Resource Consent Application

Hawksbury Lagoon Structures Phase 1

Otago Regional Council

Prepared by:

SLR Consulting New Zealand

SLR Project No.: 875.016722.00001

10 November 2025

Revision: Draft v0.2

Revision Record

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Draft v0.1	10 November 2025
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Basis of Report

This report has been prepared by SLR Consulting New Zealand (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Otago Regional Council (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Application details

Consent authority:	Otago Regional Council
Applicant:	Otago Regional Council
Address for service:	SLR Consulting New Zealand Level 1, 426 Moray Place Central Dunedin New Zealand 9016 Attention: Emma Burford [redacted]
Address for fees:	Otago Regional Council C/o engineering@orc.govt.nz
Site:	Hawksbury Lagoon Wildlife Refuge Reserve, Waikouaiti
Legal description:	Parcel 7232921
Owner(s):	Administered by Department of Conservation
Site area:	
Plan(s):	Otago Regional Plan: Water Regional Plan: Coast for Otago
Overlay(s) or control(s):	Regionally Significant Wetland Natural Inland Wetland Coastal Marine Area (and Statutory Acknowledgement)
Brief description of the proposed activity:	Installation of four overflow culverts within the causeway east of southern lagoon for flood mitigation purposes. Installation of water level gauges within Hawksbury Lagoon.
Resource consent(s) required:	Land Disturbance in a Natural Wetland, Placement and Use of Structure (NES-F) Structures in a Coastal Marine Area (Regional Plan: Coast for Otago)
Status of the proposed activity:	Non Complying activity under the NES-F Discretionary activity under Regional Plan: Coast for Otago

Figure 1: Locality plan of the site (Source: topomap.co.nz).

1.0 Information requirements

This resource consent application has been prepared in accordance with the requirements of Schedule 4 of the Resource Management Act 1991 (the Act or the RMA) and the specific information requirements for this proposal contained in Regulations 45, 62, 63, 70 and 71 of the National Environmental Standards for Freshwater 2020 (NES-F) and Regional Plan: Coast for Otago.

2.0 Proposal

Otago Regional Council (ORC) proposes to undertake flood mitigation works within the Hawksbury lagoon. The purpose of the works is primarily to mitigate the effects of flood events on the residential properties located on the southwestern banks of the southern lagoon through the installation of culverts to improve flow capacity and reduce the potential for inundation of private properties. Secondary purpose is to enable data collection around lagoon water levels, via the installation of water level gauges.

2.1 Overview

The works are to be undertaken in two separate phases; this application is for activities relating to Phase 1 only. The two phases comprise the following activities:

Phase 1

1. Install four culverts each 900mm diameter, above an existing overflow culvert on the eastern bank of the southern lagoon. Install gates on the Post Office Creek end of each of the culverts.
2. Install two water level gauges within the lagoon system.
3. Install a gauge at the coastal barrier / Post Office Creek mouth to measure sand accretion and erosion rates.
4. Engage with stakeholders on the proposed Phase 1 works, introduce concept of Phase 2 of the works.
5. ORC initiate the development of a collaborative Lagoon Management Plan with stakeholders including Rūnaka, Department of Conservation, Dunedin City Council, the Waikouaiti Coast Community Board, Friends of Hawksbury Lagoon. The purpose of the management plan will include identifying the scope and delivery mechanisms for Phase 2 flood mitigation works.

Phase 2 (for information only)

1. Detailed scope to be developed through a collaborative Lagoon Management Plan, but likely to include:
    a. Utilise data provided from water level gauges installed during Phase 1, design and install mechanical flap gates for all culverts through the lagoon system, to manage water levels across the lagoon system and Post Office Creek.
    b. Vegetation clearance to improve stormwater flow through the drainage channel to the southwest of the southern lagoon.

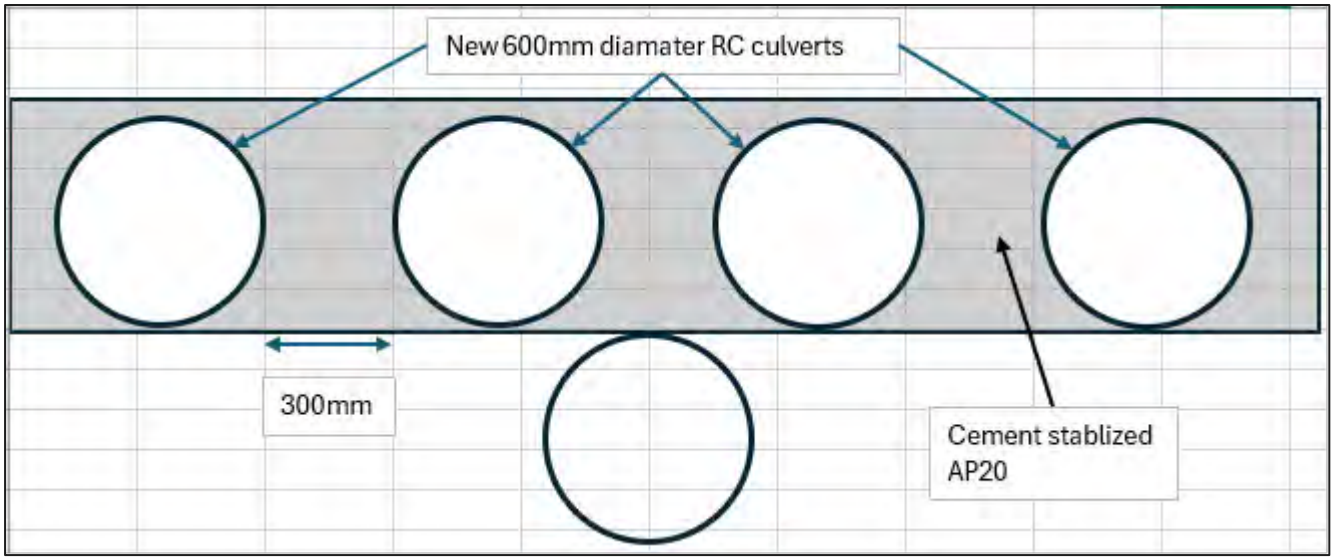
2.2 Culvert design

The four new 600mm culverts will be installed to sit above the existing 900mm culvert in the southern lagoon, with the conceptual design presented in Figure 2 below.

The additional culverts will enable the flushing of additional flows from the southern lagoon, when the existing single culvert is inundated and water level reaches between the top of the culvert and the top of the causeway. The additional culverts are intended to improve flow capacity to the reduce flood water levels in the lagoon and reduce the potential for inundation of private properties.

The new culverts will be spaced 300mm apart and set in concrete for stability, and to assist in preventing potential washout of material between the culverts.

Figure 2: Conceptual design of new culverts (Source: ORC)



2.3 Water and sand level gauges

Two water level gauges will be erected as part of the Phase1 works. One in the northern Lagoon and one in the southern lagoon, with the precise locations to be determined.

A third gauge will also be installed in Phase 1 works at the sand barrier to the mouth of Post Office Creek, to measure sand accretion and erosion rates.

The gauges will be constructed from durable, graduated timber, with clearly marked reference levels at regular 5 or 10 cm intervals. Indicative height will be 1.5m above the lagoon / stream bed.

Manual readings of both the staff gauge and lagoon water levels can be effectively carried out by trained community volunteers and ORC engineering staff.

Gauges will be staked into the bed of the lagoon / stream, installed manually without the need for use of machinery. Disturbance will be minimal and localised.

Data collected from the gauges will assist in informing the development of a second phase of works, in more intricately managing water levels across the lagoon system, as presented in section 2.1 above.

2.4 Construction methodology

The proposed construction methodology has been designed to ensure minimal disturbance and avoids any activity in the wet areas of the southern lagoon or Post Office Creek.

The construction and installation of the proposed new culverts will be undertaken from the causeway itself; and there will be no machinery positioned in the water either side of the causeway.

Installation of water and sand level gauges will be undertaken manually with no machinery in the wet bed of the lagoons or the stream.

A description of mitigation measures is presented in section 6 below.

2.5 Consent duration

A term of 35 years is sought for the ongoing use and maintenance of the proposed culverts and the occupation of the coastal marine area for the sand level gauge and to maintain this gauge.

3.0 Background

Hawksbury Lagoon is made up of a series of three lagoons, separated by causeways, located in Waikouaiti between the low-lying racecourse ground to the north, Waikouaiti Beach to the south, and Post Office Creek running along the east of the north-south causeway.

Causeways running north-south between the lagoons and Post Office Creek, and east-west between the north and south lagoons both accommodate culverts. The layout of these culverts is presented in Figure 3 below. These culverts enable water to flow between the north and south lagoons, and between the lagoons and Post Office Creek. The location for the proposed additional overflow culverts is also shown in Figure 3.

Each culvert has a rudimentary, manually operated gate system, whereby waratahs are positioned either side of the culvert and a board can be manually dropped down at the end of the culvert to close it off and prevent flow. Photographs of this arrangement are presented in Figure 4 and Figure 5. This system is managed reactively to heavy rain events and high tides and is currently managed by the local community.

There is a hydrological relationship between the lagoons and Post Office Creek. The northern lagoon receives inflow from Post Office Creek.

The southern reaches of Post Office Creek experience tidal surges. These tidal surges can impact on lagoon water levels surging upstream beyond the existing culverts (both culverts between the Post Office Creek and the lagoons, presented above). Additionally, overflow water from both the northern and the southern lagoons flows into Post Office Creek via the existing culverts.

Figure 3: Site layout

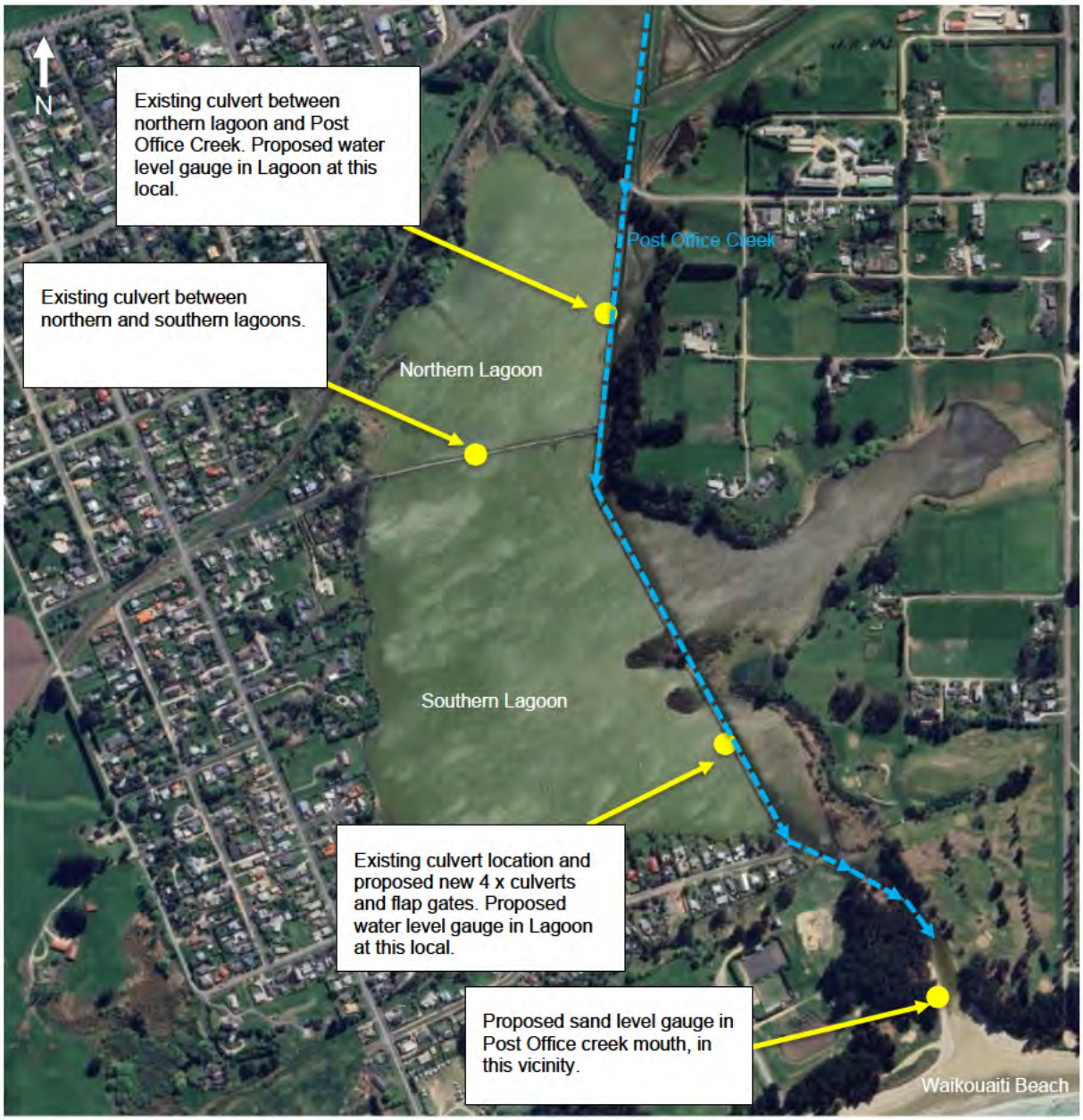


Figure 4: View of existing culvert through causeway into southern lagoon

Figure 5: View of existing culvert through causeway into southern lagoon

The culvert through the causeway into the southern lagoon is the only means of alleviating the southern lagoon from flood flow levels during significant rain events. During significant events, local properties, in particular the residential properties located on the southwest banks of the southern lagoon often experience flooding. When the southern lagoon has been inundated with flood flows in the past during significant rain events, emergency release of water has been undertaken via mechanically scraping through the causeway with a digger. Figure 6 below shows where the causeway was excavated by the community as an emergency flood mitigation measure, during the flood event of October 2024.

Figure 6: View of causeway excavated area

3.1 Consent history

There are no existing resource consents associated with the lagoons, causeway or culverts.

3.2 Consultation

3.2.1 Pre-application meeting

A pre-application meeting was held on 19 June 2025. The following attended:

- Tom Albert ORC – Planner
- Tom Dyer ORC – General Manager Science & Resilience
- Josh von Pein ORC - Rivers Flood Recovery Programme Support

- Emma Burford SLR Consulting - Planner

The background and proposed conceptual two phase approach to flood mitigation was presented. A formal record of the key points discussed is included as Appendix DAppendix D. A summary of the key points discussed are presented below:

The proposed works will be phased, and relevant consent prepared for Phase 1 and Phase 2 activities separately. Stakeholder engagement will commence for both phases early in the process of developing Phase 1 consent.

The Phase 1 works can fit within the permitted activity thresholds of Section 13 of the Otago Regional Plan: Water with sound erosion and sediment control measure put in place, this will be achieved through a condition for a full Construction Management Plan (CMP).

Consent is required under NES-FW Regulations 45, 70 and 71.

Affected parties are considered as the following:

- *Department of Conservation (DOC)*
- *Kati Huirapa Rūnaka ki Puketeraki*
- *Otago Fish and Game*
- *Hawksbury Lagoon Incorporated Society*

It is noted in the appended letter that a Memorandum of Understanding exists between the Hawksbury Lagoon Incorporated Society and DOC.

3.2.2 Consultation with mana whenua

ORC engaged directly with Kati Huirapa Rūnaka ki Puketeraki (Rūnaka) in the development of this consent application. A Rūnaka representative attended a site visit with ORC project representatives in June 2025, where the proposed flood mitigation measures were introduced, and the proposed multi-phase approach was shared. There was no specific feedback given.

ORC now seeks formal engagement with Rūnaka via Aukaha and is seeking affected party approval on the consent application. The consent application was submitted to Aukaha at the time of submitting the consent. Given the previous introduction to the issues and the proposed consent application, and the requirement to seek summer construction person, this is considered appropriate.

3.2.3 Consultation with other stakeholders

Preliminary engagement was made with the following parties informing them of the proposed works:

- Dunedin City Council
- Department of Conservation
- Otago Fish and Game
- Hawksbury Lagoon Incorporated Society
- Waikouaiti Community Board

There are multiple parties with a stake in the lagoon system, and a complex combination of ecological, cultural, and recreational values intrinsic to the lagoon system. There is an existing informal commitment from local community groups and from individuals for managing water levels in the lagoons via manually operated informal flap gates.

ORC wish to lead the development and coordination of a Hawksbury Lagoon Management Plan to provide a coordinated approach to managing water levels – whilst also creating and achieving ecological, cultural and flood management related goals and associated actions.

As part of this first phase, ORC seeks to commence the coordination and development of a multi-party Management Plan. Stakeholders would be invited to collaborate in developing this Management Plan, and would include but not be limited to Rūnaka, Department of Conservation, Dunedin City Council, the Waikouaiti Coast Community Board, Friends of Hawksbury Lagoon. The Management Plan would be collaboratively developed to identify objectives, roles and proposed actions; this would inform the scoping for Phase 2 flood mitigation works as well as future management objectives for the Lagoon system.

3.2.4 Written approvals

In addition to Rūnaka, formal written approval is being sought from the following affected parties. We are expecting we may have submitted prior to this being received:

- Department of Conservation
- Fish and Game
- Hawksbury Lagoon Incorporated Society

3.3 Permitted activities that form part of the proposal

A detailed rules assessment is provided in Appendix A. Reasons for the application are presented in section 5 of this report. The permitted activities that form part of the proposal are summarised below:

- The installation of the culverts is permitted under Rule 13.2.1.1 and 13.2.1.2 of the Otago Regional Plan: Water, because the culverts will not impede flow of water or debris and will be identifiable from the bank by markers, and will be maintained in good repair.
- The installation of the culverts is permitted under Rule 8.5.1.6 of the Regional Plan: Coast for Otago because the length of the culverts will extend no more than 2m into the coastal marine area from high mean water springs. Because their installation will be a permitted activity, their occupation of the coastal marine area is also permitted under Rule 7.5.1.4.
- The installation of the water level gauges in the lagoons is permitted under Rule 13.2.1.4 of the Otago Regional Plan: Water because the gauges will not exceed 2m^2 in area and ORC will be notified of the location and nature of the structure at least 7 days prior to installation.
- The bed disturbance associated with the placement of the culverts and the water level gauges is permitted because under Rule 13.5.1.1 because the works will be undertaken in less than 10 hours duration, and all steps will be taken to minimise sediment release to the lagoons or Post Office Creek, there will be no change to the hydrological function of Hawksbury Lagoon or water levels within it for phase 1, as the proposed culverts will sit above the existing outflow inflow culvert and assist with alleviating particularly high flood water levels during / following significant rain events.

3.4 Other resource consent requirements

There are aspects of the proposal which require resource consent from Dunedin City Council. Therefore, resource consent will be applied for the following:

- To use land for Natural Hazard Mitigation Structures and excavation within a Wahi Tapuna Mapped Area.

4.0 Site and surrounding environment

4.1 Site

Hawksbury Lagoon is a coastal lagoon system made up of a northern and southern lagoon dissected by a causeway running east-west. A causeway running north south intersects the lagoons and Post Office Creek which runs southwards into the coast.

The causeways both accommodate culverts linking the waterbodies; there are informal gates which close these culverts by way of boards, which are manually lowered or raised on an ad hoc basis by members of the community.

Hawksbury Lagoon is a regionally Significant Wetland, and a designated Wildlife Refuge administered by the Department of Conservation (DOC).

The lagoon system is a Statutory Acknowledgement Area and has significant cultural value.

The lagoons are filled by Post Office Creek from the north, and from a drainage channel into the southern lagoon from the southwest. The drainage channel crosses various land ownership including Department of Conservation and private landowners.

A summary of the key historical milestones associated with the site are presented in signage at the access to the causeway, on site, and is presented in Figure 6. The culverts were constructed in 1972 to manage water levels.

Figure 7: Information panel presenting historical milestones

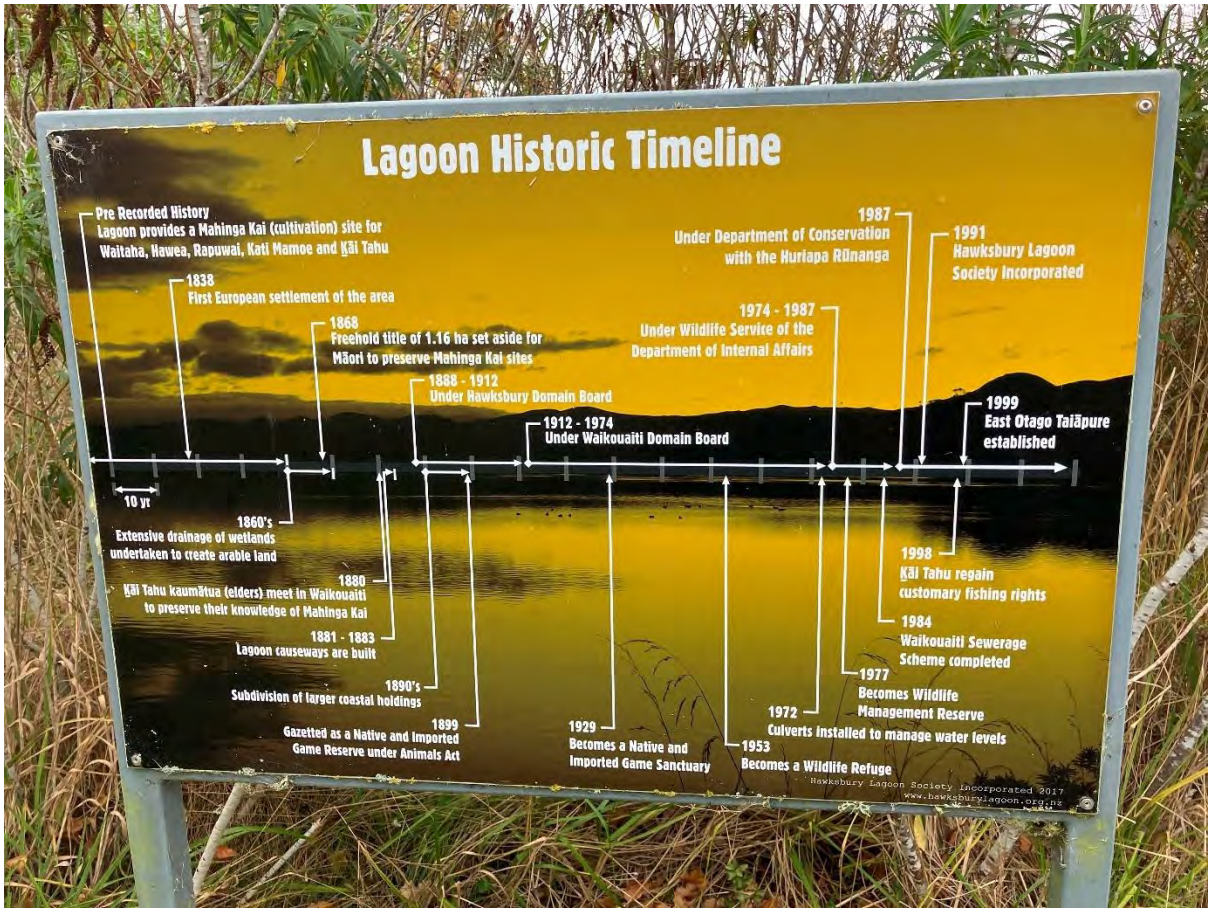


Figure 8: View north across the southern lagoon

Figure 9: View east across Post Office Creek

Figure 10**: View east along the west-east causeway separating the two lagoons**

4.1.1 Hydrology

Post Office Creek, running generally north-south towards the coast, feeds into the lagoon system from the north. The lower reaches of Post Office Creek experience tidal surges, as well as being the main stormwater conveyance for flood flows from the north.

Sami Khan, Amanda Riddle and Sam Thomas, staff from the ORC's Science team, prepared a memo dated 11-09-2025, presenting an assessment of ecological and hydrological effects for Phase 1 flood mitigation measures. A copy is attached as Appendix B. In their memo they refer to a report from MacTavish and Robin in 2013, who identify the lagoon system as being divided into three zones:

1. The lagoon - a western zone of former estuary now permanently converted into a coastal lagoon separated by causeways.
2. Intermittently Closed Estuary (ICE) - the remaining area of natural estuary and coastal mouth located east of the causeway and mainly consisting of the eastern arm.
3. The racecourse wetland - tidal channels traversing the former wetland area to the north

The culverts within the causeways connect the southern and northern lagoons and connect the southern lagoon to Post Office Creek. The natural hydrological mixing of the lagoons and Post Office Creek has been restricted by the construction of the causeway and culverts which would have otherwise been a natural series of tidal channels, marshland and mudflat system.

The mouth of Post Office Creek is mechanically opened periodically, scraping the build-up of a sandy berm that accumulates. When this is undertaken, the creek is flushed with saltwater, and the salinity of the lagoons is increased.

The lagoons are a brackish mix of saltwater and freshwater, the causeway and control gates enable a continued mixing of saltwater and freshwater, Post Office Creek flows directly to the estuary and the sea. The lagoons change between these brackish states and freshwater states.

Stormwater channels flow into the northwest of the northern lagoon, and the southwest of the southern lagoon.

Figure 11: View north of Post Office Creek mouth

Figure 12: View south across coast at Post Office Creek mouth

4.1.2 Ecology

The ORC Science Team memo notes that the lagoon is in a degraded condition, but that it remains a vital habitat for wildfowl, fish and other aquatic life. The ecological integrity of the lagoon is reliant on maintaining optimal water levels and brackish conditions.

Wildland Consultants produced an Ecological Management Plan for Hawksbury lagoon, Waikouaiti in 2009 (Plan). A copy is attached as Appendix B.

Hawksbury Lagoon is listed as a Regionally Significant Wetland in the Otago Regional Plan: Water, item #58 in Schedule 9. Hawksbury Inlet is listed as Coastal Marine Area #17 in Schedule 12 in the Otago Regional Plan: Water.

More than 30 birds were recorded at Hawksbury Lagoon, several of which are nationally threatened or uncommon species, as cited in the Wildland Consultants Plan – these species include grey duck, white heron, eastern falcon, variable oystercatcher, pied stilt, caspian tern, black-billed gull, red-billed gull, black shag, little; shag, little black shag, royal spoonbill.

Eel, inanga and bully have been listed as being present in the lagoons, and common skink and frogs as being present.

The ORC Science Team note the following regards spawning and nesting.

Fish Spawning at Hawksbury Lagoon

While specific spawning data for Hawksbury Lagoon is limited, general patterns for New Zealand freshwater fish species, many of which may inhabit the lagoon are available from NIWA's freshwater fish calendars. Common species likely to be present include:

- Inanga (*Galaxias maculatus*): Spawns in late summer to early autumn (Feb–Apr), typically during spring tides in the estuarine areas of the system
- Shortfin and Longfin Eel (*Anguilla australis* and *A. dieffenbachii*): Migrate to sea to spawn between Feb - Apr, with juvenile elvers returning upstream in late spring to early summer.
- Common bully (*Gobiomorphus cotidianus*): Spawns from spring to early summer (Sep - Dec).
- Smelt (*Retropinna retropinna*): Spawning occurs from late winter to early spring (Jul - Oct).

Bird Nesting at Hawksbury Lagoon

Hawksbury Lagoon is a significant habitat for a wide range of native and migratory birds. Nesting and breeding activity is observed throughout the year, with peaks in spring and early summer. Key nesting species and their likely breeding periods include:

- Pied Stilt (Poaka): Breeds from Aug - Jan, often nesting in shallow wetlands and mudflats.
- Royal Spoonbill (Kōtuku ngutupapa): Breeding season typically spans September to February, often nesting in colonies.
- White-faced Heron (Matuku moana): Breeds from Aug - Jan, often in trees or shrubs near water.
- Black Swan: Breeds year-round, with peaks in spring and summer.
- Paradise Shelduck: Breeds from August to December, often nesting in grasslands near water.
- Australasian Shoveler & Grey Teal: Nesting generally occurs from August to December.

