-point 11	1376	9	220	1275788	4835267

**Appendix 3: Photo numbers 1 to 9 (see appendix two for corresponding photo-point IDs, GPS coordinates and bearings)**



**Photo 1:** unit one grassland dominated by exotic reflexed salt grass with small patches of native turf. Unit 4 oioi rushland can be seen behind.



**Photo 2:** Looking across an estuarine mud section separating two sections of unit 4 rushland.



**Photo 3:** Photo showing the transition between unit 6 sedgeland/rushland and unit 1 forest with regenerating scrub flanking the forest.

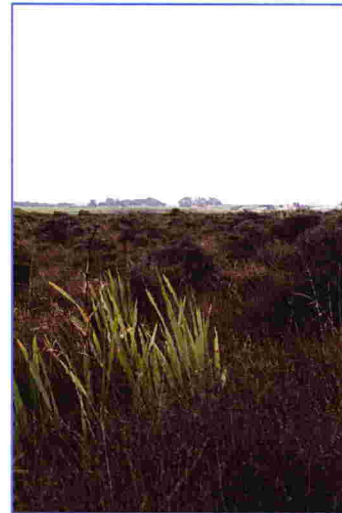


**Photo 4:** Here a shubby (salt marsh ribbonwood) section of unit 4 shrubland can be seen behind a narrow fringe of oioi at the edge of the lower Titiroa Stream.





**Photo 5:** This photo looking up the lower Titiroa Stream at high tide (with O'Neils bush, southern block, on the skyline) captures the wild beauty of this section of the river. The reserve has very high aesthetic values.



**Photo 6:** This photo represents the highest shrub density seen in unit 4. The saltmarsh ribbonwood is replaced by mingimingi as salinity reduces further away from the camera.



**Photo 7:** Unit 6 sedgeland (with high abundance of holy grass in this spot) grades into unit 5 scrub on the skyline.



**Photo 8:** The northern edge of unit one displays vigorous regeneration of shrubs and trees that are invading the adjacent unit 6 zone seen in the foreground.



**Photo 9:** This shot from the interior of unit 1 illustrates the vigour and diversity of the understory.

## Appendix 4: HVA site vascular plant species list

Species Name	Common Name	Life form
<i>Asplenium flaccidum</i>	hanging spleenwort	Fern
<i>Blechnum discolor</i>	crown fern	Fern
<i>Blechnum minus</i>	swamp kiokio	Fern
<i>Blechnum procerum</i>	small kiokio	Fern
<i>Histiopteris incisa</i>	water fern	Fern
<i>Hypolepis ambigua</i>	pigfern	Fern
<i>Microsorium pustulatum</i>	hounds tongue fern	Fern
<i>Polystichum vestitum</i>	prickly shield fern	Fern
<i>Pteridium esculentum</i>	bracken	Fern
<i>Carpodetus serratus</i>	marbleleaf	Tree/Shrub
<i>Coprosma foetidissima</i>	stinkwood	Tree/Shrub
<i>Coprosma lucida</i>	glossy karamu	Tree/Shrub
<i>Coprosma pedicellata</i>	a coprosma	Tree/Shrub
<i>Coprosma propinqua</i>	mingimingi	Tree/Shrub
<i>Coprosma rotundifolia</i>	a coprosma	Tree/Shrub
<i>Coprosma tenuifolia</i>	swamp coprosma	Tree/Shrub
* <i>Cytisus scoparius</i>	broom	Tree/Shrub
<i>Dacrycarpus dacrydioides</i>	kahikatea	Tree/Shrub
<i>Griselinia littoralis</i>	broadleaf	Tree/Shrub
<i>Hebe salicifolia</i>	koromiko	Tree/Shrub
<i>Leptospermum scoparium</i>	manuka	Tree/Shrub
* <i>Lupinus arboreus</i>	tree lupin	Tree/Shrub
<i>Melictytus lanceolatus</i>	narrow-leaved mahoe	Tree/Shrub
<i>Neomyrtus pedunculata</i>	rohu	Tree/Shrub
<i>Pittosporum tenuifolium</i>	kohuhu/black mapou	Tree/Shrub
<i>Plagianthus divaricata</i>	saltmarsh ribbonwood	Tree/Shrub
<i>Podocarpus hallii</i>	lowland totara	Tree/Shrub
<i>Prumnopitys ferruginea</i>	miro	Tree/Shrub
<i>Prumnopitys taxifolia</i>	matai	Tree/Shrub
<i>Pseudopanax colensoi</i>	three finger	Tree/Shrub
<i>Pseudopanax crassifolius</i>	lancewood	Tree/Shrub
<i>Raukawa simplex</i>	haumakāroa	Tree/Shrub
<i>Weinmannia racemosa</i>	kamahi	Tree/Shrub
* <i>Ulex europaeus</i>	gorse	Tree/Shrub
<i>Muehlenbeckia axillaris</i>	creeping pohuehue	Climber/vine
<i>Muehlenbeckia australis</i>	pohuehue	Climber/vine
<i>Muehlenbeckia complexa</i>	a vine	Climber/vine
<i>Parsonsia heterophylla</i>	native jasmine	Climber/vine
* <i>Rubus fruticosus</i>	blackberry	Climber/vine
* <i>Cerastium fontanum</i>	mouse ear chickweed	Herb
<i>Centella uniflora</i>	centella	Herb
<i>Epilobium pedunculare</i>	a willow herb	Herb
* <i>Galium palustre</i>	marsh bedstraw	Herb
* <i>Hypochoeris radicata</i>	catsear	Herb
<i>Leptinella dioica</i>	shore cotula	Herb
* <i>Lotus pedunculare</i>	birdsfoot trefoil	Herb
* <i>Ranunculus flammula</i>	spearwort	Herb
* <i>Ranunculus repens</i>	buttercup	Herb
* <i>Rumex crispus</i>	curled dock	Herb
<i>Schizaelema cockaynei</i>	a herb	Herb
<i>Selliera radicans</i>	remuremu	Herb
<i>Tetragonia tetragonioides</i>	new zealand spinach	Herb
* <i>Juncus articulatus</i>	jointed rush	Rush