These timings are important and will be considered when planning or undertaking any in-stream or barrier-related work to avoid disrupting critical life stages of resident and migratory fauna.

4.1.3 Cultural Significance

The site holds cultural significance and a rich cultural history. Kati Huirapa Rūnaka ki Puketeraki have strong links to the area and the lagoon system. A fishing easement was set aside by the Native Land Court in 1868 as partial redress for loss of mahika kai in the area; this easement is on the eastern side of the lagoon. The main north south causeway passes through this private Māori land, public access is granted by kind of favour of the trustees of the block. An ancillary claim was lodged as part of the 1998 Ngai Tahu Settlement because the conservation status of Hawksbury lagoon (Wildlife Refuge) forbade fishing. The claim was successful and descendants of the beneficiaries of the fishing easement now have rights to take eels and other fish from the lagoon, and legal recognition of mahika kai.

A formal cultural assessment has not been carried out on the proposed Phase 1 works, however ORC have engaged directly with Kati Huirapa Rūnaka ki Puketeraki and walked through the site together. Rūnaka will be formally engaged in the development of the Lagoon Management Plan and Phase 2 works.

Aukaha were formally requested for their feedback on the proposal at the same time as submitting this application to ORC.

4.1.4 Existing activities

. Kai Tahu does hold a fishing easement. No other known water-based activities are undertaken on the lagoons.

The recreational value for the area is the access along the causeways and their use as walking tracks.

4.1.5 Vegetation

The north-south and east-west causeways both comprise gravel track, grass, flax and toetoe, pictured in Figure 13 below. There is no other vegetation of significance in this area.

Figure 13: View east across the east-west causeway

Wildland Consultants undertook a mapping exercise of vegetation located around the lagoons in 2009, which is still relevant today, and is presented in Figure 14. Hawksbury Lagoon Society are embarking on a native planting regeneration programme around the lagoons, which supports this previous work of Wildland Consultants.

Figure 14: Vegetation mapping northern lagoon (Source: Wildland Consultants)

4.1.6 Access

The causeways are publicly accessible and are popular for regular use as local walking tracks.

4.1.7 Designations / Overlays / Controls / Notations

The lagoon system has significant cultural and ecological value. Hawksbury Lagoon is defined as a Regionally Significant Wetland in the Regional Plan: Water for Otago.

Hawksbury Lagoon is defined as a Natural Inland Wetland under the National Policy for Freshwater Management (NPS-FM).

The eastern bank of the causeway running north south, between the lagoons and Post Office Creek is within the coastal marine area and is subject to a Statutory Acknowledgement made under the Ngai Tahu Claims Settlement Act 1998.

Figure 15: Schedule 9 Regionally Significant Wetlands & Wetland Management Areas: 58 Hawksbury Lagoon (Map 56)

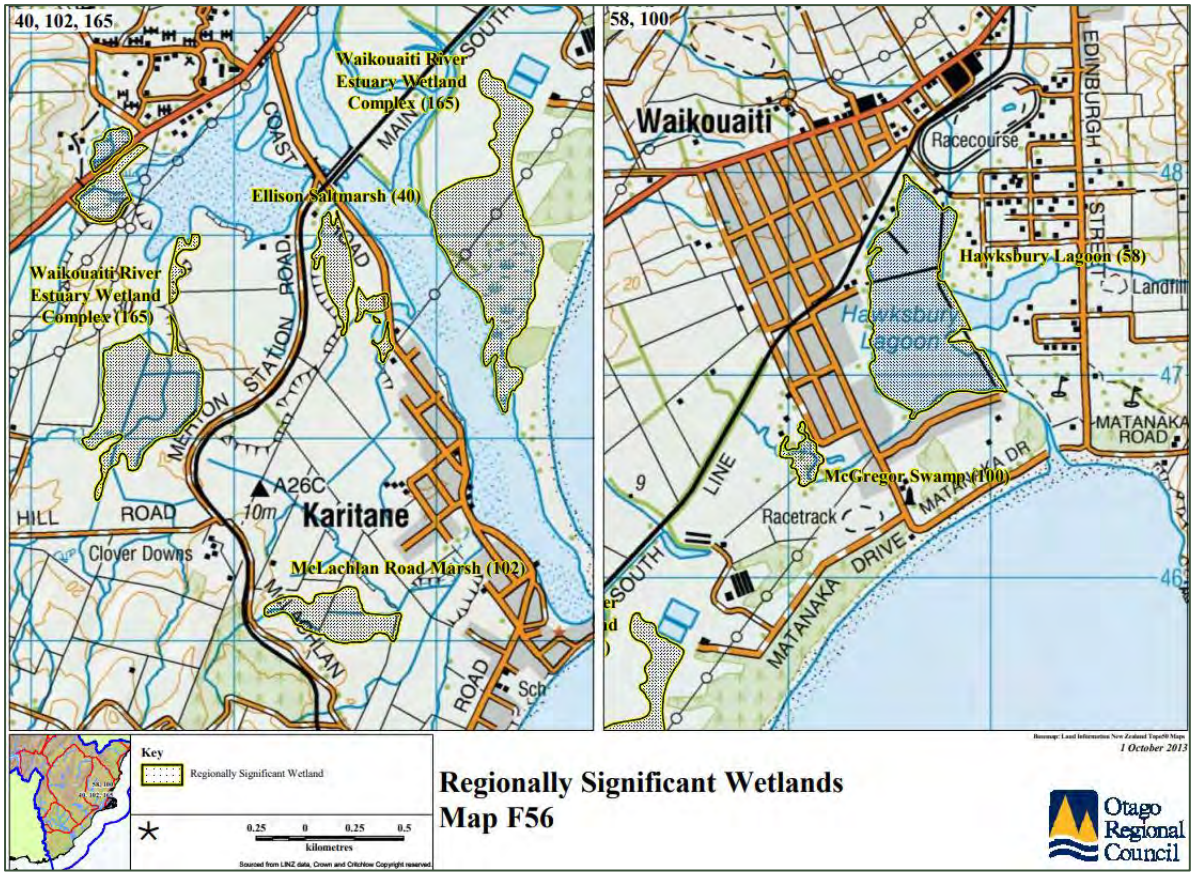
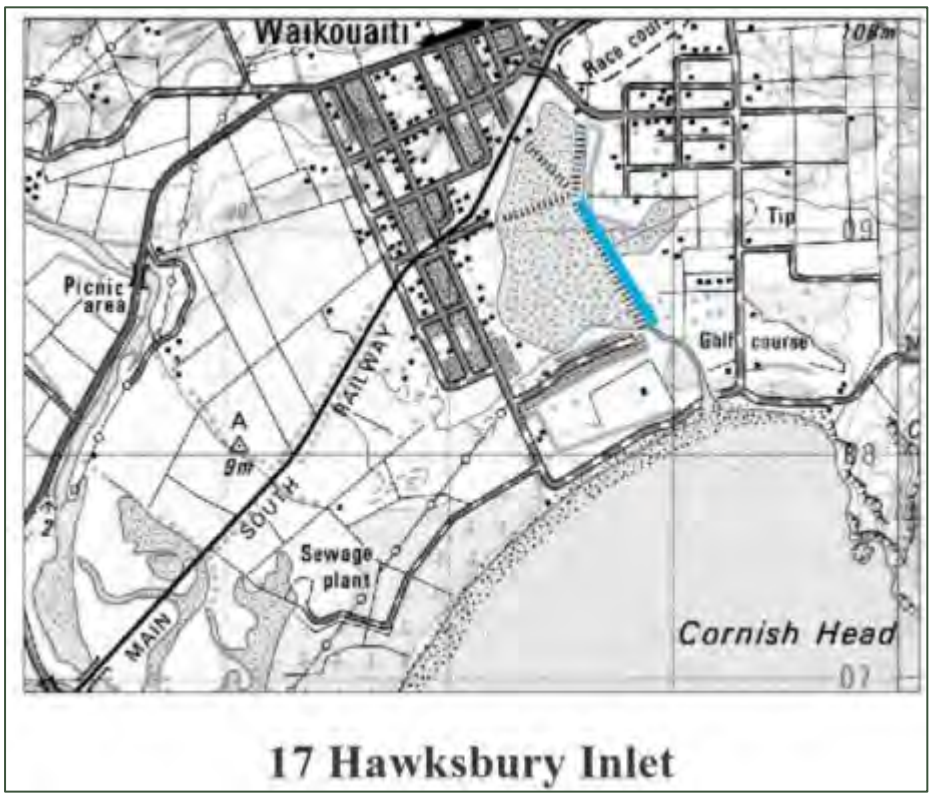


Figure 16: Schedule 12 Coastal Marine Boundaries: 17. Hawksbury Inlet



4.2 Surrounding environment

The area surrounding the lagoons comprises residential properties to the west and southwest (the latter of which are prone to flooding from the southern lagoon when the existing single culvert does not empty effectively).

Waikouaiti Racecourse is a low-lying piece of land which sits to the north of the lagoons, and where stormwater volumes accumulate and then feeds into Post Office Creek running north south, along the eastern bounds of the lagoons. Waikouaiti Beach and the coast are located the south of the site.

The causeways are man-made structures, which comprise concrete and other material which has been built upon / maintained over the years to accommodate walking access.

5.0 Reasons for the application

The proposed disturbance of land and vegetation clearance near the margins of a natural inland wetland, and the installation of culverts and structures in or near to a natural inland wetland are specified infrastructure that requires resource consent under the NES-F.

The proposed sand level gauge at the mouth of Post Office Creek is a structure in the coastal marine area that requires a resource consent under the Regional Plan: Coast for Otago.

A detailed rules assessment is provided in Appendix A.

5.1 National Environmental Standard for Freshwater (NES-F)

As outlined in Appendix A, the proposed works under Phase 1 are near to a natural inland wetland and require resource consent under the NES-F.

Land disturbance, and vegetation clearance within a 10m setback from a natural inland wetland are both **discretionary activities** under Regulation 45.

Placement and use of a culvert is a **discretionary activity** under Regulation 71, and placement and use of the passive flap gate is a structure that is a **non-complying activity** under Regulation 74.

5.2 Regional Plan: Coast for Otago

As outlined in Appendix A, the installation of the sand level gauge, proposed to be located in the mouth of Post Office Creek, around the barrier area, is considered to be a **discretionary activity** under Rule 8.5.1.9 of the Regional Plan: Coast for Otago.

The proposed level gauge will be located within the coastal marine area (CMA). It will protrude approximately 1.5m in height and will be constructed from durable, graduated timber with clearly marked reference levels at regular 5 or 10cm intervals.

5.3 Overall activity status

The proposed activity is a permitted activity under the Otago Regional Plan: Water, as presented in section 3.3 above. The installation of culverts, installation of water level gauges and the bed disturbance all sit within permitted activity rules. However, under the Regional Plan: Coast for Otago, the installation of the sand level gauge is a discretionary activity and under the NES-F the land disturbance is a discretionary activity, and the installation of the passive flap gate is a non-complying activity.

Overall, resource consent is required for a **non-complying activity**.

6.0 Assessment of effects on the environment

6.1 Introduction

Having reviewed the relevant plan provisions, visited the site and taking into account the matters that must be addressed by an assessment of effects on the environment as outlined in clause 7 of Schedule 4 of the Act, the effects that warrant consideration as part of this application are listed below.

As this application is for a **non-complying activity**, the relevant effects that the consent authority can consider are not restricted. Notwithstanding the ability of the consent authority consider all effects, the following effects are considered particularly relevant:

- Effects of construction
- Effects on hydrology
- Effects on cultural values
- Effects on ecological values
- Effects on water quality
- Effects on natural hazard risks

- Effects on natural character
- Effects on access
- Positive effects

An assessment of these effects, that corresponds with the scale and significance of the effects that the proposed activity may have on the environment, is provided below. Clause 7(2) notes that the requirement to address matters in the assessment of effects on the environment is subject to the provisions of any policy statement or plan. The relevant documents are also assessed in this report.

6.1.1 Permitted baseline

The “permitted baseline” is relevant to the assessments under sections 95A to 95G and 104 of the Act. Under these sections, the consent authority may disregard an adverse effect on the environment if a national environmental standard or the plan permits an activity with that effect. This is the permitted baseline. It is only the adverse effects over and above those forming a part of the baseline that are relevant when considering an application.

The purpose of the permitted baseline test is to isolate, and make irrelevant, the effects of activities on the environment that are permitted by the plan. When applying the baseline, such effects cannot then be taken into account when assessing the effects of a particular resource consent application. The baseline has been defined by case law as comprising the “existing environment” and non-fanciful (i.e., credible) activities that would be permitted as of right by the plan and/or national environmental standard in question.

In this case, the permitted baseline relevant to this application is that the culverts are permitted where at least 25% of the culvert’s diameter is below the level of the bed. While the invert of the existing culvert is at or close to the level of the bed it often has a solid barrier placed at its end that prevents fish passage. The proposed culvert design will not meet the requirement for at least 25% of the diameter being below the level of the bed and is a discretionary activity under Regulation 71 of the NES-FW. The purpose of the culverts is to alleviate flood flows and so to achieve this it is located above the usual water level of the lagoon, and above the existing outflow culvert. In this instance then, the establishment of culverts is a permitted activity subject to standards that is relevant to the permitted baseline. It is the effects relating to preventing fish passage except in flood conditions that are most relevant beyond the permitted baseline.

6.1.2 Receiving environment

In assessing the potential effects on the environment, the “receiving environment” for effects must be considered.

The receiving environment is a mandatory consideration that is defined by case law, and it is the environment beyond the site upon which a proposed activity might have effects. This includes the future state of the environment upon which effects will occur, including:

- the environment as it might be modified by the utilisation of rights to carry out permitted activities; and
- the environment as it might be modified by implementing resource consents that have been granted at the time a particular application is considered, where it appears likely that those resource consents will be implemented.

In this case, the receiving environment is as described in Section 4.0 of this report.

6.1.3 Other considerations

Sections 95D(d) to 95D(e) and 104(3)(a) of the Act require that assessments must disregard:

- trade competition, or the effects of trade competition; and
- any effect on a person who has given written approval to this application.

Trade competition is not relevant to this application, but written approval is. Written approvals are being sought from:

- Department of Conservation (DOC)
- Kati Huirapa Rūnaka ki Puketeraki via Aukaha
- Otago Fish and Game
- Hawksbury Lagoon Incorporated Society.

At the time of lodgement, written approvals have not been received however will be provided when available.

6.2 Effects of Construction

The culverts will be installed via mechanical excavation of the causeway, with machinery located on the causeway. No machinery will be located within the wet bed of the southern lagoon or of Post Office Creek.

A robust Erosion and Sediment Control Plan (ESCP) will be prepared as part of the Construction Management Plan (CMP), ensuring minimal impact on water quality on Post Office Creek or the southern lagoon. A full ESCP and CMP will be prepared and submitted to ORC prior to works commencing. The ESCP will following guidelines set out in *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Regional* (GD05)

The CMP and ESCP will include but not be limited to including the following components:

- No machinery will work from within the wet area of Southern Lagoon or Post Office Creek.
- All wet concrete will be restricted to the causeway area, and no wet concrete or dry concrete dust will enter the water body of Southern Lagoon or Post Office Creek.
- Sediment control measures will be in place prior to, during and after construction, for example silt sausages and silt curtains around the work area, in Southern Lagoon and in Post Office Creek.
- Work will ideally not take place during August – September being key spawning or nesting seasons – however these periods for various species straddle most of the calendar year. An ecologist will be required to be on site during construction set up, given the lack of defined window for an initial assessment and determining whether additional mitigation measures such as relocation or delaying works is necessary..
- Work will not take place during sensitive ecological periods, such as breeding seasons for native bird species or peak aquatic life cycles. An ecologist will be required to be on site pre construction and during construction.
- Weather forecasting will be carefully followed, work will not take place immediately before, during, or following significant rain events, when water levels in the Southern Lagoon and in Post Office Creek are expected to be particularly high. Earthworks or

other disturbance activities within or adjacent to the lagoon and barrier system must not be undertaken during or within 48 hours following significant rainfall events. A 'significant rainfall event' is defined as:

  - A cumulative rainfall of 20 mm or more within a 24-hour period (estimated), or
  - Any rainfall event that results in observable surface runoff or elevated water levels within the lagoon, estuary, and the racecourse.
  - This threshold aligns with ORC best practice for erosion and sediment control and is consistent with guidance from the Natural Hazards. The teams must consult local rainfall data (e.g., NIWA or ORC website) and assess site conditions before starting or resuming activities.

- Work will not take place immediately before during or after significant King High Tide events when the tidal surge along Post Office Creek is expected to be significant. Flood mitigation measures and activities that may disturb the estuary mouth barrier or adjacent lagoons (e.g., dredging, excavation, or vehicle access) must not be undertaken during King High Tide events. For the purposes of this condition, a 'King High Tide' is defined as a high tide that exceeds the combined amplitude of the principal tidal constituents M2 (principal lunar), S2 (principal solar), and N2 (elliptic lunar), as determined by NIWA. These events typically occur 2 - 4 times per year, coinciding with the alignment of the Earth, Moon, and Sun during perigean spring tides. A schedule of predicted King Tide dates should be consulted annually to inform planning and avoid high-risk periods for coastal inundation and habitat disturbance.
- The site and track surface will be reinstated on completion of works.

A traffic management plan (TMP) will be prepared, submitted to and approved by ORC prior to works commencing. This includes signage indicating ‘no through route’ for pedestrian access through the causeway during construction, site access arrangements, and includes fencing-off arrangements for ensuring pedestrian safety.

The potential effects of construction of the culverts on Post Office creek and on the southern lagoon are considered to be less than minor, conditional to a CMP and ESCP that includes detailed sediment control measures and is submitted to and certified by the consent authority prior to construction.

6.3 Effects on hydrology

The proposed culverts are designed for one way flushing of the southern lagoon into Post Office Creek after significant rain events. Their purpose is to assist in emptying the lagoon to return to levels around the existing culvert height more effectively in flood events. While there is not a precise ‘normal’ water level threshold associated with this, but rather that he proposed culverts offer additional overflow for levels over and above the ‘usual hydrological’

Detail around proposed minimum and maximum water levels and how this might be controlled / upheld, will be developed as part of the Lagoon management Pan and addressed in Phase 2.

The hydrological impact on the lagoons themselves from the Phase 1 overflow culverts is positive in that assistance is provided for outflow during significant events and minimising the necessity for emergency opening of the causeway in extreme instances. ORC Scientists note in their memo that no hydraulic modelling or capacity assessments have been undertaken and so the volumes of flood water potentially alleviated by the proposed culverts is not quantified. Modelling and data gathering can be undertaken as part of the Lagoon

Management Plan, this lack of detailed data does not impede the benefits of the overflow culverts proposed for Phase 1. The culverts are anticipated to provide some flood mitigation benefit through providing additional flow capacity and are an achievable short-term measure to alleviate potential flooding of residential properties, whilst a long-term management plan is being developed.

Under typical hydrological conditions the proposed culverts will have no impact given they sit higher than the existing culvert.

The flap gates proposed on the Post Office Creek side of the four new culverts (i.e. downflow of the outflow culverts) will prevent tidal surge flows from Post Office Creek from flowing into the southern lagoon over and above those already flowing in through the existing culvert.

The effects of proposed phase 1 works on hydrology are considered to be less than minor.

6.4 Effects on cultural values

A cultural assessment has not been carried out on the proposed Phase 1 works, however ORC have engaged directly with Kati Huirapa Rūnaka ki Puketeraki and walked through the site together introducing the proposed flood effect mitigation works, and the proposed phased approach. No specific issues were raised by Rūnaka. The applicant is now engaging formally via Aukaha. Aukaha were formally consulted on the proposal at the time of submitting.

It is proposed that a Lagoon Management Plan be developed. ORC wish to lead the development and coordination of a Hawksbury Lagoon Management Plan to provide a coordinated approach to managing water levels – whilst also creating and achieving ecological, cultural and flood management related goals and associated actions.

As part of this first phase, ORC seeks to commence the coordination and development of a multi-party Management Plan. Stakeholders would be invited to collaborate in developing this Management Plan, and would include but not be limited to Rūnaka, Department of Conservation, Dunedin City Council, the Waikouaiti Coast Community Board, Friends of Hawksbury Lagoon. The Management Plan would be collaboratively developed to identify objectives, roles and proposed actions; this would inform the scoping for Phase 2 flood mitigation works as well as future management objectives for the Lagoon system.

6.5 Ecological effects

6.5.1 Effects of Construction

The CMP and the ESCP will include measures to mitigate impacts on flora fauna and on habitat. As presented in section 6.2 above, the following measures will be undertaken, these will mitigate potential ecological impacts:

- Work will be undertaken outside of spawning and nesting seasons.
- No machinery will work from within the wet area of Southern Lagoon or Post Office Creek.
- All wet concrete will be restricted to the causeway area, and no wet concrete or dry concrete dust will enter the water body of Southern Lagoon or Post Office Creek.
- Sediment control measures will be in place prior to, during and after construction, for example silt sausages and silt curtains around the work area, in Southern Lagoon and in Post Office Creek.

- Work will not take place during sensitive ecological periods, such as breeding seasons for native bird species or peak aquatic life cycles.
- An ecologist will be present on site at the site during construction set up.

6.5.2 Effects of culverts and water gauges

The ORC Science Team state in their memo that despite its current degraded condition, the lagoon remains a vital habitat for waterfowl, fish, and other aquatic life. They state that the ecological integrity of the lagoon is primarily sustained by optimal and minimum water levels, as well as its brackish water conditions. The proposed culverts incorporating flap gates at the Post Office Creek end will ensure that the lagoon's mixing regimes and salinity gradient (brackish condition) will remain unaffected.

Fish passage is not specifically provided for as part of the culvert design; their positioning above the level of the existing culvert and above the 'usual' water levels. t. The proposed installation of culverts within Hawksbury Lagoon and Post Office Creek has the potential to affect native aquatic and bird species, particularly during high flow and flood events. Key fish species such as inanga, longfin eel, and common bully rely on unimpeded waterway connectivity for migration and spawning, and poorly designed culverts may restrict movement due to high velocities, perched outlets, or inadequate water depths. Similarly, bird species including pied stilts, royal spoonbills, and various waterfowl may be impacted by altered hydrological regimes that affect nesting and foraging habitats, especially during the critical breeding season (August to February). To mitigate these effects, culverts are designed to maintain existing (pseudo-natural) water level and flow conditions by leaving the existing culvert unaltered. Also, construction (phase I) is timed to avoid peak ecological sensitivity periods.

The significant habitat for bird life will not be impacted upon by the culverts or the water level gauges. Water level gauges will be steel or wood staked into the bed of the lagoon, this while intrusive will be localised and is not expected to have any impact on habitat, flora or fauna.

The proposed culverts are considered to have a less than minor impact on ecological values.

The water level gauges, potential development of minimum water levels, and development of a Lagoon Management Plan will provide supportive outcomes for the maintenance or improvement of ecological values of the lagoon system.

6.6 Effects on water quality

The hydrological relationship between the lagoons, Post Office Creek and the stormwater inflows into the lagoons mean that water quality varies across the lagoon system and varies within each lagoon at different times. Water quality effects during the construction phase are dealt with in section 6.2 above.

Once established, the proposed culverts will not create changes to water quality, in that they will not result in changes to the hydrological relationship between the lagoons and Post Office Creek, and minimum water levels will not be impacted upon as a result of the culverts due to their positioning above the existing culvert.

The water level gauges, and subsequent potential development of minimum water levels as part of phase 2, and development of a Lagoon Management Plan will help to provide an improved consistency in water quality.

The effects of the proposed culverts on water quality are considered to be less than minor.

6.7 Effects on natural hazard risks

6.7.1 Effects of construction

The construction methodology, and associated effects mitigation measures described in sections 2.4 and 6.2 mitigate against potential impacts on natural hazards. Of particular relevance are the erosion and sediment control measures, and work schedule around weather forecasting.

Effects of natural hazards resulting from construction are considered to be less than minor the proposed mitigation measures, the temporary nature of the effects, and their minimal scale.

6.7.2 Effects of culverts and water gauges

This proposal specifically seeks to address adverse flooding events experienced by properties that surround the Lagoons, and to provide greater resilience to climate change impacts.

The proposed culverts will have a positive effect on the mitigation of flood effects, in particular for residential properties on the southwest banks of the southern lagoon which have experienced flooding during significant rain events when the southern lagoon cannot empty fast enough through the sole existing culvert.

There will be no other effects related to natural hazards as a result of the proposed culverts. The water level gauges will have no impact of flows or flood potential, they will be steel or wood staked into the lagoon bed and will have no effects on the surface water.

Effects on natural hazards are expected to be positive.

6.8 Effects on natural character

The proposed culverts will not detract from the natural character of the site and surrounds. The causeways are manmade, and the concrete and rubble foundations are visible from the walking tracks. There are existing culverts accommodated within the causeway, each with informal gates comprising waratahs and wooden boards, all of which are clearly visible from the walking tracks. The proposed culverts will not appear visually unexpected or diverge from the existing natural character of the area.

The proposed culverts will not impact on minimum lagoon water levels, and will not significantly alter naturally occurring fluctuations in the levels of the lagoon system that could be considered to adversely affect their natural character. Effects of construction on natural character will be temporary. There will be machinery located on the causeway and excavation and sediment control measures in situ. The effects are considered less than minor given the temporary nature of this.

6.9 Effects on access

The causeway is a publicly accessible walking track, and the proposed works location does not offer an alternative ‘through route’ north south for pedestrians. The CMP will include a TMP which will include signage for pedestrians at the northern and southern ends of the causeway.

Public access through the causeway will be temporarily arrested during the constriction works. This will be short term (to be confirmed – but likely days rather than weeks).

Following completion of works the causeway access will return as is and the track surface reinstated.

Given the short-term period of the reduced public access, effects on access are considered to be minor.

6.10 Positive effects

The proposal will generate multiple positive benefits.

Environmental:

The proposal will generate positive effects on the environment, being the mitigation of flood effects .

Social effects:

The residential properties on the southwestern boundary of the lagoon are anticipated to benefit in particular from flood effects mitigation, although no modelling has been undertaken as part of this phase 1 proposal, the additional overflow ability provided by the proposed culverts will alleviate flood levels faster than the current single culvert in the southern lagoon can.

Health and Safety:

The historic requirement in emergency circumstances for community members to be required to assist in ‘opening the causeway’ to relieve flood levels will be reduced in probability and frequency with the ability for the southern lagoon to lower its water levels more quickly. Community members will benefit from not being required to take responsibility or health and safety risks in undertaking these emergency measures.

Data provision for water levels management (for development of Phase 2):

The water level gauges will provide positive effects in enabling data to be gathered and monitored to inform the development of future minimum lagoon levels as part of Phase 2, enabling ecological benefits.

Collaboration in maintaining enhancing ecological and cultural values:

The associated development of a Lagoon Management Plan which is volunteered as a condition of this consent will provide multiple benefits to stakeholders and the community in developing a cohesive plan for managing water levels to protect ecological cultural values and provide flood mitigation effects.

6.11 Conclusion

Overall, based on the preceding assessment, the effects of the proposed activity on the environment are **less than minor**. Positive and proactive construction management and erosion and sediment control plans form a key part of this application to mitigate any potential effects during the construction phase of the works. These plans are proposed to be submitted to the consent authority for certification prior to the commencement of site works.

7.0 Statutory assessment

Section 104(1) of the Act requires that, when considering a resource consent application, the consent authority must have regard to the matters set out in subsections (1)(a), (ab), (b) and (c). These matters are addressed below, and all are subject to Part 2.

7.1 Section 104(1)(a) (Actual and potential effects)

Section 104(1)(a) requires the consent authority to have regard to "any actual and potential effects on the environment of allowing the activity".

As assessed in Section 6.0 of this report above, the proposed activity will have actual and potential adverse effects on the environment that are less than minor. The proposed works also offer substantial positive effects via the mitigation of flood effects in the vicinity of the Lagoons.

7.2 Section 104(1)(ab) (Offsetting or compensation)

Section 104(1)(ab) requires that the consent authority to consider "any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity".

In this case, the proposed activity is not of a scale or nature that would require specific offsetting or environmental compensation measures to ensure positive effects on the environment.

7.3 Section 104(1)(b) (Statutory documents)

Section 104(1)(b) requires the consent authority to have regard to any relevant provisions of the following:

- a national environmental standard;
- other regulations;
- a national policy statement;
- a New Zealand coastal policy statement;
- a regional policy statement or proposed regional policy statement; and
- a plan or proposed plan.

An assessment of the relevant statutory documents that corresponds with the scale and significance of the effects that the proposed activity may have on the environment is provided below.

7.3.1 National Environmental Standard for Freshwater (NES-F)

The NES-F is a relevant consideration to this application. The proposed works for Phase 1 fall within *Subpart 1 Natural inland wetlands* - wetlands and within Construction of specified infrastructure, and *Subpart 3 – Passage of fish affected by structures*, given the nature and location of works.

Regulations 45, 58-65, 70 and 71 are relevant to the proposed works under Phase 1.

Land disturbance, and vegetation clearance within 10m setback from a natural wetland are both **discretionary activities** under Regulation 45. Disturbance will kept to a minimum, excavation of the causeway will be undertaken from the causeway, with no work being undertaken in the wet bed area of the Lagoon or Post Office Creek. Vegetation clearance will be minimal – affecting grass only. ESCP measures will be in place during construction, and the causeway surface will be reinstated on completion of works.

Placement and use of a culvert is a discretionary activity under Regulation 71. The culvert will not meet the thresholds of proximity to the bed of the watercourse under Regulation 70 – these culverts are specifically for flood flow and will not be located on the bed of the lagoon or Post Office Creek.

Placement and use of the passive flap gate is a non-complying activity under Regulation 74. The flap gates will not enable fish passage from Post Office Creek to the lagoon, however the flows in that direction are not anticipated in usual hydraulic conditions. The existing culvert which sits below the proposed four new culverts will not be changed as a result of the proposal. It is considered that fish passage while not provided for specifically, will not be impacted upon, the flows through the new culverts will be occurring during significant flood periods only. The status for fish passage at this location of the causeway will remain unchanged by the four elevated flood relief culverts.

Regulation 45 (6) requires any resource consent for a discretionary activity must be assessed against the effects management hierarchy. In this instance the land disturbance is a discretionary activity, associated with the construction of the culverts and flap gates which are discretionary and non-complying respectively.

The proposal offers benefits for local residential properties, and the lagoon system regards flood effects mitigation. The adverse effects associated with the proposal are assessed as being less than minor. The proposal is considered to meet the effects management hierarchy test under 45 (6), the assessment of which is presented below.

Effects management hierarchy, in relation to natural inland wetlands and rivers, means an approach to managing the adverse effects of an activity on the extent or values of a wetland or river (including cumulative effects and loss of potential value) that requires that:	
(a) adverse effects are avoided where practicable;	Adverse effects on water quality and habitat are avoided via the construction methodology - no machinery will be located in the wet bed of Post Office Creek or the Southern Lagoon.
(b) where adverse effects cannot be avoided, they are minimised where practicable;	Potential for adverse effects associated with sediment or erosion will be minimised through an ESCP. Key components of the ESCP are presented in this report, a full ESCP will be prepared, submitted to, and approved by ORC prior to construction. Potential adverse effects associated with construction will be minimised through a CMP. Key components of the CMP include no machinery in the wet bed areas with side of the causeway, and a comprehensive TMP to manage pedestrian access and associated public safety.
(c) where adverse effects cannot be minimised, they are remedied where practicable;	Potential adverse effects are minimised as described above. Sediment and erosion control measures will be in place during construction; no construction will take place from the wet bad of Post Office Creek or the Southern Lagoon.
(d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, aquatic offsetting is provided where possible;	There are no residual adverse effects identified as part of the proposal – the construction period is short term and associated potential effects of this are minimised. Effects on fish passage are considered less than minor given the culverts will be sitting above the 'usual' water level, and above the existing culvert – there are no changes in provision or in effects regards fish passage.
(e) if aquatic offsetting of more than minor residual adverse effects is not possible, aquatic compensation is provided; (f) if aquatic compensation is not appropriate, the activity itself is avoided.	No offsetting or compensation is required, the proposal is for 4 overflow culverts and water levels gauges with minimal changes to the site that does not warrant offsetting or compensation

7.3.2 New Zealand Coastal Policy Statement

The proposed works are consistent with the objectives and policies set out in the NZCPS, the natural character of the coastal environment is protected, as are local ecosytems and water quality. The coastal area is a statutory acknowledgement - Te Tai O Arai Te Uru (Otago Coastal Marine Area).

ORC acknowledges the cultural significance of the area, and so it has engaged with Rūnaka and is seeking written approval via Aukaha.

The proposal does not appear to raise any matters of concern in respect of the NZCPS.

7.3.3 National Policy Statement for Freshwater Management

The proposed works are assessed against the NPS-FM below. Section 1.3 (5) of the NPS-FM presents the hierarchy of obligations of Te Mana o te Wai:

(a) first, the health and well-being of water bodies and freshwater ecosystems

(b) second, the health needs of people (such as drinking water)

(c) third, the ability of people and communities to provide for their social, economic,

and cultural well-being, now and in the future.

The proposed works assist in providing for the health and wellbeing of the ecosystem of Hawksbury Lagoons with water level gauges that provide water level data to assist in developing Phase 2 and its more intricate management of minimum water levels for sustained and improved ecological health.

The development of a Lagoon Management Plan will collaboratively set out objectives, roles and actions including towards sustaining and enhancing ecological values of the lagoon system, which impact positively on this habitat.

The proposed construction methodology includes mitigation measures for managing potential sediment control. The assessment of effects concludes less than minor impacts.

The proposed works have some positive impacts on people and community wellbeing by way of the following:

Social:

The residential properties on the southwestern boundary of the lagoon are anticipated to benefit in particular from flood effects mitigation, although no modelling has been undertaken as part of this phase 1 proposal, the additional overflow ability provided by the proposed culverts will alleviate flood levels faster than the current single culvert in the southern lagoon can.

Health and Safety:

The historic requirement in emergency circumstances for community members to be required to assist in ‘opening the causeway’ to relieve flood levels will be reduced in probability and frequency with the ability for the southern lagoon to lower its water levels more quickly. Community members will benefit from not being required to take responsibility or health and safety risks in undertaking these emergency measures.

Collaboration in maintaining enhancing ecological and cultural values:

The associated development of a Lagoon Management Plan which is volunteered as a condition of this consent will provide multiple benefits to stakeholders and the community in developing a cohesive plan for managing water levels to protect ecological cultural values and provide flood mitigation effects.

7.3.3.1 Objective / Policy

Objectives and Policies	Comment
Policy 1 Freshwater is managed in a way that gives effect to Te Mana o te Wai.	As described in the NPS-FM, Te Mana o te Wai encompasses 6 principles relating to the roles of tangata whenua and other New Zealanders in the management of freshwater. To give effect to Te mana o te Wai and its principles, the applicant has contacted Runaka directly in the development of the propsed works, and have consulted via Aukaha to understand how this proposal may impact on cultural values such as kaitiakitanga, mauri and Manaakitanga. The objectives and policies of the Kāi Tahu Ki Otago Natural Resource Management Plan (2005) (KTKO NRMP) relating to water seek to protect mauri of all wai. Management practises will be in place to ensure the construction effects on wai will be managed in a way that minimises adverse effects. The Assessment of Water Quality effects associated with this work concludes that there will be less than minor effects on water quality of Hawksbury Lagoon or Post Office Creek. The proposal is considered to be consistent with the outcomes sought in the relevant objectives and policies of the KTKO NRMP.
Policy 2 Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.	Tangata whenua will be given the opportunity to formally comment on the proposal after the consent application is lodged. Local Rūnaka were engaged with directly by the ORC prior to lodgement. In lieu of having a formal comment on the proposal prior to lodgement, we have considered the KTKO NRMP while seeking written approval to the specific works via Aukaha.
Policy 3 Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments. Policy 5 Freshwater is managed (including through a National Objectives Framework) to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.	Effects on receiving environments have been assessed by ORC Scientists as summarised in the AEE. The various aspects of the works have been considered to ensure that adverse effects are minimised. Impacts on the receiving environment including on water quality are concluded as being low. The proposal aligns with these policies.

Objectives and Policies	Comment
Policy 6 There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted Policy 7 The loss of river extent and values is avoided to the extent practicable.	There will be no loss in extent or values of wetlands or rivers. The proposed works will ensure ongoing protection of Hawksbury Lagoon through assisting in alleviating flood flows leaving the lagoon, and in providing gauges to better assist in understanding the lagoon levels. Potential effects of sediment discharge impacts during maintenance works are mitigated through an ESCP. The proposal aligns with these policies.
Policy 9 The habitats of indigenous freshwater species are protected Policy 10 The habitat of trout and salmon is protected, insofar as this is consistent with Policy 9.	The ecology and hydrology assessment concludes that effects on these habitats will be minimal. The proposal aligns with these policies.
Policy 12 The national target (as set out in Appendix 3) for water quality improvement is achieved.	The effects on water quality within the Lagoon system or Post Office Creek site are assessed as less than minor.
Policy 13 The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends.	A Lagoon Management Plan for the lagoon system is proposed to be developed by ORC in partnership with stakeholders to better manage the ecological values. The development of this plan will comprise objectives roles and actions regarding sustaining and enhancing ecological health of the lagoon system as well as other objectives. This proposal seeks to install culverts to assist in avoiding the potential for emergency opening of the causeway in flood events, and to install water level gauges to develop data to input to the proposed management plan.

7.3.4 Otago Regional Policy Statements

There are two Otago Regional Policy Statements currently, Otago's Regional Policy Statement (ORPS) which became fully operative on 4 March 2024 and the proposed Otago Regional Policy Statement 2021 (pORPS 2021).

An assessment against the relevant objectives and policies of the Otago Regional Policy Statement 2019, which became fully operative on 4 March 2024, is provided below.

Objectives and Policies	Comment
Chapter 2 – Kāi Tahu Values	
Objective 2.2 *Kāi Tahu values, interests and customary resources are recognised and provided for.*	Kāi Tahu's values are recognised - Rūnaka have been engaged directly by ORC. Formal

Objectives and Policies	Comment
Policy 2.2.1 *Manage the natural environment to support Kāi Tahu wellbeing by all of the following:* *Recognising and providing for their customary uses and cultural values in Schedules 1A and B; and,* *Safeguarding the life-supporting capacity of natural resources.*	consultation is now being undertaken via Aukaha. The applicant recognises that Hawksbury Lagoon has significant cultural value. On the basis of engagement in respect of this proposal to date, it is anticipated that the proposed works will support these values.
Chapter 3 – High Quality Natural Resources and Ecosystems	
Objective 3.1 *The values (including intrinsic values) of ecosystems and natural resources are recognised and maintained, or enhanced where degraded.*	The ORC Science Team's assessment of hydrological and ecological effects concludes that these impacts are minor. Values will be maintained and enhanced through the proposed development of a Hawksbury Lagoon Management Plan.
Policy 3.1.1 *Safeguard the life-supporting capacity of fresh water and manage fresh water to:* *Maintain good quality water and enhance water quality where it is degraded, including for:* *Important recreation values, including contact recreation; and,* *Existing drinking and stock water supplies;* *Maintain or enhance aquatic:* *Ecosystem health;* *Indigenous habitats; and,* *Indigenous species and their migratory patterns.* *Avoid aquifer compaction and seawater intrusion;* *Maintain or enhance, as far as practicable:* *Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers;* *Coastal values supported by fresh water;* *The habitat of trout and salmon unless detrimental to indigenous biological diversity; and* *Amenity and landscape values of rivers, lakes, and wetlands;* *Control the adverse effects of pest species, prevent their introduction and reduce their spread;* *Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and,*	Freshwater and freshwater ecosystems will not be degraded as part of the proposal as confirmed in the Assessment of Effects. The proposed works provide mitigation of flood effects by reducing flood levels in the southern lagoon. The water level gauges will enable greater understanding of lagoon water levels. The proposal aligns with this policy.

Objectives and Policies	Comment
Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water. Policy 3.2.16 *Protect the function and values of wetlands by all of the following:* *Maintaining the significant values of wetlands;* *Avoiding, remedying or mitigating other adverse effects;* *Controlling the adverse effects of pest species, preventing their introduction and reducing their spread;* *Encouraging enhancement that contributes to the values of the wetland;* *Encouraging the rehabilitation of degraded wetlands.*	The proposed culverts do not impact on the function or values of the lagoon system. They will assist in emptying flood flows from the Southern Lagoon. The proposal aligns with this policy.

An assessment against the relevant objectives and policies of the Proposed Otago Regional Policy Statement 2021 has been provided below.

Objectives and Policies	Comment
LF – Land and freshwater	
Objectives LF-WAI-O1 *water is the foundation and source of all life – na te wai ko te hauora o ngā mea katoa,* *there is an integral kinship relationship between water and Kāi Tahu whānui, and this relationship endures through time, connecting past, present and future,* *each water body has a unique whakapapa and characteristics,* *water and land have a connectedness that supports and perpetuates life, and* *Kāi Tahu exercise rakatirataka, manaakitaka and their kaitiakitaka duty of care and attention over wai and all the life it supports.*	The proposed maintenance works provide positive effects regarding protecting the function and values of the wetland area of Hawksbury Lagoon by addressing flood levels in the southern lagoon during and following significant rain events. The proposal aligns with this policy. To give effect to Te mana o te Wai and its principles, the applicant has engaged directly with the Rūnaka, and has consulted on the consent proposal via Aukaha to understand how this proposal may impact on cultural values such as kaitiakitanga, mauri and Manaakitanga.

Objectives and Policies	Comment
Policies LF-WAI-P1 – Prioritisation *first, the health and well-being of water bodies and freshwater ecosystems, te hauora o te wai and te hauora o te taiao, and the exercise of mana whenua to uphold these,* *second, the health and well-being needs of people, te hauora o te tangata; interacting with water through ingestion (such as drinking water and consuming harvested resources) and immersive activities (such as harvesting resources and bathing), and* *third, the ability of people and communities to provide for their social, economic, and cultural wellbeing, now and in the future.* Policies LF-WAI-P2 – Mana Whakahaere *Recognise and give practical effect to Kāi Tahu rakatirataka in respect of fresh water by:* *facilitating partnership with, and the active involvement of, mana whenua in freshwater management and decision-making processes,* *sustaining the environmental, social, cultural and economic relationships of Kāi Tahu with water bodies,* *providing for a range of customary uses, including mahika kai, specific to each water body, and* *incorporating mātauraka into decision making, management and monitoring processes*	We have also addressed the proposal in relation to the relevant Iwi Management plan. The Kāi Tahu Ki Otago Natural Resource Management Plan (2005) sets out a series of key issues in the region which have the potential to impact on cultural values. The proposal is consistent with the outcomes sought in the relevant objectives and policies of the IMP. ORC have engaged directly with Kati Huirapa Rūnaka ki Puketeraki and walked through the site together introducing the proposed flood effect mitigation works, and the proposed phased approach. requested for their feedback on the proposal at the time of submitting this application to ORC. Any update will be provided upon receipt of a response.

Objectives and Policies	Comment
Policies LF-WAI-P3 – Integrated management/ki uta ki tai *Manage the use of fresh water and land, using an integrated approach that is consistent with tikaka and kawa, that:* *(1) sustains and, to the greatest extent practicable, restores or improves:* *(a) the natural connections and interactions between water bodies (large and small, surface and ground, fresh and coastal, permanently flowing, intermittent and ephemeral),* *(b) the natural connections and interactions between land and water, from the mountains to the sea,* *(c) the habitats of mahika kai and indigenous species, including taoka species associated with the water bodies,* *(4) manages the effects of the use and development of land to maintain or enhance the health and wellbeing of freshwater, coastal water and associated ecosystems,* *(5) encourages the coordination and sequencing of regional or urban growth to ensure it is sustainable,* *(6) has regard to foreseeable climate change risks, and the potential effects of climate change on water bodies, including on their natural functioning,* *(7) has regard to cumulative effects, and* *(8) applies a precautionary approach where there is limited available information or uncertainty about potential adverse effects, in accordance with IM-P6.*	The AEE concludes less than minor effects on ecological and hydrological values and habitats. The water quality will not be impacted upon by the placement of the culverts, being situated above the existing inflow outflow culvert. Construction effects will be managed with sediment and control measures on both sides of the causeway structure, water quality will be protected from effects of construction. The hydrological links between the lagoons and Post Office creek will be maintained, the culverts will provide additional flood flow release capacity during significant rain events.
Policy LF–FW–P7 – Fresh water *Environmental outcomes, attribute states (including target attribute states), environmental flows and levels, and limits ensure that:* *(1) the health and well-being of water bodies and freshwater ecosystems is maintained or, if degraded, improved,* *(2) the habitats of indigenous species with life phases dependent on water bodies are protected and sustained.*	There will be no loss in extent or values of wetlands or rivers. The Assessments of effects on hydrology and water quality conclude that effects on existing habitats will be minor. Scheduling of works will avoid spawning and nesting periods.

7.3.5 Regional Plan: Water for Otago

Objectives and Policies	Comment
Objective 3.1 *The values (including intrinsic values) of ecosystems and natural resources are recognised and maintained, or enhanced where degraded.*	Ecological values of the Hawksbury Lagoon system will not be impacted by the proposed works. Furthermore, the development of a Phase Lagoon Management Plan will seek to enhance values.
Policy 3.1.1 *Safeguard the life-supporting capacity of fresh water and manage fresh water to:* *a. Maintain good quality water and enhance water quality where it is degraded, including for:* *i. Important recreation values, including contact recreation; and,* *ii. Existing drinking and stock water supplies;* *b. Maintain or enhance aquatic:* *i. Ecosystem health;* *ii. Indigenous habitats; and,* *Indigenous species and their migratory patterns*	Pedestrian access will be temporarily blocked through the north-south causeway during construction. This will be a short-term period (days only), and a TMP will include clear signage articulating the temporary changes to pedestrians at appropriate locations. The causeway surface will be reinstated immediately following works and there will be no impacts on recreation following completion of the works. The proposed culverts will not impact on the quality of water either in the lagoons or post Office Creek due to being located above the existing culverts. The AEE concludes ecological effects, effects on water quality and on amenity are less than minor. The proposal is consistent with this policy.
Objective 10.3.1 *Otago's wetlands and their individual and collective values and uses will be maintained or enhanced for present and future generations.* 10.3.2 *Otago's Regionally Significant Wetlands and their values and uses are recognised and sustained.*	The values of Hawksbury Lagoon are maintained as a result of the proposal. The culverts will mitigate flood effects on local residential properties.
Policy 10.4.1 Otago's regionally significant wetland values are: *A1 Habitat for nationally or internationally rare or threatened species or communities;* *A2 Critical habitat for the life cycles of indigenous fauna which are dependent on wetlands;* *A3 High diversity of wetland habitat types;* *A4 High degree of wetland naturalness;* *A5 Wetland scarce in Otago in terms of its ecological or physical character;* *A6 Wetland which is highly valued by Kai Tahu for cultural and spiritual beliefs, values and uses, including waahi taoka and mahika kai;* *A7 High diversity of indigenous wetland flora and fauna;*	The ORC Science Team including Senior Freshwater Ecologist, considers the impacts of the proposed Phase 1 works – culverts and water level gauges - on ecological values are less than minor. The hydrological linkages between the lagoons and Post Office Creek will be retained. The proposed water level gauges will assist in providing data to develop a potential minimum lagoon water level in the future to further enhance water quality and ecological values and habitats. ORC shall coordinate the development a Hawksbury Lagoon Management Plan. This will be a collaborative plan which will include (but not be limited to) input from Rūnaka,

Objectives and Policies	Comment
A8 Regionally significant wetland habitat for waterfowl; and *A9 Significant hydrological values including maintaining water quality or low flows, or reducing flood flows.*	Department of Conservation, Dunedin City Council, Waikouaiti Community Board, Otago Fish and Game, Hawksbury Lagoon Incorporated Society. The purpose of the Plan will be to set objectives, roles and responsibility and include actions, relating to (but not limited to) sustaining and enhancing ecological and cultural values, and considering flood mitigation measures for the lagoon system. The diversity of wetland habitats, degree of naturalness, ecological and hydrological values will not be impeded by Phase 1 works. The management plan will assist is providing a springboard for sustained maintenance and enhancement of these values going forwards.

The proposal is considered to be consistent with the outcomes sought in the relevant objectives and policies of the Regional Plan: Water for Otago.

7.3.6 Regional Plan: Coast for Otago

Objectives and Policies	Comment
Objective 8.3.1 *To recognise and provide for values associated with:* *(a) Areas of cultural significance; and* *(b) Areas of conservation value; and* *(c) Areas of public amenity;* *when considering structures within the coastal marine area.* Objective 8.3.2 *To preserve the natural character of Otago's coastal marine area as far as practicable from the adverse effects associated with structures.*	The design of the culverts does not impede on the conservation values of the Hawksbury Lagoon and Post Office Creek areas. Consideration of the cultural significance of the site has been given, and Rūnaka were engaged by ORC on the proposed works. Access along the north-south causeway will be temporarily disrupted during construction. There will be no impacts on access following the completion of construction, the causeway surface will be reinstated on completion of works. Amenity values will not be impacted upon, due to the minor scale of works for the culverts to be constructed in a short timeframe to minimise disruption . The natural character of the marine area and lagoon system is maintained, the AEE concludes less than minor impacts on the receiving environment and natural character. The proposal is consistent with the outcomes sought in the relevant objectives and policies of the Regional Plan: Coast for Otago.

7.3.7 Kāi Tahu Ki Otago Natural Resource Management Plan (KTKO NRMP)

The KTKO NRMP is part of a larger network of regional and territorial planning documents. The plan sits alongside the Otago Regional Policy Statement (RPS), and the regional plans.

The KTKO NRMP seeks to express kaitiakitanga, by effectively and proactively applying Ngāi Tahu values and policies to natural resource and environmental management and protect taonga and the relationship of tāngata whenua to these, by ensuring that the management of land and water resources achieves meaningful cultural and environmental outcomes.

The relevant chapters of the KTKO NRMP are Chapters 5.3 (Wai Māori) and Chapter 10.2 (Wai Māori).

Objectives and Policies	Comment
Chapter 5.3 – Wai Māori 5.3.2 Wai Mäori General Issues	The proposal addresses the ongoing protection of water health of Post Office Creek and Hawksbury Lagoon during significant rain events by enabling flood volumes to be emptied form the lagoon more effectively and mitigating food effects. Works are undertaken with mitigation measures such that sediment controls will be in place during works.
5.3.4 Wai Mäori General Policies River and Instream Works: 31.To require that fish passage is provided for at all times, both upstream and downstream. 32. To oppose all river and instream work if near a nohoaka site during the months of August to April. 33.To require that buffer zones are established and agreed upon with the Papatipu Rünaka between the flowing water and the site of any river or instream work. 34.To require that any visual impacts at the site of the activity are minimal. 35.To require that wet concrete does not enter the active flow channels. 36.To require that any works be undertaken either before or after spawning season of potentially affected species as identified by the affected Papatipu Runaka56. 37.To require that all practical measures are taken to minimise sedimentation or discharge of sedimentation. 38.To require that all practical measures are undertaken to minimise the risk of contamination to the waterway. 39.To require that work is done when the water level is naturally low or dry. 40.To require that machinery enters the dry bed of the waterway only to the extent necessary, to carry out as much of the work as possible, using one corridor for entering and exiting.	The proposed culverts do not include specific fish passage design, however they will be positioned above the usual water level – above the existing inflow outflow culvert. Any existing ability for fish passage will be retained, with the existing culvert remaining in place. Sediment control measures will be in place on either side of the causeway structure. Works will be undertaken outside of spawning season, and during low flow periods. No machinery will enter Post Office Creek or the lagoon.

Objectives and Policies	Comment
41.To discourage machinery operating in flowing water. 42. To require that all machinery is clean and well maintained before entering the work site; refuelling is to be done away from the waterway.	

7.3.8 Conclusion

The above assessments demonstrate that the proposal is consistent with the relevant provisions of the relevant statutory documents, subject to fair and reasonable conditions being imposed as recommended in Section 8.0 of this report.

7.4 Section 104(1)(c) (Other matters)

In addition to the matters of regard covered under subsections (1)(a), (ab) and (b), subsection (1)(c) states that consideration must be given to "any other matters that the consent authority considers relevant and reasonably necessary to determine the application."

There are no other matters relevant to this application.

7.5 S104D for Non-Complying Activities

Under section 104D, to be able to grant resource consent for a non-complying activity, the consent authority must be satisfied that either:

> (a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii) applies) will be minor; or
>
> (b) the application is for an activity that will not be contrary to the objectives and policies of—
>
> (i) the relevant plan, if there is a plan but no proposed plan in respect of the activity; or
>
> (ii) the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or
>
> (iii) both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.

This consideration is commonly known as the “threshold test” or “gateway test”. If either of the limbs of this test can be passed, then the application is eligible for approval, but the proposed activity must still be considered under section 104. No primacy is given to either limb; if one limb can be passed then the test can be considered as passed.

The preceding assessments conclude that the proposed activity’s adverse effects on the environment will be less than minor; and as such, the application can be considered under section 104 and a determination can be made on the application under section 104B.

8.0 Other relevant sections of the Act

8.1 Section 108 (Proposed conditions of consent)

As identified in the preceding assessments, several conditions of consent are proposed to avoid, remedy or mitigate the potential adverse effects of the proposed activity on the environment. These are as follows:

1. A Construction Management Plan including an Erosion and Sediment Control plan shall be prepared, submitted to and approved by Otago Regional Council prior to construction commencing. The CMP and ESCP will include but not be limited to including the following components:
    a. No machinery will work from within the wet area of Southern Lagoon or Post Office Creek.
    b. All wet concrete will be restricted to the causeway area, and no wet concrete or dry concrete dust will enter the water body of Southern Lagoon or Post Office Creek.
    c. Sediment control measures will be in place prior to, during and after construction, for example silt sausages and silt curtains around the work area, in Southern Lagoon and in Post Office Creek.
    d. Work will ideally not take place during August to September being key spawning or nesting seasons – however these periods for various species straddle most of the calendar year. An ecologist will be required to be on site during construction set up and during construction.
    e. Work will not take place during sensitive ecological periods, such as breeding seasons for native bird species or peak aquatic life cycles. An ecologist will be required to be on site pre-construction and during construction.
    f. Weather forecasting will be carefully followed, work will not take place immediately before, during, or following significant rain events, when water levels in the Southern Lagoon and in Post Office Creek are expected to be particularly high. Earthworks or other disturbance activities within or adjacent to the lagoon and barrier system must not be undertaken during or within 48 hours following significant rainfall events. A 'significant rainfall event' is defined as:
        i. A cumulative rainfall of 20 mm or more within a 24-hour period (estimated), or
        ii. Any rainfall event that results in observable surface runoff or elevated water levels within the lagoon, estuary, and the racecourse.
        iii. This threshold aligns with ORC best practice for erosion and sediment control and is consistent with guidance from the Natural Hazards. The teams must consult local rainfall data (e.g., NIWA or ORC website) and assess site conditions before starting or resuming activities.
    g. Work will not take place immediately before during or after significant King High Tide events when the tidal surge along Post Office Creek is expected to be significant. Flood mitigation measures and activities that may disturb the estuary mouth barrier or adjacent lagoons (e.g., dredging, excavation, or vehicle access) must not be undertaken during King High Tide events. For the

purposes of this condition, a 'King High Tide' is defined as a high tide that exceeds the combined amplitude of the principal tidal constituents M2 (principal lunar), S2 (principal solar), and N2 (elliptic lunar), as determined by NIWA. These events typically occur 2 to 4 times per year, coinciding with the alignment of the Earth, Moon, and Sun during perigean spring tides. A schedule of predicted King Tide dates should be consulted annually to inform planning and avoid high-risk periods for coastal inundation and habitat disturbance.