<i>Species Name</i>	<i>Common Name</i>	<i>Life form</i>
<i>Juncus edgariae</i>	a native rush	Rush
* <i>Juncus procerus</i>	a giant rush	Rush
<i>Leptocarpus similis</i>	jointed wire rush / oioi	Rush
<i>Carex coriacea</i>	cutty grass	Sedge
<i>Carex secta</i>	pedicelled sedge	Sedge
<i>Carex virgata</i>	a sedge	Sedge
<i>Isolepis aucklandica</i>	a dwarf sedge	Sedge
<i>Isolepis cernua</i>	slender clubrush	Sedge
<i>Ucinia uncinata</i>	hook sedge	Sedge
* <i>Agrostis stolonifera</i>	creeping bent	Grass
* <i>Glyceria fluitans</i>	reed sweet grass	Grass
<i>Hierochloa redolens</i>	holy grass	Grass
* <i>Holcus lanatus</i>	yorkshire fog	Grass
<i>Poa cita</i>	silver tussock	Grass
* <i>Puccinellia distans</i>	reflexed salt grass	Grass
<i>Astelia fragrans</i>	a bush lily	Other monocots
<i>Cordyline australis</i>	cabbage tree	Other monocots
<i>Cortaderia richardii</i>	toetoe	Other monocots
<i>Phormium tenax</i>	lowland flax	Other monocots
<i>Zostera novaezelandica</i>	seagrass/eelgrass	Other monocots
<i>Sphagnum cristatum</i>	common moss	non-vascular plant

Note: This species list has been compiled from plants observed during the HVA field survey. The survey focused on identifying common, indicator and threatened species, so it is not a complete list for the site. Given the size and habitat diversity of the site, I would expect that an exhaustive survey would probably add 20-30% to the species diversity listed here. ‘\*’ denotes an exotic species.

## Appendix 5: Explanation of criteria for significance evaluation.

1. **Representativeness:** the degree to which vegetation is representative of that which formerly existed. Includes evaluation of natural areas of the same type within the ecological district with higher value placed on the best examples; so, if few examples exist of a given type then poor quality sites can be rated highly.
2. **Diversity/pattern:** the number of species of native vascular plants and animals, and the number of vegetation/habitat types, contained in an area.
3. **Rarity/special feature:** *Rarity* is the degree to which vegetation and habitat types that were formerly common are now reduced in extent, or are naturally rare, or support native species (plants or animals) that are uncommon, in decline or threatened with extinction within an ecological district/sub district, ecological region or nationally. *Special features* allows for features such as high breeding abundances of common species, or, intact ecological sequences to be taken into account.
4. **Naturalness/intactness:** the combined degree of absence of; disturbance and damage by human activity, the activity of introduced animals, or, exotic and pest plants.
5. **Size and shape:** the size of an area of vegetation or habitat and the degree to which its shape influences the viability of the site.
6. **Viability/sustainability:** the degree to which existing natural habitat or vegetation is capable of maintaining or recovering its structure and composition; either in the absence of additional management, or, with a restoration programme if feasible.
7. **Buffering/surrounding landscape/connectivity:** the extent to which an indigenous natural area is buffered from surrounding modifying influences and its connectivity with other natural areas. It also considers the degree to which an area of native habitat or vegetation links other such areas or contributes to the ecological significance of the immediate vicinity.
8. **Threats and fragility:** *Threats* are factors could disturb the natural equilibrium of ecosystem functioning in the natural area while *fragility* measures its intrinsic vulnerability to environmental change taking into account other factors above.
9. **Management input:** an assessment of the human effort that is required to maintain the inherent natural viability of a natural area. For example, weed control, fencing or replanting that is required.