2. The site and track surface will be reinstated on completion of works.
3. A traffic management plan (TMP) will be prepared, submitted to and approved by ORC prior to works commencing. This includes signage indicating ‘no through’ for pedestrian access through the causeway during construction, site access arrangements, and includes fencing-off arrangements for ensuring pedestrian safety.
4. The Otago Regional Council shall coordinate the development a Hawksbury Lagoon Management Plan. This will be a collaborative plan which will include (but not be limited to) input from Rūnaka, Department of Conservation, Dunedin City Council, Waikouaiti Community Board, Otago Fish and Game, and the Hawksbury Lagoon Incorporated Society. The purpose of the Plan will be to set objectives, roles and responsibility and include actions, relating to (but not limited to) sustaining and enhancing ecological and cultural values, and considering flood mitigation measures for the lagoon system.

9.0 Notification assessment

9.1 Public notification assessment

Section 95A of the Act requires the consent authority to follow specific steps to determine whether to publicly notify an application. An assessment of the application against these steps is provided below.

9.1.1 Step 1: Mandatory public notification in certain circumstances

An application must be publicly notified if it meets any of the criteria under section 95A(3):

> (3) (a) the applicant has requested that the application be publicly notified:
>
> (b) public notification is required under section 95C:
>
> (c) the application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.

The Applicant does not request public notification and the application is not made jointly with an application to exchange recreation reserve land.

Therefore, Step 1 does not apply, and Step 2 must be considered.

9.1.2 Step 2: Public notification precluded in certain circumstances

An application must not be publicly notified if it meets any of the criteria under section 95A(5):

(5) (a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes public notification:

(b) the application is for a resource consent for 1 or more of the following, but no other, activities:

(i) a controlled activity:

(iii) a restricted discretionary, discretionary, or non-complying activity, but only if the activity is a boundary activity:

None of these criteria apply to the application, the application is for non-complying activity which is not a boundary activity.

Therefore, the remaining steps of section 95A are not applicable.

9.2 Limited notification assessment

If the consent authority determines not to publicly notify an application, it must then follow the steps of section 95B of the Act to determine whether to give limited notification of the application. An assessment of the application against these steps is provided below.

9.2.1 Step 1: Certain affected groups and affected persons must be notified

An application must be limited notified to the relevant persons if it meets the criteria under sections 95B(2) to 95B(4):

(2) (a) affected protected customary rights groups; or

(b) affected customary marine title groups (in the case of an application for a resource consent for an accommodated activity).

(3) (a) whether the proposed activity is on or adjacent to, or may affect, land that is the subject of a statutory acknowledgement made in accordance with an Act specified in Schedule 11; and

(b) whether the person to whom the statutory acknowledgement is made is an affected person under section 95E.

(4) Notify the application to each affected group identified under subsection (2) and each affected person identified under subsection (3).

The application affects a statutory acknowledgement area. These effects are addressed under Step 3 and 95E.

9.2.2 Step 2: Limited notification precluded in certain circumstances

An application must not be limited notified to any persons if it meets any of the criteria under section 95B(6):

(6) (a) the application is for a resource consent for 1 or more activities, and each activity is subject to a rule or national environmental standard that precludes limited notification:

(b) the application is for a controlled activity (but no other activities) that requires a resource consent under a district plan (other than a subdivision of land).

None of these criteria apply to the application.

Therefore, Step 2 does not apply, and Step 3 must be considered.

9.2.3 Step 3: Certain other affected persons must be notified

Other affected persons must be notified in the following circumstances specified by section 95B(7) and (8):

> (7) In the case of a boundary activity, determine in accordance with section 95E whether an owner of an allotment with an infringed boundary is an affected person.
>
> (8) In the case of any other activity, determine whether a person is an affected person in accordance with section 95E.

The proposal is not for a boundary activity.

In deciding whether a person is an affected person under section 95E, the consent authority under section 95E(2):

> (2) (a) may disregard an adverse effect of an activity on a person if a rule or national environmental standard permits an activity with that effect;
>
> (b) must disregard an adverse effect that does not relate to a matter for which a rule or environmental standard reserves control or restricts discretion; and
>
> (c) must have regard to every relevant statutory acknowledgement made in accordance with a statute set out in Schedule 11 of the Act.

The consent authority must not consider that a person is an affected person if they have given their written approval, or it is unreasonable in the circumstances to seek that person's written approval.

With respect to sections 95B(8) and 95E, matters of discretion were considered as part of the assessment of environmental effects undertaken in Section 6.0 of this report. Effects on the surrounding community are positive, with the proposal alleviating flood effects on those properties.

The applicant is currently seeking written approval from the following parties:

- Department of Conservation (DOC)
- Aukaha, on behalf of Kati Huirapa Rūnaka ki Puketeraki
- Otago Fish and Game
- Hawksbury Lagoon Incorporated Society.

At the time of writing, written approvals have not been received. Due to the works being within a statutory acknowledgment area these parties having a particular interest and management role in the site and the matters relevant to this application, it is considered that they may be considered potentially affected to a minor degree, and therefore should be limited notified in accordance with s95E.

9.2.3.1 Statutory acknowledgements

With respect to section 95E(2)(c), when deciding who is an affected person, the consent authority must have regard to every relevant statutory acknowledgement made in accordance with an Act that is specified under Schedule 11. Those named in that schedule are affected if the adverse effects are minor or more than minor.

The statutory acknowledgements which are potentially relevant to the application are Te Tai O Arai Te Uru (Otago Coastal Marine Area).

9.2.4 Step 4: Further notification in special circumstances

As required by section 95B(10), the consent authority must determine the following:

> (10) Determine whether special circumstances exist in relation to the application that warrant notification of the application to any other persons not already determined to be eligible for limited notification under this section (excluding persons assessed under section 95E as not being affected persons).

The proposal is for additional culverts to assist in flood effects mitigation, to improve for flood flows out of the southern lagoon during significant rain events, and to install water level gauges. A consideration of adverse effects on any person has been undertaken under Step 3 where it was concluded that these are less than minor.

Therefore, there are no other persons who should be limited notified.

9.2.5 Limited notification assessment summary

The applicant is currently seeking written approval from the following parties:

- Department of Conservation (DOC)
- Aukaha on behalf of Kati Huirapa Rūnaka ki Puketeraki
- Otago Fish and Game
- Hawksbury Lagoon Incorporated Society.

At the time of writing, written approvals have not been received. Due to the works being within a statutory acknowledgment area these parties having a particular interest and management role in the site and the matters relevant to this application, it is considered that they may be considered potentially affected to a minor degree, and therefore should be limited notified in accordance with s95E.

9.3 Notification assessment conclusion

Pursuant to sections 95A to 95G of the Act, it is recommended that the application is limited notified based on the following reasons:

- The application does not require public notification in accordance with section 95A.
- Step 1 of section 95B: Limited notification must be given the following certain affected groups or persons who have been identified as affected persons under s95E:
    - Department of Conservation (DOC)
    - Aukaha on behalf of Kati Huirapa Rūnaka ki Puketeraki
    - Otago Fish and Game
    - Hawksbury Lagoon Incorporated Society.

10.0 Part 2 of the Act

We consider that those aspects of the plan relevant to this application have been "competently prepared under the Act", in the sense referred to by the Court of Appeal.[1] The consent authority is therefore not obliged to conduct an evaluation under Part 2 of the Act, and Part 2 considerations should not be used to override the plan provisions.

However, for the sake of completeness, and to remove any doubt, the following assessment against Part 2 has also been undertaken.

Section 5 identifies the purpose of the Act as being the sustainable management of natural and physical resources. This means managing the use of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

Section 6 of the Act sets out several matters of national importance, including:

(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:

(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.

The proposed culverts will assist in mitigating flood effects, whilst potential effects on the ecological and hydrological values of the site are mitigated.

Public access along the causeway will be temporarily impeded during construction. The causeway and track will be reinstated on completion of construction and access will be resumed. A formal cultural assessment has not been undertaken, however ORC engaged directly with Rūnaka on site in June 2025. The proposed flood mitigation measures of the proposed works for stage 1 were explained and the potential for multi phase project shared. No specific concerns or feedback was shared with ORC.

Rūnaka will be consulted formally on the proposal via Aukaha.

Section 7 identifies a number of "other matters" to be given particular regard to in the consideration of any assessment for resource consent, including:

(a) kaitiakitanga:

[1] *R J Davidson Family Trust v Marlborough District Council* [2018] NZCA 316.

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

The proposed works provide for flood effects mitigation while mitigating against effects on the ecological or amenity values of the area.

Section 8 requires the consent authority to take into account the principles of the Treaty of Waitangi, and this has also informed our assessment under section 104.

Overall, the application is considered to be consistent with the relevant provisions of Part 2, as expressed through the objectives, policies and rules that we reviewed in earlier sections of this application. Given this consistency, it is concluded that the proposal achieves the purposes of sustainable management set under section 5.

11.0 Conclusion

The Applicant seeks resource consent to install four new outflow culverts at the southern lagoon, and water level gauges at Hawksbury Lagoon, Waikouaiti.

In terms of section 104(1)(a) of the Act, the actual and potential effects of the proposed activity on the environment will be less than minor and acceptable as assessed discussed in sections 6.0 and 7.0 of this report.

The proposed activity will also generate positive effects, being flood effects mitigation.

The proposal has been assessed against the specific matters and limitations imposed by the plan. Relevantly limited objectives, policies, rules or other provisions have also formed part of that assessment, and the proposal is considered consistent to the degree needed to grant consent. The proposal is consistent with Part 2 as expressed through those provisions.

In terms of section 104(1)(b) of the Act, the proposal is consistent with policies and objectives set out in Otago Regional Plan: Water for Otago, and the Regional Plan: Coast for Otago, and the regional policy statements. The relevant provisions of the NES-F, the NPS-FM, and NCPS have also been assessed.

It is also considered that the proposal will have less than minor adverse effects on the wider environment. The applicant is seeking written approvals.

Hence, in accordance with sections 104B and 104D in relation to non-complying activities, it is considered appropriate for consent to be granted after limited notification, subject to fair and reasonable conditions, including the following:

1. A Construction Management Plan including an Erosion and Sediment Control plan shall be prepared, submitted to and approved by Otago Regional Council prior to construction commencing. The CMP and ESCP will include but not be limited to including the following components:

    a. No machinery will work from within the wet area of Southern Lagoon or Post Office Creek.

b. All wet concrete will be restricted to the causeway area, and no wet concrete or dry concrete dust will enter the water body of Southern Lagoon or Post Office Creek.

c. Sediment control measures will be in place prior to, during and after construction, for example silt sausages and silt curtains around the work area, in Southern Lagoon and in Post Office Creek.

d. Work will ideally not take place during August to September being key spawning or nesting seasons – however these periods for various species straddle most of the calendar year. An ecologist will be required to be on site during construction set up and during construction.

e. Work will not take place during sensitive ecological periods, such as breeding seasons for native bird species or peak aquatic life cycles. An ecologist will be required to be on site preconstruction and during construction.

f. Weather forecasting will be carefully followed, work will not take place immediately before, during, or following significant rain events, when water levels in the Southern Lagoon and in Post Office Creek are expected to be particularly high. Earthworks or other disturbance activities within or adjacent to the lagoon and barrier system must not be undertaken during or within 48 hours following significant rainfall events. A 'significant rainfall event' is defined as:

    i. A cumulative rainfall of 20 mm or more within a 24-hour period (estimated), or

    ii. Any rainfall event that results in observable surface runoff or elevated water levels within the lagoon, estuary, and the racecourse.

    iii. This threshold aligns with ORC best practice for erosion and sediment control and is consistent with guidance from the Natural Hazards. The teams must consult local rainfall data (e.g., NIWA or ORC website) and assess site conditions before starting or resuming activities.

g. Work will not take place immediately before during or after significant King High Tide events when the tidal surge along Post Office Creek is expected to be significant. Flood mitigation measures and activities that may disturb the estuary mouth barrier or adjacent lagoons (e.g., dredging, excavation, or vehicle access) must not be undertaken during King High Tide events. For the purposes of this condition, a 'King High Tide' is defined as a high tide that exceeds the combined amplitude of the principal tidal constituents M2 (principal lunar), S2 (principal solar), and N2 (elliptic lunar), as determined by NIWA. These events typically occur 2 to 4 times per year, coinciding with the alignment of the Earth, Moon, and Sun during perigean spring tides. A schedule of predicted King Tide dates should be consulted annually to inform planning and avoid high-risk periods for coastal inundation and habitat disturbance.

2. The site and track surface will be reinstated on completion of works.

3. A traffic management plan (TMP) will be prepared, submitted to and approved by ORC prior to works commencing. This includes signage indicating ‘no through’ for pedestrian access through the causeway during construction, site access arrangements, and includes fencing-off arrangements for ensuring pedestrian safety.

4. The Otago Regional Council shall coordinate the development a Hawksbury Lagoon Management Plan. This will be a collaborative plan which will include (but not be limited to) input from Rūnaka, Department of Conservation, Dunedin City Council, Waikouaiti Community Board, Otago Fish and Game, and the Hawksbury Lagoon Incorporated Society. The purpose of the Plan will be to set objectives, roles and responsibility and include actions, relating to (but not limited to) sustaining and enhancing ecological and cultural values, and considering flood mitigation measures for the lagoon system.

Appendix A Rules Assessment

Resource Consent Application

Hawksbury Lagoon Structures Phase 1

Otago Regional Council

SLR Project No.: 875.016722.00001

10 November 2025

Rules assessment

The following rules assessment has determined that resource consent is required for:

a. a **non-complying activity** under the NES-F;

b. A **discretionary activity** Regional Plan: Coast for Otago

Note that only those rules and standards which are relevant to this application have been addressed.

National Environmental Standards for Freshwater Regulations 2020	
Provision	**Comments**
Regulation 45: (2) Earthworks or land disturbance within, or within a 10 m setback from, a natural inland wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.	**Resource consent required.** Land disturbance associated with the construction of the four culverts is within 10m of the wetland and is therefore a **discretionary activity.** Land disturbance will be isolated to the area of the causeway to install the four culverts. The purpose of the works is specified infrastructure to assist with the mitigation of flood effects. Works will be undertaken from the causeway itself, with no machinery in or disturbance of the wet bed area of the lagoon or Post Office Creek.
Regulation 71 Discretionary activities: The placement, use, alteration, extension, or reconstruction of a culvert in, on, over, or under the bed of a river is a discretionary activity if it does not comply with any of the conditions in regulation 70(2).	**Resource consent required.** The construction of the four culverts do not meet the requirements set out in Regulation 70 (e) and (f), because they are not placed with at least 25% of their diameter below the level of the bed, and the bed substrate is not present over the full length of the culverts. The culverts are located above the existing main inflow outflow culvert, and are for emergency flood flow relief only, over and above the 'usual' hydrological state. Consequently, the installation of the culverts is a **discretionary activity** under regulation 71.
Regulation 74 (1) The placement, use, alteration, extension, or reconstruction of a passive flapgate in, on, over, or under the bed of any river or connected area is a non-complying activity. Conditions required in resource consent	**Resource consent required.** The passive flap gates forming part of the proposed culverts are **non-complying** under Regulation 74. Fish passage is not provided for from Post Office Creek into the lagoon – by way of the passive flap gates on the Post Office Creek end of each culvert. The culverts will sit above the existing inflow outflow culvert with the purpose of

(2) A resource consent granted for the non-complying activity must impose the conditions required by— (a) regulations 62 and 65 (information about structures and passage of fish and about flap gates), unless the activity is use; and (b) regulation 69 (monitoring and maintenance).	relieving flood flow volumes from the southern lagoon into Post Office Creek during flood events. The flap gates is necessary to assist in this function. Any fish passage from the lagoon to Post Office Creek in these events will continue to be provided for as is via the existing culvert. Any potential fish passage from Post Office Creek into the lagoon is extremely unlikely in these events given that during flood events the creek will be flowing heavily towards the coast, and the flow direction through the culverts will be into the creek.
Regional Plan: Water for Otago	
Rule 13.1.1.1 The use of any structure that is fixed in, on, under, or over the bed of any lake or river, or any Regionally Significant Wetland, is a permitted activity, providing: (a) The structure is lawfully established; and (b) In the case of a change in use, the effects of the new use of the structure are the same or similar in character, intensity and scale as the preceding use; and (c) Measures are taken to avoid animal waste entering the lake, river or Regionally Significant Wetland; and (d) The structure is maintained in good repair.	**Complies.** Once installed, the proposed culverts will be compliant with this rule. Culverts will be maintained as required.
Rule 13.2.1.1 The erection or placement of any fence, pipe, line or cable over the bed of a lake or river, or a Regionally Significant Wetland, is a permitted activity, providing: (a) The fence, pipe, line or cable does not cross a lake or river identified in Schedule 1A as being an "Outstanding natural feature or landscape" unless it is attached to an existing lawfully established support structure; and (b) No part of the fence, pipe, line or cable is fixed to the bed of the lake or river unless it is attached to an existing lawfully established support structure; and (c) No part of any pipe, line or cable is less than two metres above the 1 percent probability flood level, unless it is attached to an existing lawful structure; and (d) Where it is attached to an existing lawful structure, no part of	**Complies.** The culverts comply with this rule. Their installation will be above the existing culverts and so not within the bed of the lagoon itself. No part of the culverts will be fixed directly to the bed of the lagoon. The structures will sit above the water level for 'usual hydrological conditions' as noted by ORC Science Team. The purpose of the structures is to assist in alleviating flood flows and will not result in flooding or erosion. The culverts will be maintained in good repair.

any pipe, line or cable extends below the underside of the existing structure; and (e) Any fence over the bed of a lake or river, or a wetland, does not impede the flow of flood water or debris, or is installed and maintained so it results in no flooding or erosion of the bed or banks of the lake or river, or of a wetland; and (f) The fence, pipe, line or cable does not interfere with navigation; and (g) For existing overhead network utility services over the bed of a lake or river, there is no reduction in the height of clearance above the waterway; and (h) The fence, pipe, line or cable is maintained in good repair.	
Rule 13.2.1.2 The placement of any pipe, line, or cable on or under the bed of a lake or river, or any Regionally Significant Wetland, is a permitted activity, providing: (a) The pipe, line, or cable does not impede the flow of water or debris, or is installed and maintained so it results in no flooding, erosion or sedimentation; and (b) The location of the pipe, line, or cable is identified by markers on the banks of the river or lake; and (c) The pipe, line, or cable is maintained in good repair.	**Complies.** The installation of the culverts is permitted under Rule 13.2.1.2 of the Otago Regional Plan: Water, because the pipe will not impede flow of water or debris and will be identifiable from the bank by markers and be maintained in good repair.
Rule 13.2.1.4 The erection or placement of any flow or level recording device, outfall or intake structure or navigational aid structure, that is fixed in, on or under the bed of any lake or river, or any Regionally Significant Wetland, is a permitted activity, providing: (a) The structure does not exceed 2 square metres in area provided that in respect of any flow or level recording device any catwalk to the nearest bank shall be excluded from the area calculation; and (b) The structure, or its erection or placement, does not cause any flooding or erosion; and (c) The Otago Regional Council is notified of the location and nature of the structure, at least seven working days prior to commencing the erection or placement; and	**Complies.** The installation of the water level gauges in the lagoons is permitted under Rule 13.2.1.4 of the Otago Regional Plan: Water because the gauges will not exceed 2m^2 in area. The water level gauges will not cause any flooding or erosion. They will be manually staked into the bed of the lagoon and any bed disturbance will be minimal and localised.

(d) Except in the case of a navigational aid, or the sight board of any gauge, any visible part of the structure is of a neutral colour to blend in with the surroundings; and (e) The structure is maintained in good repair; and (f) The site is left tidy following the erection or placement.	
Rule 13.5.1.1 The disturbance of the bed of any lake or river, or any Regionally Significant Wetland, and any resulting discharge or deposition of bed material associated with: (i) The erection, placement, extension, alteration, replacement, reconstruction, repair, maintenance, demolition or removal, of any structure that is fixed in, on, under or over the bed of any lake or river, or the wetland; or (ii) The clearance of debris or alluvium from within, or immediately surrounding, any structure in order to safeguard the function or structural integrity of the structure; or (iii) The maintenance or reinstatement of a water intake, in order to enable the exercise of a lawful take of water, is a ***permitted*** activity, providing: (a) Except in the case of the demolition or removal of a structure, the structure is lawfully established; and (b) Except in the case of (i), there is no increase in the scale of the existing structure; and (c) If work is undertaken between 1 May and 30 September inclusive, the Department of Conservation and the relevant Fish and Game Council will be notified as soon as reasonably practicable in advance; and (d) The bed or wetland disturbance is limited to the extent necessary to undertake the work; and (e) The bed or wetland disturbance does not cause any flooding or erosion; and (f) The time necessary to carry out and complete the whole of the work within the wetted bed of the lake or river does not exceed 10 hours in duration; and (g) All reasonable steps are taken to minimise the release of sediment to the lake or river during the disturbance, and there is no conspicuous change in the colour or visual clarity of the water	**Complies.** The bed disturbance associated with the placement of the culverts and the water level gauges is permitted because under Rule 13.5.1.1 because the works will be undertaken in less than 10 hours duration, and all steps will be taken to minimise sediment release to the lagoons or Post Office Creek, there will be no change to the hydrological function of Hawksbury Lagoon or water levels within it for phase 1

body beyond a distance of 200 metres downstream of the disturbance; and (h) No lawful take of water is adversely affected as a result of the bed or wetland disturbance; and (i) The site is left tidy following completion of the activity; and (j) Except for activities covered by Rules 13.2.1.5, 13.2.1.6, or 13.2.1.8, there is no change to the water level range or hydrological function of any Regionally Significant Wetland; and (k) Except for activities covered by Rules 13.2.1.5, 13.2.1.6, or 13.2.1.8, there is no damage to fauna, or New Zealand native flora, in or on any Regionally Significant Wetland.	
Regional Plan: Coast for Otago	
Rule 7.5.1.4 The occupation of the coastal marine area by any structure which is identified as a permitted activity by rules 8.5.1.1, 8.5.1.2, 8.5.1.3, 8.5.1.6, 8.5.1.7, 8.5.2.1, 8.5.2.2, 8.5.2.3, or 8.5.4.1 is a ***permitted activity***.	**Does not comply.** The installation of the sand level gauge does not comply with Rule 7.5.1.4; their occupation of the coastal marine area is not identified as a permitted activity. The installation of the culverts is considered a permitted activity under this rule, as Rule 8.5.1.6 can be met (see below).
Except as provided for by rules 7.5.1.1, 7.5.1.2, 7.5.1.3, or 7.5.1.4 any activity involving occupation of land of the Crown within the coastal marine area is a ***discretionary*** activity.	**Resource consent required.**
Rule 8.5.1.6 The placement of a pipe to discharge stormwater, stream water or cooling water is a ***permitted*** activity where: (a) The length of the pipe is kept as small as is necessary and extends no further than two metres into the coastal marine area from mean high water springs; and (b) The pipe blends with surrounding landscape; and (c) The Otago Regional Council is informed of the placement of the pipe before installing the pipe.	**Complies** The installation of the culverts is permitted under Rule 8.5.1.6 of the Regional Plan: Coast for Otago because the length of the culverts will extend no more than 2m into the coastal marine area from high mean water springs.
Rule 8.5.1.9 Except as provided for by Rules 8.5.1.1 to 8.5.1.6, 8.5.1.8 and 8.5.1.10, any activity	**Resource consent required.** The installation of the sand level gauge within the foreshore (mouth of Post Office creek around

involving the erection or placement of a structure or structures in, on, under, or over any foreshore or seabed is a ***discretionary*** activity.	the sand barrier area) is considered a discretionary activity under rule 8.5.1.9. the assessment of effects concludes less than minor effects.

Appendix B ORC Hydrological and Ecological Assessment

Resource Consent Application

Hawksbury Lagoon Structures Phase 1

Otago Regional Council

SLR Project No.: 875.016722.00001

10 November 2025

Otago Regional Council

MEMORANDUM

To: **Emma Burford**, Senior Project Consultant – Planning, SLR Consulting

From: **Sami Khan** (Senior Scientist – Freshwater Ecology), **Amanda Riddle** (Scientist – Surface Hydrology) and **Sam Thomas** (Senior Scientist – Coast)

Date: **11/09/2025**

Re: **Assessment of ecological impacts, and an assessment of hydrological effects, for Stage 1 of flood mitigation measures in Hawksbury Lagoons, Waikouaiti**

Name	Role	Date Completed
Ben Mackey	Manager - Resource Science Unit	16/09/2025

Purpose.

The purpose of this memo is to discuss the assessment of ecological impacts and hydrological effects of proposed flood mitigation measures (Stage 1) in Hawksbury Lagoon. The project was developed by Josh von Pein, Civil Engineer, JVP Civil.

Context.

Hawksbury Lagoon is a costal lagoon located in Waikouaiti town on the northern boundary of Dunedin City. It is a designated Wildlife Refuge administered by the Department of Conservation. Under the Regional Plan – Water for Otago the lagoon is also listed as one of the Regionally Significant Wetlands. The lagoon, associated streams and coastal mouth in its current state are in a heavily modified and degraded condition. Several historical modifications have resulted in the current state, notably infilling for land reclamation, erecting causeways with control gates, residential development, mechanical opening of the mouth and operation of a nearby landfill. A detailed report[1] has been developed by Steve Rate et al. in year 2009 that documents catchment land use practices, hydrology, ecological values and some management

[1] Ecological Management Plan for Hawksbury Lagoon, Waikouait

measures. A subsequent report[2] was developed by Dugald MacTavish and Robin Mitchell in 2013 suggesting restoration measures and management options for the system.

Due to their distinct hydrology and ecology in their report MacTavis and Robin (2013) divided the lagoon complex into three zones.

I. The lagoon - a western zone of former estuary now permanently converted into a coastal lagoon separated by causeways,

II. Intermittently Closed Estuary (ICE) - the remaining area of natural estuary and coastal mouth located east of the causeway and mainly consisting of the eastern arm,

III. The racecourse wetland - tidal channels traversing the former wetland area to the north

Hydrological connectivity in the lagoon (mixing of the Post Office Creek freshwater and sea water) has been restricted by the causeways and open culverts/control gates. The water level and chemistry (salinity) in the lagoon is determined by the sandy berm/barrier height at the river mouth. When the mouth is mechanically opened it flushes Post Office creek, estuary and hence the lagoons. As the barrier height at the mouth starts building up the landward estuarine extent increases and so does the water level in the Post Office Creek and the lagoon. Due to these abrupt changes in water level and salinity, the lagoons oscillate between freshwater to brackish states. However, the control gates in the causeway are keeping the seawater and freshwater mixing to a minimum as most of Post Office creek water flows directly to the estuary and sea. During the opened regimes (high runoff from the creek or coastal surges, or when mechanically opened) the sea connects with the upstream tidal channels in the estuary and this zone represents all that is left of what would once have been an extensive network of tidal channels and marshland in the wider estuarine and mudflat system. The lagoon also receives storm water discharges at the south-western and north-western ends (Photo 1).

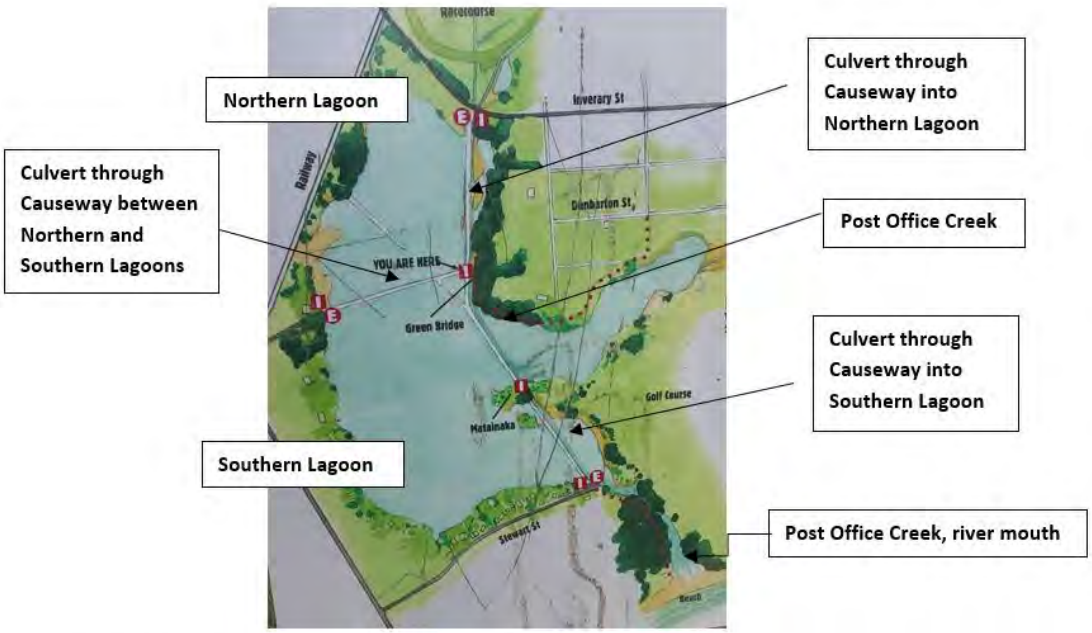


Photo 1 – Hawksbury Lagoon (taken from information board on site)

[2] Engineering at Hawksbury Lagoon: identifying feasible water management options for ecosystem restoration

Problem Statement

During heavy rain events, the flow of stormwater from the lagoon is restricted from draining into Post Office Creek by an existing culvert and held back by the north to south aligned causeway. The culvert is constructed through the causeway, located approximately 30 meters north of Stewart Street. The restricted flow capacity through the culvert causes the water level within the lagoon to rise, which can lead to flooding of private land and inundation of habitable floor areas. When the culvert is unrestricted, the water level in the southern lagoon is directly influenced by the water level of Post Office Creek. When the water level in Post Office Creek drops below the outlet inlet level of the culvert, the corresponding water level in the southern lagoon may also drop, or completely drain, which may potentially lead to adverse environmental conditions. The depth and flow of Post Office Creek is influenced by the upstream volume of water in Post Office Creek, the river mouth (which is regularly opened by the Council), and, occasionally, coastal storm surges. In the past during heavy rain events, locals have arranged for the causeway to be excavated, to create a makeshift weir to reduce the water height in the lagoon and protect adjacent houses from flooding. While this has helped mitigate flooding risk, it may have resulted in some negative environmental outcomes.

Proposed Solution to the Problem

Solutions to the problem have been proposed under two phases. In Phase I, the council propose to install four culverts, each of 600mm in diameter to act as overflow pipes while Phase II entails installation of mechanical gates to manage water level in the lagoon and Post Office Creek. Detailed designs and specifications of proposed works under both phases are mentioned in Hawksbury Lagoon Flood Mitigation – Plan (annex 1).

Discussion

Proposed activities under Phase I and Phase II of the plan are solely designed to alleviate flood risks to the adjacent properties by managing high water level in the lagoon. Phase I that includes installation of four pipes (culverts) are aimed to increase the flushing mechanism by controlling the ponding capacity in the lagoon during torrential rainfall and high runoffs.

Despite its current degraded condition, the lagoon remains a vital habitat for waterfowl, fish, and other aquatic life. The ecological integrity of the lagoon is primarily sustained by optimal and minimum water levels, as well as its brackish water conditions. The existing causeway restricts saline intrusion, helping to preserve the brackish condition, which support and maintain lagoons ecology. The proposed pipe system is designed for one-way flushing during high floods, incorporating flap gates at the creek end. This design ensures that the lagoon's mixing regimes and salinity gradient (brackish condition) will remain unaffected. As such, the proposed activities (Phase I) are not expected to pose any risk to the lagoon's ecological values, including its riparian zones, open water areas, and marshlands.

It is anticipated that the proposed activities will not have any effects to hydrology under typical hydrological conditions in the lagoon and in Post Office Creek as the proposed culverts will be located above the usual water level in both the Lagoon and Post Office Creek. The proposed solution aims to alleviate flood risks to private land and properties. It can be assumed that given the extra capacity added through the additional four culverts that this may alleviate some of the flooding issues. However, no hydraulic modelling or capacity assessments of the proposed

solution has been undertaken and therefore are unable to assess the true degree of flood alleviation that the proposed solution will have during high rainfall events.

To improve the ecological health of the estuarine system all the structures that hamper hydrological connectivity such as the causeways and structures that segregate racecourse (formerly salt marshes and wetlands) must be eliminated or partly removed to enhance hydrological connectivity and to limit mechanically opening of the river mouth. In the current management framework, we note that flushing of the lagoons is deemed undesirable however naturally there would have been less ponding and periodic flushing of the estuarine systems and the current lagoons acting as mudflats.

Recommendation or Conclusion

Otago Regional Council's Engineering Unit and external consultant (SLR Consulting) have asked Resource Science Unit of the Council to advise if the proposed activities would pose any adverse effects to the ecology and hydrology of the lagoon. The advice sought is limited to the current state of the lagoon not the wider complex. We conclude that the ecological and hydrological adverse effects of activities (Phase-I) will be minimal.

We suggest the following recommendations.

Phase-I Recommendation

1. Schedule activities to avoid sensitive ecological periods, such as breeding seasons for native bird species or peak aquatic life cycles, to minimize disturbance.
2. Minimise disturbance by undertaking work using less-invasive techniques such as operating small digger from road or causeway.
3. Maintain buffer zones around the construction site to protect riparian habitats and reduce nutrient and contaminant inflow.
4. Ensure robust sediment and erosion control measures are in place to prevent runoff into the lagoon and creek, particularly during earthworks or vegetation clearance.
5. Continue engagement with iwi, community groups, and relevant stakeholders to ensure transparency and incorporate local ecological knowledge.

Phase-II Recommendation

We advise that prior to the commencement of Phase-II activities, further investigation is essential to:

1. Establish the necessity of installing mechanical gates, including a clear articulation of the intended hydrological or ecological outcomes.
2. Assess the effectiveness of the proposed gate system in achieving those outcomes, supported by modelling or comparable case studies.
3. Evaluate potential adverse effects on lagoon ecology and hydrology, particularly in relation to water level fluctuations, sediment transport, and habitat integrity.

These investigations should be undertaken collaboratively with relevant technical experts and stakeholders, and their findings should inform any final design or implementation decisions.

Appendix C Wildlands Consultants Ecological Management Plan for Hawksbury Lagoon

Resource Consent Application

Hawksbury Lagoon Structures Phase 1

Otago Regional Council

SLR Project No.: 875.016722.00001

10 November 2025

ECOLOGICAL MANAGEMENT PLAN FOR HAWKSBURY LAGOON, WAIKOUAITI

AUGUST 2009

Report No. 2251

Prepared for:

HAWKSBURY LAGOON INC.

[redacted]

Wildland CONSULTANTS

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CONTENTS

PROJECT TEAM

Steve Rate - Field survey, report compilation.
Richard Gillies - Pest animal control options.
Andy Garrick – Cost estimates.
Kelvin Lloyd - Internal peer review.

Reviewed and approved for release by:

W.B. Shaw
Director/Principal Ecologist
Wildland Consultants Ltd

PART 1:
ECOLOGICAL ASSESSMENT

1. REPORT STRUCTURE

This report comprises two parts.

Part 1 is an ecological assessment of the Hawksbury Lagoon, at Waikouaiti. It includes a desk-top review of information relating to the ecology of Hawksbury Lagoon, as well as a description of current vegetation, flora, fauna habitats, threats, and ecological processes, based on a field survey.

Part 2 is an ecological restoration plan for public land and a small area of private land within the study area. It contains:

- Objectives for indigenous restoration at the site;
- An outline of appropriate indigenous plant species for different habitats/areas;
- Appropriate planting densities for different species;
- Post-planting maintenance requirements;
- Requirements for control of weeds and pest animals;
- Indicative costs of ecological restoration at the site;
- A timeline for planting and maintenance, with staged planting if necessary;
- A suggested approach for ecological restoration.

2. INTRODUCTION

Hawksbury Lagoon Wildlife Refuge was formed in 1973 to protect the considerable wildlife values of the Hawksbury Lagoon, at Waikouaiti. This coastal lagoon has been strongly modified by human activities, including infilling, hydrological controls, residential development, and operation of a nearby landfill. Hawksbury Lagoon Inc. is a Waikouaiti-based community group who wish to improve the indigenous biodiversity values of the lagoon and surrounding land, and are seeking advice to help plan for ecological restoration of public land on the lagoon margins.

3. METHODS

A review was undertaken of relevant literature on terrestrial vegetation, indigenous fauna, and fisheries within or adjacent to the Hawksbury Lagoon. This included databases such as the New Zealand Freshwater Fish Database (NZFFD; NIWA 2009), unpublished reports, and published material.

A field visit was undertaken in July 2009. The site was defined (Figure 1) as:

- the lagoon proper;
- DOC- and DCC-administered land adjacent to the lagoon;
- the outlet of the lagoon to the coast; and
- a section of privately-owned land below Hawksbury Inlet.

Figure 1: Land tenure, Hawksbury Lagoon and environs, Waikouaiti.

A walk-through survey was undertaken of accessible lagoon margins and causeways. The remainder of the site was viewed from a distance using binoculars. Plant species, vegetation types, fauna habitats, and hydrology were assessed, described, and mapped. Particular attention was paid to the potential of parts of the site for ecological restoration.

4. ECOLOGICAL CONTEXT

4.1 Waikouaiti Ecological District

The landcover database (LCDB2) gives an indication of the vegetation and habitats that are present within each ecological district in New Zealand. A large proportion of the 68,287 ha Waikouaiti Ecological District is covered in high-producing exotic grassland (20,950 ha; c.31% of total area) and low-producing grassland (24,518 ha; 36% of total area), reflecting the predominantly pastoral land use. There is relatively little indigenous vegetation remaining (<15% of total area), although there are areas of

Hall's totara/ngaio-lacebark-ribbonwood-kowhai-mahoe coastal forest; matai-totara-rimu/hardwood forest at lower altitudes inland; extensive kanuka-manuka scrub; hard tussock, silver tussock, and snow tussock grassland at higher altitude in the west; silver beech, hardwood and kaikawaka forests in the uplands around the South branch of the Waikouaiti River and Silver Stream (McEwen 1987). Herbaceous freshwater vegetation (8.72 ha; 0.01% of total area), lakes and ponds (19.23 ha; 0.03%), estuarine open water (147.15 ha; 0.22%), and herbaceous saline vegetation (183.81 ha; 0.27%) comprise a small proportion of the ecological district.

4.2 Hydrology

Hawksbury Lagoon is a shallow, lowland coastal lagoon, with an elevational range of 0-2 m asl. It receives fresh water inputs from Post Office Creek to the north, and two smaller unnamed waterways, one entering at the head of Hawksbury Inlet (the arm of the lagoon which extends east towards Edinburgh Street) and the other in the southwestern corner of the Lagoon. Post Office Creek is now a constructed channel running down the eastern margins of the Lagoon. It is separated from the Lagoon proper by a causeway, through which pass two gated culverts. A further ungated culvert is located in a second causeway which divides the Lagoon east to west. The gated culverts, which are in poor repair, are opened and closed by a local resident, so that water levels in the lagoon remain relatively constant (*c*.0.5 m deep). On the eastern side of the main causeway are the Hawksbury Inlet and two areas of mudflats. Water levels in Hawksbury Inlet are uncontrolled, with large areas of mudflat becoming exposed in summer months. There is a little saline intrusion into the lagoon, resulting in a mix of fresh and brackish water, and the persistence of salt-tolerant plant species (e.g. *Leptinella dioica*, *Selliera radicans*, *Samolus repens*). The creek mouth to the sea is sometimes blocked by build up of sand and is then bulldozed open when the water level threatens residential properties.

The intent of current management is to:

- Maintain water levels within the Lagoon to minimise smells and nuisance insects;
- Lower water levels within the Lagoon when they encroach on private property;
- Keep the channel open to the sea to avoid water backing up and flooding adjoining land;
- Protect residential properties by diverting Post Office Creek flood flows directly to the sea.

5. LAND TENURE

Most of Hawksbury Lagoon is administered by the Department of Conservation (DOC). One small area on the western margins of the lagoon, and areas near the outlet are administered by Dunedin City Council (DCC). Private land, comprising residential properties, market gardens, and grazed pasture, abuts the lagoon along much of its margin (Figure 1).

6. CULTURAL SIGNIFICANCE

Information in this section was supplied by Kati Huirapa Runaka ki Puketeraki (August 2009). Kai Tahu have strong links to this part of the Otago coast. The Maori name for Hawksbury Lagoon is Matainaka which refers to juvenile whitebait/inaka. A fishing easement was set aside by the Native Land Court in 1868 as partial redress for loss of mahika kai in the area. This easement is located on the eastern side of the lagoon and includes the small peninsula that extends into the main lagoon. The main causeway passes through this private Maori land, and public access is allowed by kind favour of the trustees of this block. An ancillary claim was lodged as part of the 1998 Ngai Tahu Settlement, because the conservation status of Hawksbury Lagoon (Wildlife Refuge) forbade fishing. The claim was successful and descendants of the beneficiaries of the fishing easement now have rights to take eels and other fish from within the lagoon, as well as legal recognition of mahika kai. The runaka are intimately involved in the past and future of this area and it is important that their support is sought for any work likely to be undertaken.

7. ECOLOGICAL SIGNIFICANCE

Hawksbury Lagoon is listed in Schedule 25.4 'Areas of Significant Conservation Value' in Dunedin City District Plan (DCC 2006). Site C021 (Part of Hawksbury Lagoon Wildlife Refuge), administered by DOC, is included because of its wetland habitat values for indigenous bird and fish species. Site C105 (Edge of Hawksbury Lagoon) is included because it is a regionally significant lowland lake listed in the WERI database.

'Hawksbury Inlet' (CPA7) is listed in Schedule 2 'Management Areas' in the Otago Regional Council's Regional Plan: Coast (ORC 2001). Values within the Coastal Marine Area are listed as "Kai Tahu cultural and spiritual values. Estuarine values which include a habitat for a large number of wading birds and water fowl."

Hawksbury Lagoon is also listed as a significant wetland in the Otago Regional Council's Water for Otago (ORC 2004). This excludes Hawksbury Inlet listed in ORC (2001). The wetland is culturally significant to Kai Tahu as a mahika kai site, has a high diversity of bird and fish life, and provides regionally significant habitat for waterfowl.

8. VEGETATION AND HABITATS

Ten broad vegetation types were identified. These are described below and mapped in Figures 2a and b.

8.1 Grassland dominated by exotic species

8.1.1 Tall fescue-dominated grassland

Tall fescue (*Schedonorus phoenix*) and cocksfoot (*Dactylis glomerata*) dominate grassland on lagoon margins in the northern-most part of the site. Curled dock

(*Rumex crispus*), vetch (*Vicia sativa*), red clover (*Trifolium pratense*), yarrow (*Achillea millefolium*), narrow-leaved plantain (*Plantago lanceolata*), and Scotch thistle (*Cirsium vulgare*) are scattered throughout. Plantings of species such as narrow-leaved lacebark (*Hoheria angustifolia*), cabbage tree (*Cordyline australis*), kowhai (*Sophora microphylla*), and kohuhu (*Pittosporum tenuifolium*) have been undertaken in this area.

Adjacent to this area, on wet ground closer to the lake, tall fescue dominates with frequent Yorkshire fog (*Holcus lanatus*) and creeping bent (*Agrostis stolonifera*), and scattered creeping buttercup (*Ranunculus repens*). This type is also present within Hawksbury Inlet. There are a few trees of tortured willow (*Salix matsudana* var. *tortuosa*) present at the northern site and scattered bittersweet (*Solanum dulcamara*) in the Hawksbury Inlet site.

Tall fescue also dominates grassland on the sides of causeways on the eastern side, and crossing, the lagoon. Browntop (*Agrostis capillaris*) and Yorkshire fog are also common, with scattered vetch, red clover, and narrow-leaved plantain. Scattered plantings have been undertaken along the sides of the eastern causeway, and there are some species which have established themselves. These species include those native to the area (e.g. kohuhu, kowhai, lemonwood (*Pittosporum eugenioides*), *Coprosma propinqua*, saltmarsh ribbonwood (*Plagianthus divaricata*), harakeke (*Phormium tenax*), *Olearia avicenniifolia*, *O. arborescens*, *O. lineata*, toetoe (*Cortaderia richardii*), knobby clubrush (*Ficinia nodosa*), *Muehlenbeckia complexa*, *Juncus edgariae*), non-local natives (*Pittosporum ralphii*, akeake (*Dodonaea viscosa*), *Olearia traversiorum*), and environmental weeds (gorse (*Ulex europaeus*), Scotch broom (*Cytisus scoparius*), pampas (*Cortaderia* spp.), tree lupin (*Lupinus arboreus*), and marram (*Ammophila arenaria*)).

Plate 1: Tall fescue-dominant grassland on the lagoon's north-western margins.

Plate 2: The sides of the main causeway separating Post Office Creek from the lagoon are dominated by tall fescue on lower slopes, with browntop and scattered plantings on upper slopes.

8.1.2 Marram-dominant grassland

Marram grassland is present on dunes near the lagoon outlet. Cocksfoot is also common, with scattered vetch, catsear, and emergent shrubs of tree lupin and Scotch broom. A small area of planted pingao (*Desmoschoenus spiralis*) on the edge of a dune has been partially eroded by wave action.

8.1.3 Cocksfoot-dominant grassland

Cocksfoot dominates two small grasslands on low hillslopes in Hawksbury Inlet. Yorkshire fog, browntop, and Californian thistle (*Cirsium arvense*) are also present. Scattered throughout are uncommon creeping buttercup, hemlock, and mouse-ear chickweed. Totara (*Podocarpus totara*), which have been planted at c.5 m spacings in these grasslands, are now 10 years old and c.1.5 m tall. Another small grassland, on the lagoon margin north of the Scotia Street road-end, has abundant cocksfoot and frequent Californian thistle and browntop.

Cocksfoot, frequent Yorkshire fog, and patchy tussocks of tall fescue dominate grassland grazed heavily by horses on Stewart Street. Also common is daisy, chickweed, mouse-ear chickweed, catsear, browntop, Californian thistle, and broad dock.

8.2 Treeland dominated by exotic species

In the northeast of the study area, alongside Inverary Street, crack willow (*Salix fragilis*), Lombardy poplar (*Populus nigra*), and alder (*Alnus glutinosa*) form a treeland over mown grassland dominated by cocksfoot. Browntop, yarrow, daisy (*Bellis perennis*), white clover (*Trifolium repens*), narrow-leaved plantain, and curled dock are also present. At the edge of the lagoon is a tree of Sitka spruce (*Picea stichensis*) and patches of periwinkle (*Vinca major*).

Poplar (*Populus* spp.) treeland is present at several sites on lagoon margins. Exotic grassland dominates the groundcover.

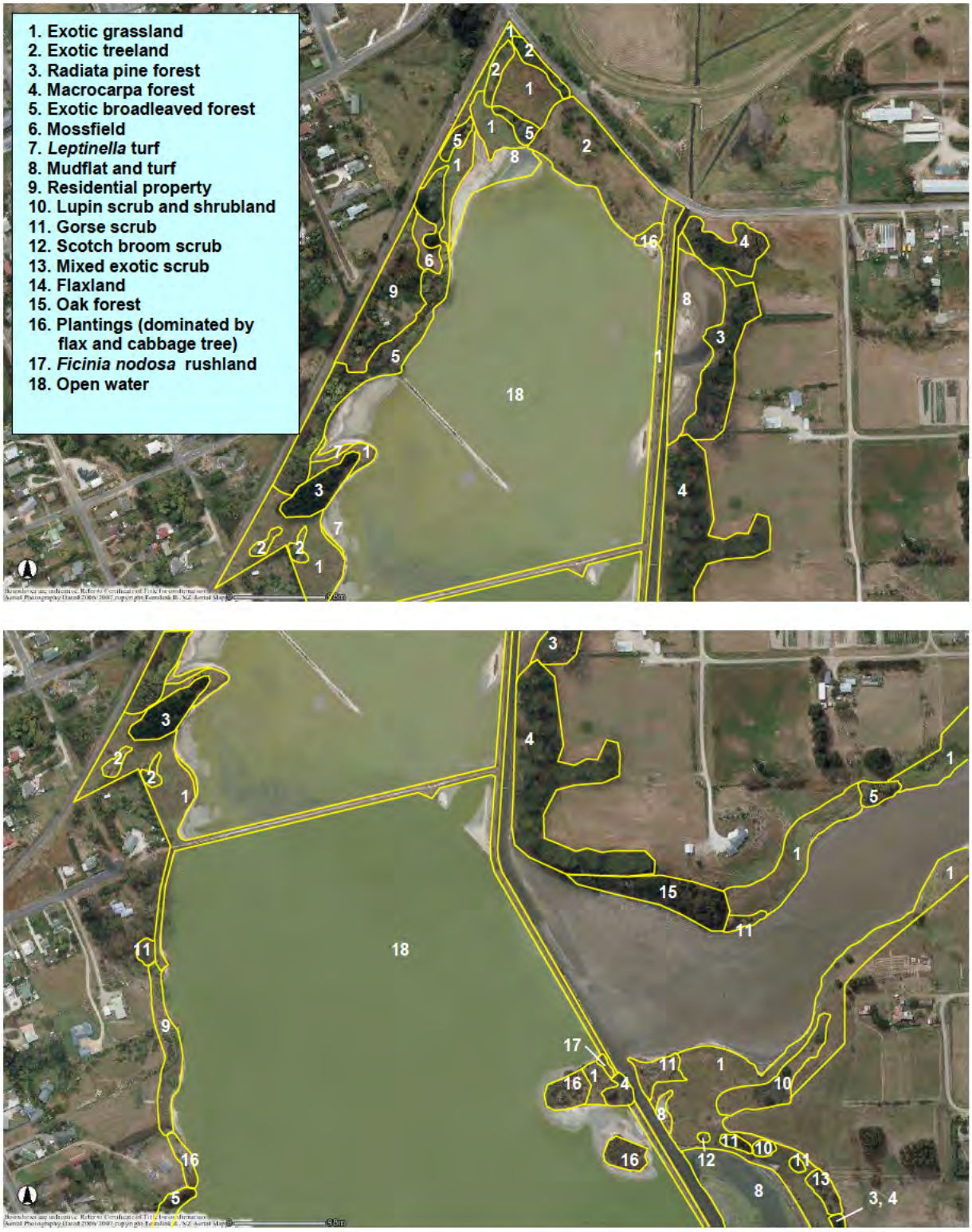

Figure 2a: Vegetation and habitat map for the northern part of Hawksbury Lagoon.

Figure 2b: Vegetation and habitat map for the southern and eastern parts of Hawksbury Lagoon.

Planted golden willow (*Salix alba* var. *vitellina*) forms treeland at scattered sites within exotic grassland on the western margins of the lagoon.

8.3 Broadleaved forest dominated by exotic species

8.3.1 White poplar forest

White poplar (*Populus alba*) forest is present at one site next to the railway line. Several of the large poplar trees appear to have fallen at some time in the past and branches from the horizontal trunks now form the canopy. The understorey comprises frequent elder and occasional hawthorn and bittersweet. The groundcover comprises frequent tall fescue and cocksfoot, with patchy creeping buttercup, cleavers, and chickweed, and rare prickly shield fern (*Polystichum vestitum*) and stinking iris (*Iris foetidisma*).

8.3.2 Crack willow forest

Crack willow (*Salix fragilis*) forest has a limited distribution at the site, only being present as two small areas, one on the northern margin of Hawksbury Inlet and the other next to the railway line. The Hawksbury Inlet site has a groundcover of cocksfoot, creeping buttercup (*Ranunculus repens*), chickweed (*Stelleria media*), and scattered purei (*Carex geminata*) and floating sweetgrass (*Glyceria fluitans*). Tall fescue and creeping bent are present near the edge of the lagoon. The site next to the railway has blackberry (*Rubus fruticosus* agg.), elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), and a groundcover of waxweed (*Hydrocotyle heteromeria*), cleavers (*Galium aparine*), chickweed, creeping buttercup, and hemlock (*Conium maculatum*). A few male fern (*Dryopteris filix-mas*) are also present. There is a small stream nearby with scattered floating sweetgrass, starwort (*Callitriche stagnalis*), and watercress (*Nasturtium microphyllum*).

8.3.3 Oak forest

Oak forest is present on the northern margin of the eastern inlet of the lagoon. Several large exotic beech (*Fagus sylvatica*) trees are also present. In the understorey, there are frequent hawthorn and young trees of oak and beech, and scattered Scotch broom, gorse, kohuhu seedlings, *Coprosma dumosa*, and cabbage tree (*Cordyline australis*). The groundcover is dominated by cocksfoot and litter, but cleavers, browntop, ragwort (*Senecio jacobaea*), and a small patch of hounds tongue fern (*Microsorum pustulatum*) are also present.

Plate 3: The understorey is relatively open on the western boundary of oak forest, Hawksbury Lagoon. Macrocarpa forest is visible through the oak trees.

8.4 Exotic conifer forest

Exotic conifer forest is present on low hillslopes along the eastern margins of the lagoon, on dunes near the outlet, and a small area on flats on the western margin of the lagoon. Macrocarpa (*Cupressus macrocarpa*) is dominant on north-eastern hillslopes. Also present in the canopy are radiata pine (*Pinus radiata*), and, immediately adjacent to the lagoon, a few oak (*Quercus* sp.). There is little understorey, with a few African boxthorn (*Lycium ferocissimum*) on the margins. Groundcover comprises patchy nettle (*Urtica urens*) and bare earth. This is one of two sites where stock (sheep) have been present.

Further south, radiata pine is dominant for *c.*100 m. A few eucalyptus (*Eucalyptus* sp.) are also present. There is little understorey, with scattered Scotch broom and seedlings of radiata pine and macrocarpa. The groundcover comprises pine needle litter and scattered *Lepidium ?pseudotasmanicum*, and tussocks of cocksfoot. At the start of Hawksbury Inlet, macrocarpa is dominant at the top of the hillslope, adjoining an oak forest which descends the slope almost to the inlet margin.