# APPENDIX D

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COASTAL PERMIT AUTH-204122



**environment  
SOUTHLAND**

*Te Taiaro Tonga*

**AUTH-204122**

Cnr North Road and Price Street  
(Private Bag 90116  
DX YX20175)  
Invercargill

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

## **Coastal Permit**

Pursuant to Section 104B of the Resource Management Act 1991, a resource consent is hereby granted by the Southland Regional Council to **Catchment Management Division of the Southland Regional Council of Private Bag 90116, Invercargill 9840** from **29 October 2015**.

**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 occupy the coastal marine area and to dam tidal waters with a tidegate structure
Location - site locality	Upstream of the Tokanui-Gorge Road Highway bridge
- map reference	NZTM2000 1276640E 4836895N
- catchment	Titiroa River
Legal description of land at the site:	Section 1 SO 11258 and Part Lot 1 DP 11173
Expiry date:	<b>29 October 2020</b>

### **Schedule of Conditions**

1. This consent authorises occupation of the coastal marine area and the damming of tidal waters with a tidegate structure, as described in the application for resource consent dated 24 August 2006.
2. By 30 June 2017 the consent holder shall undertake (or otherwise obtain) a survey of native fish species upstream and downstream of the tidegate structure to determine if the structure is impeding spawning and migration of native fish species and, if so, the scale of effect on spawning and migration. The survey shall be carried out by a suitably qualified person and shall include, but is not limited to:

- a. Comparison of fish communities in comparable sites upstream and downstream of the structure using the methods outlined in the New Zealand Freshwater Fish Sampling Protocols<sup>1</sup>.
- b. Assessment of the flow profile immediately downstream of the tidegate structure to determine whether water velocities exceed the swimming speeds of native fish species in the area.
- c. A salinity survey of the Titiroa River to determine the upstream extent of the saltwater wedge, and whether the tidegates affect spawning of inanga.


For the purposes of this condition, a suitably qualified person shall be a qualified ichthyologist, marine biologist, environmental scientist or organisation that has expertise in completing surveys of aquatic environments.

3. A copy of the survey required by Condition 2 shall be forwarded to the Consent Authority, and to the Department of Conservation (Murihiku District) by 31 July 2017.
4. The consent holder shall:
  - a. at all times during the term of this consent maintain the structure in good repair, appearance and condition.  
*Note: Rule 11.4.1 of the Regional Coastal Plan permits maintenance and repair of structures, subject to conditions.*
  - b. notify the Consent Authority ([escompliance@es.govt.nz](mailto:escompliance@es.govt.nz)), of any alteration to the structure which is carried out without resource consent pursuant to a permitted activity rule in an operative regional plan.  
*Note: Rule 11.4.2 of the Regional Coastal Plan permits alteration of structures, subject to conditions. Alterations not specifically permitted by a regional rule, regulations or legislation will require resource consent.*
5. In consideration of the right to occupy Crown Land in the coastal marine area for the activity specified above, the consent holder shall, each year, pay to the Consent Authority the appropriate coastal occupation charge specified in the Regional Coastal Plan. Each financial year, commencing 1 July, the charge shall be adjusted for inflation in accordance with the Consumer Price Index. The sum payable in the first year of this consent (or the proportion thereof for which the consent is current) is \$88.40 plus GST, and shall be payable in advance on invoice. The revenue from this charge shall be used only for the purpose of promoting the sustainable management of the coastal marine area.
6. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent during the period 1 February to 30 September each year, or within two months of any enforcement action being taken by the Consent Authority in relation to the exercise of this consent, or on receiving the fish survey report as specified in Conditions 2 and 3, for the purposes of:
  - (a) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage;
  - (b) ensuring the conditions of this consent are consistent with any National Environmental Standards Regulations, relevant plans and/or the Environment Southland Regional Policy Statement

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<sup>1</sup> Joy, David & Lake (2013). New Zealand Freshwater Fish Sampling Protocols (p64)

for the Southland Regional Council



H Lennox  
Consents Manager

Notes:

1. *If you require a replacement permit upon the expiry date of this permit, any new application should be lodged at least six months prior to the expiry date of this permit. Applying at least six months before the expiry date may enable you to continue to exercise this permit until a decision is made, and any appeals are resolved, on the replacement application.*
2. *For Condition 3, the postal address of the Department of Conservation (Murihiku District) is:*

*Department of Conservation  
Murihiku District  
P O Box 743  
Invercargill 9840*