A small area of radiata pine forest on the western margins of the lagoon has a groundcover of needles and a few stacks of cut firewood. On the southern side of the lagoon outlet is forest dominated by radiata pine. Scattered macrocarpa are also present. The ground is covered in sand and pine needle litter.

8.5 Scrub dominated by exotic species

8.5.1 Gorse scrub and Scotch broom scrub

Several small patches of gorse scrub and Scotch broom scrub are present on flats and low hillslopes in the east and southeast of the study area. These are surrounded by rank grassland dominated by tall fescue and cocksfoot. Some examples on the margins of Hawksbury Inlet have a few tall unidentified trees (possibly eucalypts) growing in or near them. One patch near the southern end of Inverness Street comprises gorse, with elder and hawthorn. These examples were viewed from a distance.

Gorse is also present along a small drain in the southwest part of the site that adjoins Stewart Street, adjacent to pasture grazed by horses.

8.5.2 Lupin scrub

Lupin scrub is present on dunes near the beach. Marram is also present. Small areas of lupin scrub and shrubland are also present next to gorse scrub on low hillslopes near 70 Greenlaw Street (Maori land). These areas were viewed from a distance.

Plate 4: Lupin (L), gorse (G), and Scotch broom (B) scrub on hillslopes and flats on the southeast side of Hawksbury Lagoon. This photograph was taken from the main causeway over the excavated channel of Post Office Creek.

8.6 Harakeke flaxland

Harakeke-dominant vegetation is present on a small island located in the south-eastern part of the lagoon. Other species present include gorse (some dead), knobby clubrush, and tall fescue. At the northern end of the island there is a band of saltmarsh ribbonwood, linked to a band of oioi (*Apodasmia similis*) rushland.

Harakeke-dominant plantings are also present near Inverary Street and on private property on the western margins of the lagoon. Other species present include cabbage tree, toetoe, and kohuhu.

8.7 Mudflats and open water

Mudflats are present east of the main causeway and walking track. Little vegetation is present except for scattered *Elatine gratioloides*. There is a small clump of three-square (*Schoenoplectus pungens*) at the northern end of one mudflat, with scattered batchelor's buttons (*Cotula coronopifilia*) along its margins. The main lagoon, Hawksbury Inlet, and Post Office Creek contained mostly open water at the time of survey.

Plate 5: Mudflats with *Elatine gratioloides* bordering a close-cropped turf of creeping bent, in the northeast of Hawksbury Lagoon. Forest dominated by macrocarpa and radiata pine is visible on hillslopes on the left.

8.8 Turf

In the northeast of the site, mudflats border a turf of close-cropped creeping bent, with patchy *Selliera radicans*, *Apium prostratum*, and *Leptinella dioica* on its western edge.

Turf dominated by *Leptinella dioica* and creeping bent is present on wet western margins of the lagoon north of Scotia Street. Other species present include tall fescue, *Selliera radicans*, *Samolus repens*, *Apium prostratum*, buck's horn plantain (*Plantago coronopus*), and *Plantago triandra*.

Turf dominated by *Leptinella dioica* and creeping bent also extends under nearby poplar, willow, and eucalyptus trees, but associate species there are narrow-leaved plantain, *Senecio minimus*, yarrow, white clover, daisy, selfheal (*Prunella vulgaris*), broad-leaved dock, hemlock, foxglove, and scattered ragwort. Turf habitats appear to be maintained by waterfowl grazing.

Plate 6: Turf dominated by creeping bent, *Leptinella dioica*, and *Selliera radicans*, with scattered *Apium prostratum* and tall fescue, located on the eastern margins of Hawksbury Lagoon.

8.9 Mossfield

Mossfield is present next to the railway in the northwestern part of the study area. The vegetation comprises an abundant unidentified moss species, frequent creeping bent and narrow-leaved plantain, and occasional *Trifolium dubium*, ragwort, and foxglove. Variegated flax has been planted on the lagoon margins near this area.

8.10 Residential properties and market garden

Residential property boundaries are very close to, or abut, the lagoon in the south and southwest of the study area. Residential gardens incorporate many exotic plant species (which are not identified in this report), some of which are likely to be invasive (e.g. cotoneaster and Chilean rhubarb (*Gunnera tinctoria*)). Mown lawns often reach to the water's edge. In some cases, residents have incorporated parts of reserve land into their gardens. This is especially evident in the DCC-administered esplanade reserve (CARS 19) on the western margins of the lagoon.

Land at the head of Hawksbury Inlet is leased. Current land uses include market gardening and sheep grazing.

9. FLORA

A total of 121 plant species were recorded, of which 43 (36%) were local natives, five (4%) were non-local natives, and 72 (60%) were exotics (Appendix 1). Two species are classified as nationally uncommon (as per de Lange *et al*. 2009). Gossamer grass (*Anemanthele lessoniana*; At Risk-Declining) was recorded under a canopy of exotic trees on the western margins of the lagoon. This species is commonly grown in gardens and it is likely that the observed plants were garden escapes rather than naturally-occurring specimens. Pingao (*Desmoschoenus spiralis*; At Risk-Relict) has been planted on dunes near the beach, and plantings have been partially destroyed after a storm.

Many invasive weed species are present. Several patches of periwinkle (*Vinca major*) were recorded at the head of the lagoon and at the end of Scotia Street. A large infestation of ivy (*Hedera helix*) is also present within exotic grassland at the end of Scotia Street. Flowering currant (*Ribes sanguineum*) and Scotch broom (*Cytisus scoparius*) are common alongside the railway line, with Scotch broom also present on south-eastern lagoon margins. Elder (*Sambucus nigra*) is scattered along both eastern and western margins. Gorse (*Ulex europaeus*) is mostly concentrated on hillslopes in the southeastern part of the site. Hawthorn (*Crataegus monogyna*) is only common under oak forest, but is also present in the western part of the site. Pampas (*Cortaderia selloana*) is scattered along the causeways. Marram grass (*Ammophila arenaria*) is common only on dunes near the sea, although there is one small area on the main causeway. Only a few plants of stinking iris (*Iris foetidisma*), blackberry, karamu (*Coprosma robusta*), cotoneaster (*Cotoneaster* sp.), holly (*Ilex aquifolium*), red hot poker (*Kniphofia uvaria*), and male fern (*Dryopteris filix-mas*) were recorded. Of the tree species present, the greatest threats are posed by crack willow (*Salix fragilis*), alder (*Alnus glutinosa*), and silver birch (*Betula pendula*), all of which can spread within wetland environments. Abundant, low-stature exotic grasses such as tall fescue (*Schedonorus phoenix*) and creeping bent (*Agrostis stolonifera*) will require repeated control around any indigenous plantings.

Plate 7: Pampas on the main causeway at the southern end of Hawksbury Lagoon.

10. FAUNA

10.1 Avifauna

More than 30 bird species of have been recorded at Hawksbury Lagoon (Appendix 3), several of which are nationally threatened or uncommon species (Table 1). The lagoon also provides important habitat for more common water fowl such as New Zealand shoveler (*Anas rhynchotis variegate*), paradise shelduck (*Tadorna variegata*), grey teal (*Anas gracilis*), black swan (*Cygnus atratus*), and mallard (*Anas platyrhynchos*). Several species breed at the site. While there is a predominance of wetland bird species, a few common forest species such as grey warbler (*Gerygone igata*), bellbird (*Anthornis melanura melanura*), and tui (*Prosthemadera novaeseelandiae novaeseelandiae*) are also present.

Table 1: Nationally threatened and uncommon avifauna recorded at Hawksbury Lagoon. National threat classifications are from Miskelly *et al*. (2009).

Species	Common Name	Threat Classification
Anas superciliosa superciliosa	Grey duck	Threatened - Nationally Critical
Egretta alba modesta	White heron	Threatened - Nationally Critical
Falco novaeseelandiae "eastern"	Eastern falcon	Threatened - Nationally Vulnerable

Species	Common Name	Threat Classification
Haematopus unicolor	Variable oystercatcher	At Risk - Recovering
Himantopus himantopus leucocephalus	Pied stilt	At Risk - Declining
Hydroprogne caspia	Caspian tern	Threatened - Nationally Vulnerable
Larus bulleri	Black-billed gull	Threatened - Nationally Endangered
Larus novaehollandiae scopulinus	Red-billed gull	Threatened - Nationally Vulnerable
Phalacrocorax carbo novaehollandiae	Black shag	At Risk - Naturally Uncommon
Phalacrocorax melanoleucos brevirostris	Little shag	At Risk - Naturally Uncommon
Phalacrocorax sulcirostris	Little black shag	At Risk - Naturally Uncommon
Platalea regia	Royal spoonbill	At Risk - Naturally Uncommon

10.2 Fish

There are no fish records for Hawksbury Lagoon or contributing tributaries in the New Zealand Freshwater Fish Database (NIWA 2009). However the Regional Plan: Coast for Otago (ORC 2004), lists eels and inanga as present (Table 2). Department of Conservation (1987) lists bullies (*Gobiomorphus* sp.), eels, and occasional visits by salt water species when the outlet is open to the sea.

Table 2: Freshwater fish species recorded at Hawksbury Lagoon (ORC 2004).

Species	Common Name	Threat Classification
Anguilla sp.	Eel	N/A (depends on species)
Galaxias maculatus	Inanga	Not Threatened
Gobiomorphus sp.	Bully	Not Threatened

10.3 Herpetofauna

Department of Conservation (1987) lists common skink (*Oligosoma nigriplantare polychrome* - Not Threatened) and frogs (species not identified) as present.

10.4 Mammals

European rabbits (*Oryctolagus cuniculus*) were observed at the site. Other pest animals that are also likely to be present include brown hares (*Lepus europaeus*), rats (*Rattus* spp.), brushtail possums (*Trichosurus vulpecula*), hedgehogs (*Erinaceus europaeus*), domestic cats (*Felis catus*), house mice (*Mus musculus*), and mustelids (*Mustela* spp.). Domestic dogs (*Canis familiaris*) are taken on lagoon walking tracks. Sheep have access to mudflats and turf through macrocarpa forest in the northeastern part of the site, although sign was only observed in forest. Sheep also graze hillslope pasture at the head of Hawksbury Inlet.

PART 2:

ECOLOGICAL MANAGEMENT PLAN

11. VISION

It is suggested that a vision is developed for the restoration of Hawksbury Lagoon. The vision should, ideally, include elements such as improving water quality and the extent and quality of indigenous vegetation and fauna habitats, specifically referring to indigenous plants, birds, fish, and invertebrates. A vision could be along the following lines:

> **To restore and maintain ecological health and key ecological processes of the Hawskbury Lagoon, to provide long-term good quality habitats for indigenous plants, birds, fish, and other biota.**

12. RESTORATION OBJECTIVES

In order to meet the overall vision, a series of objectives for Hawksbury Lagoon ecological restoration should be developed. The following are suggested:

- To increase the extent of indigenous vegetation through plantings;
- To improve water quality through the establishment of indigenous vegetation;
- To improve habitats for native plants and fauna through control of weeds, establishment of indigenous vegetation, and improvement of water quality;
- To reduce the incidence of ecological weeds through weed control;

Other objectives relating to recreation and amenity values would be relevant, but are outside the scope of this report.

13. VEGETATION AND HABITAT RESTORATION APPROACH

13.1 Stakeholders

Several organisations, groups, and individuals are likely to have an interest in restoration plans and activities undertaken at Hawksbury Lagoon. These include, but are not limited to, the Department of Conservation, Otago Regional Council, Dunedin City Council, NZ Fish and Game, NZ Ornithological Society, local residents and property owners, and local Maori. Involving and working with all of these stakeholders will be required for successful restoration of Hawksbury Lagoon.

13.2 Hydrology and water quality

Several options have been previously considered by the Department of Conservation (DOC) for altering hydrological flows to improve water quality (Ian Hadland, Fish & Game New Zealand, pers. comm., August 2009). This information could be obtained from DOC or Fish & Game, and be used to determine or advance ideas on possible water management strategies. Due to the need to protect existing properties from flooding and decrease the incidence of nuisance insects, it appears that permanent opening of all culverts between Post Office Creek and the lagoon is not a viable

option. It has been suggested recently that installing a weir at the southern end of the lagoon and permanently opening a culvert at the northern end would be the best solution. The feasibility of this option would need to be investigated by a hydrological engineer. At a minimum, new and easily-managed flap gates should be installed so that they can be opened and closed easily. However, this option still requires a volunteer to manage water levels.

Whatever option is adopted, ecological restoration can proceed with the existing water management regime. Well-drained habitats will not change markedly with any modification of the existing system, and any wetland plantings, if appropriate species are used, will migrate with any gradual change in the water level regime. Water quality is likely to improve with establishment of aquatic species such as raupo (*Typha orientalis*), which will help to trap suspended sediment and thereby reduce nutrients levels which promote nuisance algal growth.

13.3 Management zones

Eleven management zones (A-K) have been identified based on existing land cover, land use, and location (Figure 2). The primary purpose of these zones is to identify specific management needs for particular areas. It is not envisaged at this stage that restoration would be undertaken on dunes and beach as, ideally, this should be undertaken as part of the restoration of the entire DCC-administered estate (part of Waikouaiti Sports Ground and the Waikouaiti Recreation Reserve) that extends south to the Waikouaiti River estuary. The restoration approach for each management zone is outlined below:

Zone A: Inverary Street

Aim: To retain an accessible mown area for picnics, views, and other related uses while increasing indigenous habitats by undertaking plantings along the lagoon margins, as 'clumps' within the mown area, and in the entire north-western half of the zone.

Weeds: Periwinkle, tall fescue, and sitka spruce are the main weeds along the lagoon margins. Alder and willow are present in the mown area. Rank cocksfoot and other exotic grasses are dominant in the north-western half of site. Removal of non-local planted species such as karamu and non-invasive species such as tortured willow and poplar would increase ecological values if indigenous plantings are undertaken.

Planting: Species tolerant of moist soils (Table 4) should be planted on lagoon margins. Plant species of well-drained sites from the edge of mown area to near the railway line, and as 'clumps' within the mown area.

Amenity: Seating, tables.

Notes: Builds on plantings already undertaken. Leave a 10 m-wide unplanted buffer zone near the railway line. Permission to control weeds on railway land should be sought. Plantings may need protection from vandalism in this area.

Zone B: Walkways/Causeways

Aim: To increase indigenous habitats and protect against wave-induced erosion, while retaining views.

Weeds: Pampas, marram, lupin, gorse, apple, and Scotch broom. Removal of several planted non-local species such as *Olearia traversiorum* and *Pittosporum ralphii* would increase ecological values in the long term.

Planting: Plant species tolerant of moist soils that will 'soften' wave action on the sides of causeways. Species suited to well-drained sites can be planted on top. Use species that will not require large amounts of maintenance to keep the walkway open. Leave gaps at top of the causeway unplanted so that views are retained (but plant lower banks).

Works: Repair of eroded parts of the causeway may be necessary before planting.

Notes: It is the Society's wish that non-local native species planted by former members be retained.

Zone C: Conifer Forest and Oak Forest

Aim: To create indigenous coastal forest comprising Hall's totara, ngaio, narrow-leaved lacebark, ribbonwood, kowhai, mahoe, and other appropriate tree species.

Weeds: Boxthorn, hawthorn, Scotch broom, radiata pine, macrocarpa, oak, beech, and planted non-local natives.

Planting: Species of well-drained sites on hillslopes, with a narrow band of moisture tolerant species on lagoon margins.

Notes: The felling of large trees is a major undertaking and contractor quotes should be sought. Most of the felled material will need to be removed from the site (or mulched) to allow access for planting and maintenance.

Zone D: Margins of Hawksbury Inlet

Aim: To create indigenous podocarp/broadleaved forest on upper slopes and increase the extent of indigenous vegetation on moist soils.

Weeds: Crack willow, gorse, lupin, hawthorn, Scotch broom, and a few unidentified trees (viewed from a distance). Elder is present next to Edinburgh Street.

Planting: Hillslopes as for Zone C. Large area of moist soils at head of inlet with some *Carex geminata* already present.

Notes: Grazing of unplanted pasture at the head of Hawksbury Inlet should be continued, with progressive removal of stock as staged planting proceeds. Totara has already been planted at two sites. Rank grass should be controlled by mechanical releasing and/or mulching and the gaps between existing trees planted with appropriate indigenous species (Table 4).

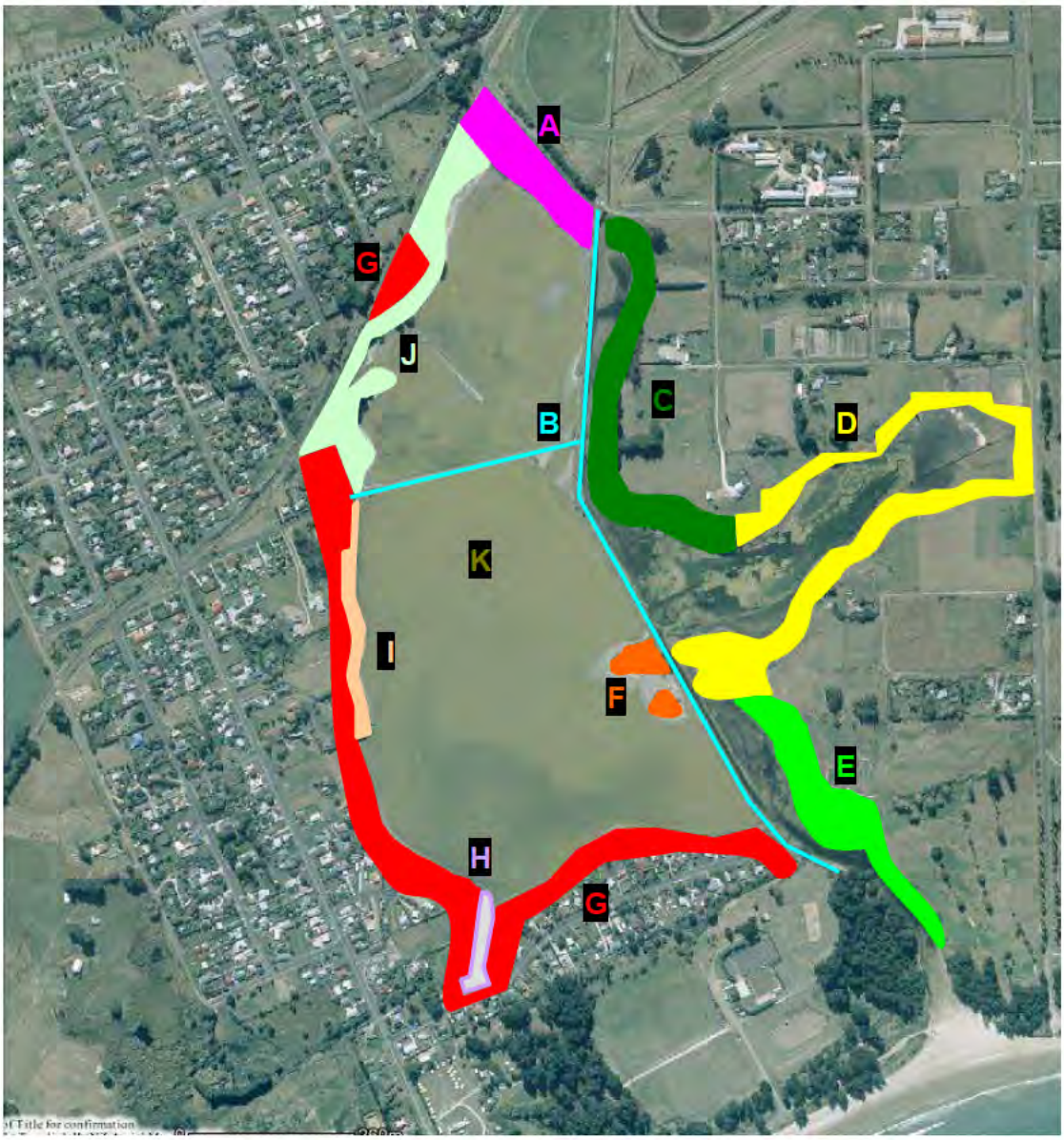

Figure 2: Management zones (A-K), Hawksbury Lagoon.

Zone E: Eastern Side of Outlet

Aim: To increase the extent of indigenous vegetation and habitats.

Weeds: Radiata pine, macrocarpa, poplar, elder, gorse, Scotch broom, lupin, hawthorn.

Planting: Plant low-lying area currently covered in tall fescue and scattered gorse and Scotch broom with species tolerant of moist site conditions. Hillslopes planted in species of well-drained sites.

Zone F: Island and Peninsula

Aim: To increase the quality and quantity indigenous habitats by building on previous plantings and weed control.

Weeds: Silver birch, macrocarpa, and gorse.

Planting: Fill gaps in current indigenous cover with flax. Leave some areas open for views.

Notes: Removal of macrocarpa is a major undertaking, seek quotes from contractors.

Zone G: Residential Properties

Aim: Educate owners as to value of indigenous species.

Weeds: Likely to be many (most properties not visited). Includes willows, cotoneaster, and non-local natives.

Planting: Encourage property owners to plant locally-sourced indigenous species on lagoon margins. Educate people about the weediness of some non-local native species such as karamu and the potential impacts of pets on wildlife.

Notes: Due to the difficulty of liaising with a large number of landowners, this zone has the lowest priority for restoration. At least one property owner has already undertaken indigenous plantings of flax, cabbage tree, and kohuhu.

Zone H: Horse Paddock

Aim: To establish indigenous habitats, while providing access to, and views from, the lagoon margin.

Weeds: Pampas, eucalyptus, and gorse. Willow on property boundary to the east. Hawthorn on property to northwest.

Amenity: Construct gravel path to viewing area by lake.

Planting: Species tolerant of moist soil by stream and lagoon edge. Elsewhere species of well-drained sites.

Notes: Remove grazing animals.

Zone I: DCC Reserve, Western Margins

Aim: To create a buffer of indigenous vegetation along the lake edge.

Weeds: Non-local natives, cotoneaster. Ivy in narrow strip north of DCC reserve.

Planting: Low-stature species tolerant of moist soils (e.g. flax, toetoe). Locally-sourced indigenous species could be supplied to adjacent landowners to plant in the reserve.

Notes: This zone incorporates a narrow strip north of the DCC reserve. The reserve is incorporated into nearby residential gardens (it is mown, planted). Steep slopes on nearby residential properties will enable views to be retained if lower stature species are planted.

Zone J: North-Western Margins

Aim: Increase extent of indigenous habitats.

Weeds: Variegated flax, stinking iris, male fern, elder, crack willow, blackberry, hawthorn, Scotch broom, flowering currant, Sitka spruce, eucalyptus, and poplar. Neighbouring property has a tall hawthorn hedge.

Planting: Do not plant areas of *Leptinella* turf alongside the lagoon. The low-lying area to the north (covered in tall fescue grassland) and a small stream further south should be planted in species tolerant of moist/wet soils. Species suited to well-drained sites for higher elevation areas.

Notes: Do not plant in a 5-10 m wide buffer zone alongside the railway line. Permission to undertake plantings and control weeds on railway land should be sought. The nearby landowner appears to manage some areas beyond their property boundaries and there may be some resistance to removal of existing exotic trees.

Zone K: Open Water, Mudflats, and Turf

Aim: To create habitats for indigenous avifauna by planting aquatic species.

Weeds: Creeping bent-dominant turf provides food for grazing waterfowl and should not be controlled.

Planting: Aquatic species. Plant at selected sites around lagoon margins. Include sites distant from access ways, to provide nesting sites for avifauna.

Notes: Consider construction of an island(s) at least 50 m from lagoon margins or causeways. Plant the island in indigenous species, as well as nearby aquatic habitats.

13.4 Weed control

Many environmental weeds are present. These are listed below in Table 3 with their recommended control techniques. Resource consent may be required for the use of herbicide near water.

Table 3: Control methods recommended for selected environmental weeds recorded in the Hawksbury Lagoon study area, July 2009.

Species/Group	Control Method
Blackberry (*Rubus fruticosus* agg.)	Dig out and dispose of root crowns off-site or cut and paste stump with herbicide.
Boxthorn (*Lycium ferocissimum*)	Pull out seedlings or cut and paste stump with herbicide.
Cotoneaster (*Cotoneaster* sp.)	Pull out seedlings or cut and paste stump with herbicide.
Crack willow (*Salix fragilis*)	Kill specimens located in inaccessible areas while standing. Bore a hole every 100 mm around the trunk and fill each hole with undiluted Glyphosate (10ml) or 2,4-D ester (20ml).
Elder (*Sambucus nigra*)	Pull out seedlings or cut and paste stump with herbicide; stack wood off ground or remove from site to prevent resprouting.
Exotic grasses and grassland herbs	Spray with Glyphosate herbicide.
Flowering currant (*Ribes sanguineum*)	Pull out seedlings or cut and paste stump with herbicide.
Gorse (*Ulex europaeus*)	Cut and paste stump with herbicide.
Hawthorn (*Crataegus monogyna*)	Cut and paste stump with herbicide.
Holly (*Ilex aquifolium*)	Pull out seedlings or cut and paste stump with herbicide.
Ivy (*Hedera helix*)	Spray with Glyphosate herbicide or, for vines growing up trees, cut and paste stump with herbicide; seek access to and control ivy on private property near Scotia Street.
Karamu (*Coprosma robusta*)	Pull out seedlings or cut and paste stump with herbicide.
Male fern (*Dryopteris filix-mas*)	Dig out and dispose off-site.
Marram (*Ammophila arenaria*)	Spray with Glyphosate herbicide.
Pampas (*Cortaderia selloana*)	Spray with Glyphosate herbicide.
Periwinkle (*Vinca major*)	Spray with Glyphosate herbicide; seek access to and control periwinkle on private property near Scotia Street; hard to kill and constant follow-up control required.
Red hot poker (*Kniphofia uvaria*)	Dig out and dispose of tubers off-site.
Scotch broom (*Cytisus scoparius*)	Cut and paste stump with herbicide.
Stinking iris (*Iris foetidisma*)	Spray with Glyphosate herbicide or dig out and dispose of rhizomes off-site.

13.5 Specimen trees

Many exotic trees have been planted within the project area. These include golden willow, tortured willow, alder, macrocarpa, silver birch, radiata pine, poplars, oak, and beech. Some of these provide food sources for birds (e.g. oaks provide acorns that are eaten by ducks), as well as shelter and nest sites (white-faced heron have nested in radiata pine), but in general, these trees do not provide as many ecological benefits as indigenous vegetation would. In addition, some species (e.g. silver birch,

alder) pose a risk to existing values and to restoration activities due to their invasive nature. It is therefore recommended that these trees are progressively removed from areas targeted for restoration plantings. Willows require herbicide application to kill them, either by boring, frilling, or painting cut stumps. All other trees can be felled, making sure no foliage is left below the cut. If some specimen trees (such as oaks) are retained, under-planting with indigenous species will increase ecological values.

13.6 Planting guidelines

A key management objective for restoration of Hawksbury Lagoon is the establishment of indigenous vegetation cover in order to improve water quality and enhance aquatic and well-drained habitats. This will require fencing to exclude livestock, weed control, pest animal control, planting, and ongoing maintenance.

13.6.1 Fencing

Stock should be excluded from the head of Hawksbury Inlet before planting is undertaken in this area. This should be possible by keeping stock behind existing fence lines[1]. The breach in the fence in the northeastern corner of the site should be fixed before beginning any other work. Permanent 8-wire fencing is recommended, as this will exclude both cattle and sheep, and requires little maintenance. If any fencing is required at a later date, the fence should be placed as far from the wetland as possible (this will usually be on the property boundary). In pasture areas, leaving an unplanted strip 1 m wide between the fence and the plantings will prevent plantings from being eaten by livestock, and allow for the development of a strip of rank grass which will entrap sediment and slow overland flow of water.

13.6.2 Site preparation

Site preparation is a key factor in the successful establishment of indigenous plantings. Non-invasive weeds should be sprayed with a Glyphosate-based herbicide two weeks prior to planting. Larger woody species will require felling or killing with herbicide while standing. Many weed species will require follow up control operations to ensure total removal prior to planting. The weed control component of site preparation should be undertaken over the summer months in those areas designated for planting in the following autumn.

13.6.3 Pest animal control

Pest animals will require control prior to planting. There are likely to be several potentially problematical pest species present, including brushtail possums, brown hares, and rabbits. It is important that these species are controlled to levels that will not affect the revegetation plantings or natural regeneration. Possum control can be undertaken using a network of bait stations. Rabbits and hares are best controlled by spotlighting and shooting, but because the lagoon is located in a residential area, pindone poison baits are likely to be the preferred option. See Section 12.6.4 for more detail on pest animal control.

[1] Redundant fences/posts located in open water and mudflats in the Hawksbury Inlet and on western margins of the lagoon could be removed, although this is not required on ecological grounds.

13.6.4 Planting

Eco-Sourcing

The species to be planted at the restoration site should occur naturally at other similar habitats in Waikouaiti Ecological District and they should be "eco-sourced" (grown from seeds, propagules or cuttings collected from naturally occurring populations elsewhere in the Waikouaiti Ecological District or the Otago Coast Ecological Region). Cultivars of indigenous species (e.g. variegated flax, *Pseudopanax* spp., *Pittosporum* spp.) and non-local natives (e.g. karamu, *Hoheria populnea*, *Olearia traversii*, *Pittosporum ralphii*) are not suitable for restoration plantings.

Species Selection

Species selection for indigenous plantings must be guided by local factors such as existing vegetation cover, soil type, and flooding regime (Table 4). Planting sites can be divided into four broad categories on the basis of soil moisture and flooding levels:

- Hillslopes, with well-drained soils, should be planted in taller trees and shrubs.
- Low banks, causeways near the lagoon, and low-lying areas, should be dominated by species tolerant of moist soils, including scattered woody plants, such as koromiko, *Coprosma propinqua*, and manuka.
- Lagoon margins, with wet soils, should have plants that are able to withstand regular inundation, such as sedges.
- Aquatic sites should have species such as raupo that tolerate permanent inundation.

Plant schedules (Table 4) are dominated by hardy species such as flax and *Coprosma propinqua*. On hillslopes these species will provide shelter for slower-growing species such as totara and matai.

Plant Stock, Spacing, and Density

The density of plantings and the grades of plants used will determine the total planting cost. In revegetation plantings, some species can establish from a root trainer (RT) size (if planted well), but others, as noted in the plant schedules, require planting at bigger grades (PB3 or larger) to ensure successful establishment. To achieve good success when using smaller grade plants, site preparation must be carried out to a high standard and plants must be well cared for prior to planting. Weed control and releasing around plants must be undertaken carefully and on time. In order to keep costs as low as possible at Hawksbury Lagoon, while still achieving good ecological outcomes, plantings are dominated by smaller grade, low-cost species such as flax.

A high planting density of 10,000 plants/ha (1 m centres) is recommended to achieve canopy closure within 2-3 years of planting and reduce the opportunity for weed establishment. Large canopy trees such as Hall's totara and kahikatea are spaced at least 5 m apart amongst the smaller, faster growing species which are spaced 1 m apart. On lagoon margins, sedges and grasses should be planted at 0.5-0.75 m centres to rapidly cover the bank and reduce erosion from wave action.

Planting at this density will require considerable resources, which may not be available to the Society. In this case, a staged approach may be a better option, involving successive planting of small areas over a duration of ten or more years.

Planting density could be reduced, but this would require more post-planting maintenance to prevent smothering of planted trees by exotic grass swards. It would be better to plant at 1 m spacing within clumps, and disperse individual clumps so that overall density within a fixed area would be reduced. Over time, the gaps between clumps should also be planted.

Table 4: Planting schedule for well-drained, moist, and wet sites at Hawksbury Lagoon. The proportion of each species to be planted is provided (e.g. 45% of plants in wet sites should be *Carex geminata*).

Scientific Name	Common Name	Plant Size	Spacing (m)	Dry Sites (%)	Moist Sites (%)	Wet Sites (%)	Aquatic
Apodasmia similis[1]	oioi	RT	0.5	0	0	0	✓
Aristotelia serrata	wineberry	PB	5	5	0	0	×
Carex geminata		PB	0.5	0	0	45	×
Carpodetus serratus	putaputaweta	PB	1	1	0	0	×
Coprosma propinqua		PB	1	10	15	0	×
Cordyline australis	cabbage tree	PB	1	10	10	5	×
Cortaderia richardii	toetoe	RT	0.5	0	20	20	×
Dacrycarpus dacrydioides	kahikatea	PB	5	0	1	0	×
Dacrydium cupressinum	rimu	PB	5	1	0	0	×
Eleocharis acuta[1]	sharp spike sedge	RT	0.5	0	0	0	✓
Ficinia nodosa[1]	knobby clubrush, wiwi	RT	0.5	0	1	2	×
Griselinia littoralis	broadleaf	PB	5	5	0	0	×
Hebe salicifolia	koromiko	PB	1	0	5	0	×
Hoheria angustifolia	narrow-leaved lacebark	PB	5	5	0	0	×
Isolepis cernua[1]	slender clubrush	RT	0	0	0	0	✓
Juncus kraussii var. *australiensis*[1]	searush	RT	0.5	0	0	1	×
Kunzea ericoides	kanuka	RT	1	4	0	0	×
Leptospermum scoparium	manuka	RT	1	0	15	2	×
Melicope simplex[3]		PB	1	1	0	0	×
Melicytus ramiflorus	mahoe	PB	1	3	0	0	×
Myoporum laetum[2]	ngaio	PB	5	1	0	0	×
Myrsine australis	mapou	PB	1	1	0	0	×
Olearia avicenniifolia		PB	5	6	0	0	×
Phormium tenax	harakeke, flax	RT	1	20	30	25	×
Pittosporum tenuifolium	kohuhu	PB	1	20	0	0	×
Plagianthis divaricatus	saltmarsh ribbonwood	PB	1	0	2	0	×
Plagianthus regius	lacebark	PB	5	1	0	0	×
Podocarpus hallii	Hall's totara	PB	5	1	0	0	×
Prumnopitys taxifolia	matai	PB	5	1	0	0	×
Pseudopanax crassifolius[3]	lancewood	PB	1	3	0	0	×
Schoenoplectus pungens[1]	three-square	RT	0	0	0	0	✓
Sophora microphylla	kowhai	PB	5	1	1	0	×
Typha orientalis[1]	raupo	PB	0.5	0	0	0	✓

[1] Plant as 'clumps' at selected locations on lagoon margins.
[2] Plant only near lagoon outlet.
[3] Plant once cover established.

Timing

Plants should be ordered as early as possible (up to a year before planting). This will enable the supplier(s) to ensure that they have enough stock of the appropriate species, and can mean that the price per plant is more economical than if the plants are purchased without placing a prior order. Planting of well-drained sites should be undertaken in early autumn (March-April) or late winter/early spring (August-early September), but the timing of planting needs to be flexible and to take account of seasonal weather patterns. For example if a very dry summer is experienced, soil moisture may not be sufficient for autumn planting. Spring plantings can be affected by equinoctial or dry northwest winds and staking may be required to provide initial support for species that are susceptible to wind, with irrigation required for those species that are sensitive to water stress. Planting of wetland sites (e.g. reservoir margins and drains) should be undertaken in November, when the stems of wetland plants are actively growing and will not rot.

Maintaining Plantings

The plantings will need to be released from weed competition two or three times during the first year following planting, and 1-2 times in the following two or three years, until the indigenous plants have become established. Aggressive woody weeds, such as elder, gorse, and Scotch broom, are likely to require further control until canopy closure is achieved.

Plants that die in the first year should be replaced, particularly where their absence would allow the growth of aggressive weeds. Some infilling planting may also be required in subsequent years.

Monitoring

For the first year following planting, all plantings should be inspected on a fortnightly or monthly basis, depending on seasonal requirements. This surveillance will allow the project manager to identify changes in vegetation composition, assess the survival of indigenous plants, and gauge the success of weed control. The information can be used to determine if further infill planting and/or pest control is required.

While not essential, monitoring can detect patterns of change over time in plant growth, and the effectiveness of weed control. A simple method is to establish fixed photopoints and to take photographs at set intervals, e.g. every six or twelve months. At the least, photographs should be taken prior to work starting and on completion.

13.7 Habitat enhancement for fauna

13.7.1 Habitat diversity

Indigenous wetland and forest birds that are likely to utilise a restored lagoon require a variety of habitats. For example:

- Mallards, grey duck, New Zealand shoveler, and grey teal favour shallow water around the edges of the lagoon.

- Paradise shelduck feed on turf within the lagoon.
- Pied stilts feed on worms and insects in shallow water and mud flats.
- All waterfowl need open water to moult in safety, away from predators.
- Tui, silvereyes, and bellbirds will feed on flax and kowhai nectar.
- Pukeko nest on clumps of grass or rushes and feed on grasses, clover, and raupo.
- Kereru will eat kowhai foliage and the fruits of kahikatea.

Restoration should focus on improving habitats for existing species. However, habitat may be able to be created or improved for other bird species, especially if combined with restoration at larger scales (e.g. Waikouaiti River Estuary, dune and beach restoration):

- Marsh crake prefer raupo swamps and saltmarsh habitats.
- Spotless crake prefer raupo swamps and reedbeds.
- South Island fernbird prefer wetlands with dense ground cover under a selection of shrubs and small trees like manuka.
- Australasian bittern prefer tall, dense raupo and reeds.

13.7.2 Food supplies

Wetland birds require a variety of food sources. Species such as white-faced heron, bittern, and royal spoonbill feed on fish, frogs, and invertebrates, while mallard and black swans feed on aquatic plants, and paradise shelduck and geese graze on pasture and aquatic vegetation. Tui, bellbird, silvereye feed on nectar from plants such as flax and kowhai, and kereru food sources include kowhai foliage and podocarp fruits. Indigenous plantings will supply additional food sources for forest and water birds, as well as provide shelter and increase habitat diversity.

As a large range of bird species currently utilise the lagoon, many of these food sources must exist in sufficient quantity to sustain their populations, or their seasonal food requirements. Indigenous plantings, especially aquatic plantings, will increase the diversity of invertebrates in the lagoon, but the only other way of increasing food supplies is through changing the hydrological regime of the lagoon. Regular tidal flushing would have the greatest effect on productivity, but this is an impractical scenario given the flooding threat to private property. The construction of a weir and open culvert may increase the food supply within the lagoon by improving water quality.

13.7.3 Islands

Along with the lack of suitable vegetation, a lack of predator-free areas is likely to be preventing several bird species from utilising and/or breeding at the site. One way of providing such habitats is to create an island (or two) in the middle of the lagoon. The surrounding water will discourage predators such as cats from reaching the island. The existing island is too close to the shore and, during periods of low water levels, is connected to the surrounding land by mudflats. The following guidelines apply to construction of islands:

- Site at a sufficient distance from the edge of the lagoon to discourage predators.

- Create gently-sloping edges to provide easy access for waterfowl and loafing areas.
- Plant with indigenous species, including aquatic species in surrounding water, to provide shelter, hiding places, and nest sites.

13.7.4 Pest animal control

Possum control undertaken for protection of plantings may also reduce predation on indigenous fauna, and improve ecological processes such as seed dispersal and pollination. Intensive mustelid and rat control may reduce predation rates on indigenous birds, lizards, and invertebrates. However, in general, there is less information on the benefits of intensive pest control for wetland bird communities than, for example, for indigenous forest bird communities, and the main contributors to improving wildlife habitat may be revegetation and catchment/hydrology management. The main benefit of mustelid and rat control (when combined with possum control) may be to improve the functioning of ecological processes, such as seed dispersal and pollination, which help sustain indigenous vegetation communities around the lagoon. Options for pest animal control at Hawksbury Lagoon are set out, with costs, in Table 5.

Table 5: Pest animal control options and costs for Hawksbury Lagoon.

Target Species	Operational Target	Method	Annual Cost[1]
Possum	Maintain possum numbers continuously at very low levels	Kill-traps (Timms trap, Warrior), approx. 45[2] traps checked fortnightly, or 45 baitstations filled 6 times per annum with Pestoff (if risks of catching domestic cats in traps are deemed unacceptable). Set-up cost approx. $1,000-$2,000	$3,000 - $4,680
Rabbit, hare	Maintain rabbit and hare numbers continuously at very low levels	Pindone, hand-laid, 4 times per annum (requires controlled substance licence.	$1,200
Dogs	Minimise disturbance and predation of wildlife, minimise risk to dogs	Compulsory use of leads Compulsory containment behind residential fences	
Domestic cats	Minimise disturbance and predation of wildlife, minimise risk to cats	Keep cats well-fed, speyed/neutered	
Indicative annual total to protect revegetation work and minimise disturbance (and risks to) domestic dogs and cats			**$4,200 - $5,880**
Mustelids (stoats, ferrets, weasels); rodents (Norway rat, ship rat)	Maintain mustelid and rat numbers continuously at very low levels	DOC200 kill-traps, approx. 45 checked fortnightly. Set-up cost approx. $3,000 - $4,000	$4,680
Indicative annual total for mustelid and rat control			**$4,680**
Overall Indicative Total			**$8,880 - $10,560**

[1] Indicative annual cost using contractor.
[2] Estimated 4.5 km lagoon perimeter, where bait stations/traps would be located.

Feral geese (*Anser anser*) could also be controlled. This has been previously undertaken by Fish & Game and the NZ Wildlife Service, but may no longer be carried out (Derek Onley pers. comm. August 2009).

13.7.5 Bird monitoring

The Ornithological Society undertakes bird counts at the lagoon 2-3 times per year. These counts could be used to assess the success of restoration activities with regard to avifauna.

13.8 Fisheries management

Movement of diadromous fish species from Hawksbury Lagoon to the sea is currently limited to when the outlet is open. This will not change under the proposed management regime. Existing culverts are barriers to fish passage when closed, and the velocity of water when open may also inhibit the passage of some species. If a weir is built at the southern end of the lagoon, then a fish pass can be incorporated into the design. Some relatively cheap designs are available (e.g. Mitchell 1994), although specialist advice should be sought on design and construction. An armoured outfall will be required to prevent erosion. An open channel/culvert at the northern end of the lagoon, if combined with the weir, may allow fish passage, thus negating the need for a fish pass. If current lagoon water levels are to be maintained, there do not appear to be any other options for fish passage other than the weir/open culvert combination.

Fish habitats will also be improved through the restoration of aquatic plant communities. Aquatic plants are important to fish because they:

- Purify water.
- Recycle nutrients.
- Provide a physical link between water and air that is required by many invertebrates (that are a food source).
- Provide refugia for zooplankton which graze phytoplankton and keep water clear.
- Provide cover for fish and invertebrates.
- Provide spawning areas.
- Provide food.
- Provide habitat diversity by affecting flow patterns and creating physical habitat (Petr 2000).

13.9 Recreational use

Recreational use can be compatible with the ecological values of some wetland areas, providing the following guidelines are followed:

- Dogs are leashed at all times.

- Boating is not permitted.

- Walkways are carefully placed to retain some areas away from public use. This may preclude the establishment of a walkway along the entire lagoon margins. Buffers of vegetation between tracks and the lagoon will also partially protect wildlife from disturbance.

- Walkways are appropriately surfaced to provide a low-maintenance permeable surface, and are set back from water margins.

- Boardwalks and bridges are used to cross side tributaries, in order to retain fish migration pathways.

- All wet areas, permanent or ephemeral, are crossed by boardwalks to avoid changes in site hydrology.

- Defined access points are allowed for between walkways and the waters edge, to focus use at locations that are less environmentally sensitive (e.g. away from steep banks, or areas of higher quality vegetation or fauna habitat).

13.10 Management of surrounding areas

A long term objective could be to improve the quality of water entering the lagoon by establishing riparian buffers alongside all contributing waterways. This would have the added benefits of increasing indigenous habitats and establishing links or 'stepping stones' for mobile species to other areas of indigenous habitat in the vicinity of Waikouaiti.

Restoration of dune/beach communities from the base of Cornish Head to the Waikouaiti River estuary would also increase the value of habitats for indigenous fauna, including birds (e.g. South Island fernbird). However, this is a major undertaking that requires a separate management plan and funding.

14. IMPLEMENTATION PLAN

14.1 Staged approach

The Hawksbury Lagoon site is large and therefore restoration activities should be staged over several years. If only small amounts of funding are received, then only small areas (*c*.1-1.5 ha) should be planted each year. This will leave sufficient resources available for maintenance of existing plantings, while undertaking ongoing restoration activities such as weed control elsewhere. Staged planting may also reduce the risk of extreme climatic events affecting all of the plantings.

14.2 Prioritisation of tasks

It is recommended that the staged approach is based on the following priorities:

- Confirm long-term water management regime.
- Seek funding.
- Order plants
- Install water control device(s)/fish pass, if required.
- Fix fence in north-east corner.

- Control invasive weeds (e.g. boxthorn, marram, pampas)
- For each management zone, or part of, in succession:
  - Planting preparation.
  - Undertake indigenous plantings.
  - Maintain plantings.
  - Monitor progress.

14.3 Prioritisation of zones

If funding or other resources are limited, the following management zones should be restored first:

- Zones that require the least planting preparation (i.e. dominated by exotic grassland).
- Zones with greatest potential ecological gain (e.g. aquatic habitats, buffers to other land uses).
- Highly visible zones (e.g. those visible from existing access points) to promote the project.

The highest priority zones are therefore A, B, D, F, H, and K. Second priority zones are E, C, I, and J. Zone G (residential properties) has the lowest priority. Although smaller areas within these latter zones could also be planted easily, it is probably better to work on each zone in its entirety.

15. COST ESTIMATES

15.1 Plantings

Planting cost estimates of *c.*$30,000/ha (Table 6) include the following:

- site preparation costs (spot-spraying or screefing, control of woody weeds). These vary between management zones.
- plant costs of $1.20 per RT and $3.50 per PB2/PB3.
- planting density of 10,000 plants/ha.
- 90-95% of plants being RTs.
- releasing of plantings 2-3 times/year for three years. Costs in years 2 and 3 are lower than in the first year.

15.2 Additional costs

Contractor quotes should be sought for felling of large trees (e.g. pines, macrocarpa, poplar, silver birch), and are additional to planting costs. A weir and a fish pass may cost as little as $2,000, depending on the design, but extra costs are likely to be incurred through the consent application process which may require an engineer's drawing and flow assessment. Contractors' quotes should also be sought for the upgrading of flap gates on existing weirs. Fence construction costs (Zone C) are likely to be $10-15/meter. Creating an island could cost $1,500 or more, depending on heavy digger transport costs, access, and resource consent requirements.

All of the cost estimates provided below are indicative only. When planning work, quotes should be sought from all contractors and suppliers required to undertake the work. Establishing a community native plant nursery and involving volunteers are useful options for reducing planting and maintenance costs.

Table 6: Cost estimates for restoration at Hawksbury Lagoon. Areas available for planting are approximate.

Zone	Plantable Area (ha)	Additional Costs	Plantings (Including Preparation and Maintenance)
A	0.5 (excludes retained mown areas)	Contractor tree felling	$15,000
B	0.3	-	$9,000
C	2.5	Contractor tree felling	$75,000
D	4.5	-	$135,000
E	1.5	Contractor tree felling	$45,000
F	<0.1	Contractor tree felling	$1,000
G	-	-	-
H	0.5	-	$15,000
I	0.5	Contractor tree felling	$15,000
J	2.0	Contractor tree felling	$60,000
K	0.5[1]	Island construction, weir, fish pass (all optional) + resource consent	$1,000 (plants only)
Total	**12.9**		**$371,000**

[1] Only small parts of the total area of open water to be planted.

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REFERENCES

Allen R.B. 1991: Restoration of native vegetation, Waikouaiti Beach and Hawkesbury Lagoon, East Otago. Prepared for Waikouaiti and Karitane Beautification Society and Dunedin City Council Recreation and Planning Department. DSIR Land Resources, Dunedin.

Cromarty P. (comp.) and Scott D.A. (Ed.) 1996: A directory of wetlands in New Zealand. Department of Conservation, Wellington.

de Lange P.J., Norton D.A., Courtney S.P., Heenan P.B., Barkla J.W., Cameron E.K., Hitchmough R. and Townsend A.J. 2009: Threatened and uncommon plants of New Zealand (2008 revision). *New Zealand Journal of Botany 47*: 61-96.

Department of Conservation 1987: Hawksbury Lagoon Reserve for Government purposes - Wildlife Refuge. Draft Management Plan. Department of Conservation.

Dunedin City Council 2006: Dunedin City District Plan. Operative 3 July 2006. Dunedin City Council, Dunedin.

Forest and Bird 2003: Forest and Bird (Dunedin Branch) Newsletter - December 2003. http://www.ecoimages.co.nz/ForestandBird/pdf/Dec03.pdf

McEwen W. M. (ed) 1987: Ecological Regions and Districts of New Zealand. *New Zealand Biological Resources Centre Publication No. 5*, Part 4. Department of Conservation, Wellington.

Mitchell C., 1994: Recommendations for a fish pass on the Braemar lagoon water level control weir. *Conservation Advisory Science Notes No. 91*. Department of Conservation, Wellington. 10 pp.

NIWA 2009: New Zealand Freshwater Fish Database. National Institute of Water and Atmospheric Research.

NZPCN 2009: New Zealand Plant Conservation Network. http://www.nzpcn.org.nz

Otago Regional Council 2001: Regional Plan: Coast for Otago. Otago Regional Council, Dunedin. 290 pp.

Otago Regional Council 2004: Regional Plan: Water for Otago. Otago Regional Council, Dunedin.

OSNZ 2007: Otago Region Newsletter 9/2007 October 2007. The Ornithological Society of New Zealand.

OSNZ 2009: Otago Region Newsletter 2/2009 February 2009. The Ornithological Society of New Zealand.

Petr T. 2000: Interactions between fish and aquatic macrophytes in inland waters: a review. *FAO Fisheries Technical paper 396*. Food and Agriculture Organization of the United Nations, Rome. 185 pp.

Waitakere City Council 2008: The Waitakere Best Practice Guidelines for Riparian Restoration. Final Draft. Waitakere City Council.

PLANT SPECIES RECORDED AT HAWKSBURY LAGOON DURING SITE VISITS

* Exotic species.
\# Non-local native species.

Species	Common Name	Plant Type	Abundance
Acaena novae-zelandiae	Bidibid	Dicot herb	Rare
*Achillea millefolium**	Yarrow	Dicot herb	Occasional
*Agrostis capillaris**	Browntop	Grass	Frequent
*Agrostis stolonifera**	Creeping bent	Grass	Occasional
*Alnus glutinosa**	Alder	Tree	Rare
*Ammophila arenaria**	Marram grass	Grass	Rare
Anemanthele lessoniana	Gossamer grass	Grass	Rare
Apium prostratum	Native celery	Dicot herb	Rare
Apodasmia similis	Oioi; jointed wire rush	Rush	Rare
*Barbarea intermedia**	Winter cress	Dicot herb	Rare
*Bellis perennis**	Daisy	Dicot herb	Rare
*Betula pendula**	Silver birch	Tree	Rare
*Callitriche stagnalis**	Starwort	Dicot herb	Rare
*Cardamine hirsuta**	Bitter cress	Dicot herb	Rare
Carex geminata	Purei	Sedge	Rare
*Cerastium fontanum**	Mouse-ear chickweed	Dicot herb	Rare
*Cirsium arvense**	Californian thistle	Dicot herb	Occasional
*Cirsium vulgare**	Scotch thistle	Dicot herb	Occasional
*Conium maculatum**	Hemlock	Dicot herb	Rare
Coprosma areolata		Tree	Rare
Coprosma dumosa		Shrub	Rare
Coprosma propinqua		Tree	Rare
Coprosma robusta#	Karamu	Tree	Rare
Cordyline australis	Cabbage tree; ti kouka	Tree	Occasional
*Cortaderia selloana**	Pampas	Grass	Rare
Cortideria richardii	Toetoe	Grass	Occasional
Cotoneaster sp.*	Cotoneaster	Shrub	Rare
Cotula coronopifolia	Bachelor's buttons	Dicot herb	Rare
*Crataegus monogyna**	Hawthorn	Tree	Occasional
*Crepis capillaris**	Hawksbeard	Dicot herb	Rare
Critesion murinum subsp. *murinum**	Barley grass	Grass	Rare
*Cupressus macrocarpa**	Macrocarpa	Tree	Frequent
*Cytisus scoparius**	Scotch broom	Shrub	Occasional
*Dactylis glomerata**	Cocksfoot	Grass	Abundant
Desmoschoenus spiralis	Pingao	Sedge	Rare
*Digitalis purpurea**	Foxglove	Dicot herb	Occasional
Dodonea viscosa#	Akeake	Tree	Rare
*Dryopteris filix-mas**	Male fern	Fern	Rare
Elatine gratioloides		Dicot herb	Occasional
Eucalyptus spp.*	Eucalyptus	Tree	Occasional
*Fagus sylvatica**	Beech	Tree	Occasional
Ficinia nodosa	Knobby clubrush	Rush	Occasional
*Galium aparine**	Cleavers	Dicot herb	Occasional
*Glyceria fluitans**	Floating sweetgrass	Grass	Rare

Species	Common Name	Plant Type	Abundance
*Hedera helix**	Ivy	Liane	Rare
*Hieracium pilosella**	Mouse-ear hawkweed	Dicot herb	Rare
Hoheria angustifolia	Narrow-leaved lacebark	Tree	Rare
Hoheria ?populnea#		Tree	Rare
*Holcus lanatus**	Yorkshire fog	Grass	Frequent
Hydrocotyle heteromeria	Waxweed	Dicot herb	Rare
*Hypochaeris radicata**	Catsear	Dicot herb	Occasional
*Ilex aquifolium**	Holly	Tree	Rare
*Iris foetidisma**	Stinking iris	Monocot herb	Rare
Juncus distegus		Rush	Rare
Juncus edgariae		Rush	Rare
*Kniphofia uvaria**	Red hot poker	Monocot herb	Rare
Lepidium sp.*	Argentine cress	Dicot herb	Occasional
Leptinella dioica		Dicot herb	Occasional
*Leucanthemum vulgare**	Oxeye daisy	Dicot herb	Rare
*Lupinus arboreus**	Lupin	Shrub	Occasional
*Lycium ferocissimum**	African boxthorn	Shrub	Rare
*Malus × domestica**	Apple	Tree	Rare
Microsorurm pustulatum	Hounds tongue fern	Fern	Rare
Muehlenbeckia australis	Pohuehue	Liane	Rare
Muehlenbeckia complexa	Shrubby pohuehue	Shrub	Rare
*Myostis sylvatica**	Garden forget-me-not	Dicot herb	Rare
*Nasturtium microphyllum**	Watercress	Dicot herb	Rare
Olearia arborescens	Tree daisy	Tree	Rare
Olearia avicenniifolia		Tree	Rare
Olearia lineata		Tree	Rare
Olearia traversiorum#		Tree	Occasional
Phormium tenax	Harakeke; flax	Monocot herb	Frequent
*Picea sitchensis**	Sitka spruce	Tree	Rare
*Pinus radiata**	Radiata pines	Tree	Frequent
Pittosporum eugenioides	Lemonwood	Tree	Rare
Pittosporum ralphii#		Tree	Rare
Pittosporum tenuifolium	Kohuhu	Tree	Occasional
Plagianthus divaricatus	Saltmarsh ribbonwood	Shrub	Occasional
*Plantago coronopus**	Buck's horn plantain	Dicot herb	Rare
*Plantago lanceolata**	Narrow-leaved plantain	Dicot herb	Occasional
Plantago triandra	Starweed	Dicot herb	Rare
Podocarpus totara	Totara	Tree	Rare
Polystichum vestitum	Prickly shield fern	Fern	Rare
*Populus alba**	White poplar	Tree	Rare
*Populus nigra**	Lombardy poplar	Tree	Rare
Populus sp.*	Poplar	Tree	Occasional
*Prunella vulgaris**	Selfheal	Dicot herb	Rare
Pyrrosia eleagnifolia	Leather-leaf fern	Fern	Rare
Quercus sp.*	Oak	Tree	Rare
*Ranunculus repens**	Creeping buttercup	Dicot herb	Occasional
Ranunculus amphitrichus	Waoriki	Dicot herb	Rare
*Ribes sanguineum**	Flowering currant	Shrub	Occasional
Rosa sp.*	Rose	Shrub	Rare
Rubus fruticosus agg.*	Blackberry	Shrub	Rare
*Rumex crispus**	Curled dock	Dicot herb	Occasional
*Rumex obtusifolius**	Broad-leaved dock	Dicot herb	Rare
Salix ?alba var. *vitellina**	Golden willow	Tree	Occasional
*Salix ?babylonica**	Weeping willow	Tree	Rare
*Salix fragilis**	Crack willow	Tree	Rare
Salix matsudana var. *tortuosa**	Tortured willow	Tree	Occasional

Species	Common Name	Plant Type	Abundance
*Sambucus nigra**	Elder	Tree	Occasional
Samolus repens		Dicot herb	Occasional
*Schedonorus phoenix**	Tall fescue	Grass	Abundant
Schoenoplectus pungens	Three-square	Rush	Rare
Selliera radicans	Remuremu	Dicot herb	Rare
*Senecio jacobaea**	Ragwort	Dicot herb	Occasional
Senecio minimus		Dicot herb	Occasional
*Senecio vulgaris**	Groundsel	Dicot herb	Rare
*Solanum dulcamara**	Bittersweet	Shrub	Occasional
Solanum laciniatum	Poroporo	Tree	Rare
*Solanum nigra**	Nightshade	Dicot herb	Rare
Sonchus oleraceus	Sow thistle	Dicot herb	Rare
Sophora microphylla	Kowhai	Tree	Rare
*Stelleria media**	Chickweed	Dicot herb	Occasional
*Trifolium dubium**	Suckling clover	Dicot herb	Rare
*Trifolium pratense**	Red clover	Dicot herb	Occasional
*Trifolium repens**	White clover	Dicot herb	Rare
*Ulex europaeus**	Gorse	Shrub	Occasional
*Urtica urens**	Nettle	Dicot herb	Rare
*Vicia sativa**	Vetch	Dicot herb	Occasional
*Vinca major**	Periwinkle	Dicot herb	Occasional

AVIFAUNA RECORDED AT HAWKSBURY LAGOON

References: Department of Conservation (1987), Forest and Bird (2003), ORC (2004), OSNZ (2007 & 2009), current survey, Derek Onley (pers. comm. August 2009).
National threat classifications are from Miskelly *et al*. (2009).
Hybrids (grey duck-mallard, black stilt-pied stilt, Canada goose-feral goose) have also been recorded.
*Exotic species.
†Rarely recorded

Species	Common Name	Threat Classification
*Alauda arvensis**	Skylark	Introduced and Naturalised
Anas gracilis	Grey teal	Not Threatened
*Anas platyrhynchos**	Mallard	Introduced and Naturalised
Anas rhynchotis variegata	New Zealand shoveler	Not Threatened
Anas superciliosa superciliosa	Grey duck	Threatened - Nationally Critical
*Anser anser**	Feral goose	Introduced and Naturalised
Anthornis melanura melanura	Bellbird	Not Threatened
Ardea novaehollandiae	White-faced heron	Not Threatened
Aythya novaeseelandiae†	New Zealand scaup	Not Threatened
*Branta canadensis**	Canada goose	Introduced and Naturalised
Chrysococcyx lucidus lucidus	Shining cuckoo	Not Threatened
*Carduelis carduelis**	Goldfinch	Introduced and Naturalised
*Carduelis chloris**	Greenfinch	Introduced and Naturalised
*Carduelis flammea**	Redpoll	Introduced and Naturalised
Charadrius melanops†	Black-fronted dotterel	Native - Coloniser
Circus approximans	Australasian harrier	Not Threatened
*Cygnus atratus**	Black swan	Introduced and Naturalised
Egreta garzeta†	Little egret	Native - Vagrant
Egretta alba modesta†	White heron	Threatened - Nationally Critical
*Emberiza citronella**	Yellowhammer	Introduced and Naturalised
Falco novaeseelandiae "eastern" †	Eastern falcon	Threatened - Nationally Vulnerable
*Fringilla coelebs**	Chaffinch	Introduced and Naturalised
Fulica atra†	Australian coot	Native -Coloniser
Gerygone igata	Grey warbler	Not Threatened
*Gymnorhina tibicen**	Australian magpie	Introduced and Naturalised
Haematopus unicolor	Variable oystercatcher	At Risk - Recovering
Himantopus himantopus leucocephalus	Pied stilt	At Risk - Declining
Hirundo tahitica neoxena	Welcome swallow	Not Threatened
Hydroprogne caspia†	Caspian tern	Threatened - Nationally Vulnerable
Larus bulleri	Black-billed gull	Threatened - Nationally Endangered
Larus dominicanus dominicanus	Southern black-backed gull	Not Threatened
Larus novaehollandiae scopulinus	Red-billed gull	Threatened - Nationally Vulnerable
*Passer domesticus**	House sparrow	Introduced and Naturalised
Phalacrocorax carbo novaehollandiae†	Black shag	At Risk - Naturally Uncommon
Phalacrocorax melanoleucos brevirostris	Little shag	At Risk - Naturally Uncommon
Phalacrocorax sulcirostris†	Little black shag	At Risk - Naturally Uncommon
Platalea regia	Royal spoonbill	At Risk - Naturally Uncommon

Species	Common Name	Threat Classification
Porphyrio melanotus	Pukeko	Not Threatened
Prosthemadera novaeseelandiae novaeseelandiae	Tui	Not Threatened
*Prunella modularis**	Dunnock	Introduced and Naturalised
Rhipidura fuliginosa fuliginosa	South Island fantail	Not Threatened
Stictocarbo punctatus punctatus	Spotted shag	Not Threatened
*Sturnus vulgaris**	Starling	Introduced and Naturalised
Tadorna tadornoides[†]	Chestnut-breasted shelduck	Native - Vagrant
Tadorna variegata	Paradise shelduck	Not Threatened
Todiramphus sanctus	Kingfisher	Not Threatened
Tringa stagnatilis[†]	Marsh sandpiper	Native - Vagrant
*Turdus merula**	Blackbird	Introduced and Naturalised
*Turdus philomelos**	Song thrush	Introduced and Naturalised
Vanellus miles	Spur-winged plover	Not Threatened
Zosterops lateralis lateralis	Silvereye	Not Threatened

Appendix D Pre-application Advice

Resource Consent Application

Hawksbury Lagoon Structures Phase 1

Otago Regional Council

SLR Project No.: 875.016722.00001

10 November 2025

Otago Regional Council

File: 842472334-8082

Date: 23 June 2025

Kia ora,

Pre-Application Meeting Follow up

Thankyou for attending a pre-application meeting to discuss your proposal for flood mitigation works at the Hawksbury Lagoon.

This letter summarises and confirms the advice we provided to you.

1. Stage 1 Works

Stage 1 works include:

- Placement of four overflow culverts above the existing culvert outlet from the Southern Lagoon, with potential passive flap gates
- Placement of level recording devices

The Hawksbury Lagoon is identified in the Regional Plan: Water for Otago (RPW) as a **Regionally Significant Wetland.**

The Hawksbury Lagoon meets the definition of a **Natural Inland Wetland** given in the National Policy Statement for Freshwater Management.

Schedule 12 of the RPW identifies the boundary of the **Coastal Marine Area** at the Hawksbury Inlet as: *The "mouth" where it enters the sea, the "boundary" running along the causeway edge to include the Eastern arm in the coastal marine area.*

The Coastal Marine Area is subject to a Statutory Acknowledgement made under the Ngāi Tahu Claims Settlement Act 1998.

Figure 1: Coastal Marine Area boundary, Hawksbury Inlet (blue)

2. Placement of culverts

2.1 Regional Plan: Water for Otago (RPW)

Placement of a culvert

Rule 13.2.1.2 of the RPW states:

*The placement of any pipe, line, or cable on or under the bed of a lake or river, or any Regionally Significant Wetland, is a **permitted activity,** providing:*

- *a) The pipe, line, or cable does not impede the flow of water or debris, or is installed and maintained so it results in no flooding, erosion or sedimentation; and*
- *b) The location of the pipe, line, or cable is identified by markers on the banks of the river or lake; and*
- *c) The pipe, line, or cable is maintained in good repair.*

Placement of a level recording device

Rule 13.2.1.4 of the RPW states:

The erection or placement of any flow or level recording device, outfall or intake structure, or navigational aid structure, that is fixed in, on, or under the bed of any lake or river, or any regionally significant wetland, is a permitted activity, providing:

- *a) The structure does not exceed 2 square metres in area provided that in respect of any flow or level recording device any catwalk to the nearest bank shall be excluded from the area calaculation; and*

b) The structure, or its erection or placement, does not cause any flooding or erosion; and
c) The Otago Regional Council is notified of the location and nature of the structure, at least seven working days prior to commencing the erection or placement; and
d) Except in the case of a navigational aid, or the sight board of any gauge, any visible part of the structure is of a neutral colour to blend in with the surroundings; and
e) The structure is maintained in good repair; and
f) The site is left tidy following the erection or placement.

Bed disturbance associated with placement of structures
Rule 13.5.1.1 of the RPW states:
The disturbance of the bed of any lake or river, or any Regionally Significant Wetland, and any resulting discharge or deposition of bed material associated with:

i. The erection, placement, extension, alteration, replacement, reconstruction, repair, maintenance, demolition or removal, of any structure that is fixed in, on, under or over the bed of any lake or river, or the wetland; or
ii. The clearance of debris or alluvium from within, or immediately surrounding, any structure in order to safeguard the function or structural integrity of the structure; or
iii. The maintenance or reinstatement of a water intake, in order to enable the exercise of a lawful take of water,

*Is a **permitted activity,** providing:*
a) Except in the case of the demolition or removal of a structure, the structure is lawfully established; and
b) Except in the case of (i), there is no increase in the scale of the existing structure; and
c) If work is undertaken between 1 May and 30 September inclusive, the Department of Conservation and the relevant Fish and Game Council will be notified as soon as reasonably practicable in advance; and
d) The bed or wetland disturbance is limited to the extent necessary to undertake the work; and
e) The bed or wetland disturbance does not cause any flooding or erosion; and
f) The time necessary to carry out and complete the whole of the work within the wetted bed of the lake or river does not exceed 10 hours in duration; and
g) All reasonable steps are taken to minimise the release of sediment to the lake or river during the disturbance, and there is no conspicuous change in the colour or visual clarity of the water body beyond a distance of 200 metres downstream of the disturbance; and
h) No lawful take of water is adversely affected as a result of the bed or wetland disturbance; and
i) The site is left tidy following completion of the activity; and
j) Except for activities covered by Rules 13.2.1.5, 13.2.1.6, or 13.2.1.8, there is no change to the water level range or hydrological function of any Regionally Significant Wetland; and
k) Except for activities covered by Rules 13.2.1.5, 13.2.1.6, or 13.2.1.8, there is no damage to fauna, or New Zealand native flora, in or on any Regionally Significant Wetland.

If the placement and associated bed disturbance can comply with the above requirements, then no resource consent is required under the RPW. Otherwise, the placement of the culvert is a **restricted discretionary activity** under Rule 13.2.2.1 of the RPW; the placement of a level

recording device is a **discretionary activity** under Rule 13.2.3.1; and the bed disturbance is a **discretionary activity** under rule 13.5.3.2.

Use of a culvert
Rule 13.1.1.1 of the RPW states:

The use of any structure that is fixed in, on, under, or over the bed of any lake or river, or any Regionally Significant Wetland, is a permitted activity, providing:

a) The structure is lawfully established; and
b) In the case of a change in use, the effects of the new use of the structure are the same or similar in character, intensity and scale as the preceding use; and
c) Measures are taken to avoid animal waste entering the lake, river or Regionally Significant Wetland; and
d) The structure is maintained in good repair.

2.2 National Environmental Standards for Freshwater

Placement and use of a culvert
Regulation 70 of the NESFW states:

*1) The placement, use, alteration, extension, or reconstruction of a culvert in, on, over, or under the bed of any river or connected area is a **permitted activity** if it complies with the conditions.*
2) The conditions are that—
a) the culvert must provide for the same passage of fish upstream and downstream as would exist without the culvert, except as required to carry out the works to place, alter, extend, or reconstruct the culvert; and
b) the culvert must be laid parallel to the slope of the bed of the river or connected area; and
c) the mean cross-sectional water velocity in the culvert must be no greater than that in all immediately adjoining river reaches; and
*d) the culvert's width where it intersects with the bed of the river or connected area (**s**) and the width of the bed at that location (**w**), both measured in metres, must compare as follows:*
i. where $w \leq 3$, $s \geq 1.3 \times w$:
ii. where $w > 3$, $s \geq (1.2 \times w) + 0.6$; and
e) the culvert must be open-bottomed or its invert must be placed so that at least 25% of the culvert's diameter is below the level of the bed; and
f) the bed substrate must be present over the full length of the culvert and stable at the flow rate at or below which the water flows for 80% of the time; and
g) the culvert provides for continuity of geomorphic processes (such as the movement of sediment and debris).

In general, only culverts in relatively small defined channels can comply with all of the above requirements. Based on the description of the activity and the receiving environment, it is likely that the proposed culvert installation and use would instead be a **discretionary activity** under Regulation 71 of the NESFW.

Regulation 71 of the NESFW states:

A resource consent granted for the discretionary activity must impose the conditions required by—

a) regulations 62 and 63 (information about structures and passage of fish and about culverts), unless the activity is use; and

b) regulation 69 (monitoring and maintenance).

Placement and use of a flap gate

Regulation 74 of the NES-FW states:

1) *The placement, use, alteration, extension, or reconstruction of a passive flap gate in, on, over, or under the bed of any river or connected area is a **non-complying activity.***
2) *A resource consent granted for the non-complying activity must impose the conditions required by—*
   a) *regulations 62 and 65 (information about structures and passage of fish and about flap gates), unless the activity is use; and*
   b) *regulation 69 (monitoring and maintenance).*

Please note that the placement of use of a culvert *with* a passive flap gate will require assessment against both Regulations 70/71 *and* 74. This is because Regulation 59 of th NESFW states: *If an overall structure is made up of 2 or more structures to which different provisions of this subpart apply (for example, a culvert with a flap gate), those provisions apply to the respective parts of the overall structure.*

Earthworks and land disturbance within a natural inland wetland

Regulation 45 of the NESFW states:

1) *Vegetation clearance within, or within a 10 m setback from, a natural inland wetland is a **discretionary activity** if it is for the purpose of constructing specified infrastructure.*
2) *Earthworks or land disturbance within, or within a 10 m setback from, a natural inland wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.*
3) *Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural inland wetland is a discretionary activity if it—*
   a) *is for the purpose of constructing specified infrastructure; and*
   b) *results, or is likely to result, in the complete or partial drainage of all or part of the natural inland wetland.*
4) *The taking, use, damming, or diversion of water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if—*
   a) *the activity is for the purpose of constructing or upgrading specified infrastructure; and*
   b) *there is a hydrological connection between the taking, use, damming, or diversion and the wetland; and*
   c) *the taking, use, damming, or diversion will change, or is likely to change, the water level range or hydrological function of the wetland.*
5) *The discharge of water into water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if—*
   a) *the discharge is for the purpose of constructing or upgrading specified infrastructure; and*
   b) *there is a hydrological connection between the discharge and the wetland; and*

c) *the discharge will enter the wetland; and*
d) *the discharge will change, or is likely to change, the water level range or hydrological function of the wetland.*

6) *A resource consent for a discretionary activity under this regulation must not be granted unless the consent authority has first—*
a) *satisfied itself that the specified infrastructure will provide significant national or regional benefits; and*
b) *satisfied itself that there is a functional need for the specified infrastructure in that location; and*
c) *applied the effects management hierarchy.*

"Specified Infrastructure" includes *any public flood control, flood protection, or drainage works carried out by or on behalf of a local authority, including works carried out for the purposes set out in Section 133 of the Soil Conservation and Rivers Control Act 1941.* The proposed culverts and level recording devices meeting this definition.

2.3 Regional Plan: Coast for Otago

As noted above, the CMA boundary is formed by the causeway between the Southern Lagoon and the inlet. Culverts joining the lagoon to the inlet therefore lie partially within the CMA.

Rule 8.5.1.6 of the Regional Plan: Coast for Otago (RPC) states:

The placement of a pipe to discharge stormwater, stream water, or cooling water is a ***permitted activity*** *where*

a) *the length of the pipe is kept as small as is necessary and extends no further than two metres into the coastal marine area from mean high water springs; and*
b) *The pipe blends with surrounding landscape; and*
c) *The Otago Regional Council is informed of the placement of the pipe before installing the pipe.*

Rule 7.5.1.4 of the RPC states:
The occupation of the coastal marine area by any structure which is identified as a permitted activity by rules 8.5.1.1, 8.5.1.2, 8.5.1.3, 8.5.1.6, 8.5.1.7, 8.5.2.1, 8.5.2.2, 8.5.2.3, or 8.5.4.1 is a ***permitted activity****.*

Otago Regional Council

3. Planning Summary

The table below summarises relevant permitted activity rules and consent requirements for Stage 1 activities.

	Culvert	Passive Flap Gate	Level recording Device
NESFW 2020			
Placement and use of structure	Regulation 70: Permitted Otherwise: Regulation 71 (discretionary)	Regulation 74: Non-complying	
Land disturbance in a natural inland wetland	Regulation 45: Discretionary. **Council must apply effects management hierarchy**		
Regional Plan: Water for Otago			
Placing a structure	13.2.1.2: Permitted Otherwise: 13.2.2.1 (restricted discretionary)	N/A	13.2.1.4: Permitted Otherwise: 13.3.2.1 (discretionary)
Associated bed disturbance	13.5.1.1: Permitted Otherwise: 13.5.3.2 (discretionary)	N/A	13.5.1.1: Permitted Otherwise: 13.5.3.2 (discretionary)
Use of a structure	13.1.1.1: Permitted (if lawfully established)	N/A	13.1.1.1: Permitted (if lawfully established)
Regional Plan: Coast for Otago			
Placing a structure	8.5.1.6: Permitted	N/A	
Occupying the coastal marine area	7.5.1.4: Permitted		

4. Assessment

While the status of applications for culverts and flap gates under the NESFW is **discretionary** and **non-complying** respectively, it should be noted that the purpose of these regulations is to deal specifically with the effects of structures on the passage of fish. Effects on fish passage would likely form the foundation of Council's assessment of an application made under these regulations.

Assessment of proposals to disturb land within a natural inland wetland frequently focus on the effects of sedimentation, and how these are mitigated, avoided, and/or remedied. Please note that applications to disturb land made under Regulation 45 of the NESFW require Council to apply the effects management hierarchy described in Section 3.21 of the National Policy Statement for Freshwater Management. This should be discussed in your own assessment of effects.

Potentially affected persons

Persons that would be considered with regard to adverse effects would likely include (at a minimum):

- The Department of Conservation for adverse effects on ecological values
- Kati Huirapa Rūnaka ki Puketeraki for adverse effects on uses of water and the CMA as well as values and associations that are culturally significant to Kāi Tahu, including (but not limited to) those identified in Schedule 1D of the RPW
- Otago Fish and Game Council for adverse effects on game bird habitat (noting that actual hunting is not permitted in the Hawksbury Lagoon)
- Hawksbury Lagoon Incorporated Society for adverse effects on activities authorised by DOC (see below)

With regard to community groups and ratepayers' associations, Council's assessment of affected party status rests on whether the group has a *function* that is:

a) defined by an external authority; and
b) adversely affected by the activity.

Possessing an interest in the Hawksbury Lagoon would not meet this test.

I note that a Memorandum of Understanding (see link) exists between the Hawksbury Lagoon Incorporated Society and DOC. The memorandum authorises the Society carry out a number of activities in the lagoon, including native planting, pest management, and track construction and maintenance.

I consider it likely that this memorandum constitutes evidence of an *externally defined function,* and that adverse effects on these functions could result in Council considering the Hawksbury Lagoon Incorporated Society as an affected party.

Statutory Acknowledgement

The Coastal Marine Area is subject to a Statutory Acknowledgement made under the Ngāi Tahu Claims Settlement Act 1998. Regulations made under section 207 of the Act require Council to forward any resource consent application to undertake activities within or adjacent to a Statutory Acknowledgement Area to Te Rūnanga o Ngāi Tahu. Please not that this is not a notification made under Section 95 of the RMA.

External processing of resource consent

Assessment of this application will be delegated to independent planners and decision makers. You do not need to do anything different to lodge this resource consent. Applications should be emailed to consents.applications@orc.govt.nz as per usual.

Next steps

If you believe any of this information is not relevant to your proposal, have any queries or require clarification on the information provided please contact me on 027 307 2122 or by emailing me at tom.albert@orc.govt.nz.

[redacted]

Otago Regional Council

Tom Albert
23 June 2025

Appendix E Hawksbury Lagoon Incorprated Community MOU with Department of Conservation

Resource Consent Application

Hawksbury Lagoon Structures Phase 1

Otago Regional Council

SLR Project No.: 875.016722.00001

10 November 2025

Department of Conservation
Te Papa Atawhai

COMMUNITY AGREEMENT

(pursuant to section 53(2)(i) Conservation Act 1987)

AGREEMENT NAME: Hawksbury Lagoon Community Agreement

This Agreement is made this 24th day of December 2021

PARTIES:

1. Hawksbury Lagoon Incorporated Society (**'the Organisation'**)

2. Director-General of Conservation (**'DOC'**) or (**'the Department'**)

PREAMBLE

A. The Department of Conservation Te Papa Atawhai ('the Department') is responsible for managing and promoting conservation of the natural and historic heritage of New Zealand on behalf of, and for the benefit of, present and future New Zealanders. It also has a responsibility under section 4 of the Conservation Act 1987 to interpret and administer the conservation legislation to give effect to the principles of the Treaty of Waitangi to the extent that it applies to this conservation activity.

B. To perform its functions, the Department wants to work with others, recognising that New Zealanders want to connect with, and contribute their expertise to restore and protect their unique natural environment, historic and cultural heritage.

C. Hawksbury Lagoon Incorporated are a local place-based conservation organisation with a well-established historical connection with Hawksbury Lagoon. In 2012 a Memorandum of Understanding (MOU) DOC-2603200 was established between the organisation, DOC, the Dunedin City Council and the Waikouaiti Maori Reserve Trustees. This Community Agreement

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

[redacted]

replaces the MOU with the Department and authorises 'the activity' as set out in Section E of this agreement.

D. The parties are entering this Agreement in a spirit of collaboration to make a difference for conservation. Under section 53(2)(i) of the Conservation Act 1987, DOC has the power to enter into agreements with individuals/groups/organisations.

THE PARTIES AGREE to work together as follows.

Schedule 1

SPECIFICS OF AGREEMENT

Section A: What does the Organisation aim to achieve?

The Organisation wishes to carry out conservation work relating to Hawksbury Lagoon Wildlife Refuge such as:

- Native planting using locally sourced native plants for each zone guided by the Ecological Management Plan (EMP) for Hawksbury Lagoon, Waikouaiti 2009 prepared by Wildland Consultants EMP - DOC-6363576 – Hawksbury Website Link
- Weeding of targeted pest plant species as per the EMP for each zone.
- Trapping of mammalian pest species.
- Cutting and maintaining of vegetation near walkways.
- Advocacy via signage, website and flyers.
- Geese control via egg pricking
- Water monitoring via installed scientific equipment.

Section B: Where is the Organisation undertaking the Activity?

Name and Location: Hawksbury Lagoon Wildlife Refuge Government Purpose Reserve - Waikouaiti
Land status: Protected Area
Area: 64.5250 ha
Legal description: s.22 – Government Purpose Reserve
Map reference: NZTM: 1,418,626 - 4,947,307
Excludes: Matainaka Fishing Reserve
See Appendix 1(a)

Section C: How long is this Agreement for?

This Agreement starts on: 24/12/2021
and ends on: Five Years from above date

Group/Organisation's initials	[redacted]	*OC's initials*	[redacted]

[redacted]

Right of renewal (subject to fully complying with this Agreement): YES

Final End Date: (24/12/2026)

Section D: Are there any special conditions about how/where Organisation does these activities?

The Special Conditions are outlined in schedule 3.

Section E: The Activity

E.1 The Organisation is authorised to carry out the following activities:

Native Planting:

- Planting of appropriate, locally sourced, native species in zones identified in the EMP.

Pest Management - Flora:

- Weed pest plant species as appropriate in each zone per the EMP.

Pest Management - Fauna:

- Use of DOC100, 200 and 250 Kill traps to control pest species.
- The Organisation is responsible for all monitoring, reporting and associated activities using the online site Trap.nz.

Track maintenance:

- Clear overhanging vegetation which presents a hazard with hand tools.
- Report severe degradation and compromised tracks to DOC.

Installation of signage:

- Consultation and submission of plans required with DOC prior to installation.

Track construction:

- Any track construction requires consultation and authorisation by DOC.

Community group/University/Iwi work-days:

- Provide a Health and Safety briefing and monitor volunteers as per the organisation's Health and Safety Plan.

Species Monitoring

- Monthly bird counts under the supervision of an expert ornithologist

Canada and Feral Geese Egg Pricking

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

E.2 DOC's contribution to the Activity is:

- Technical expertise when requested and provided as per resource availability.
- Increase exposure to Hawksbury Lagoon via information on the DOC website under volunteer opportunities and Hawksbury Lagoon information.
- Advise the group of any DOC activity planned for the site and any adverse natural event on the site that DOC becomes aware of during the term of this agreement.
- Maintenance of grass/weeds on the causeways.
- Maintenance of the assets identified in Appendix 1(b): 3 signs, 1 bridge structure.

E.2 Both parties agree to:

Meet on site at least once a year to discuss issues of mutual interest, opportunities, work planning.

If matters arise that may be of interest to either Party, the contact person designated by each party is to be informed. That person should develop an effective working relationship with the other Party.

Undertake a hand-over if the contact person changes for either Party to ensure the new person fully understands the activities under this Agreement and can quickly settle into the role.

Section F
Consultation with whānau, hapū and iwi about the Activity:

F.1 The Organisation is mindful that whānau, hapū and iwi have a role as kaitiaki of natural and cultural resources on public conservation land and waters.

F.2(a) The Department acknowledges the role of Greg Kerr on the Hawksbury Lagoon Committee as the representative for Kāti Huirapa ki Puketeraki and the Maori Fishing Reserves trust. The Department offers its services to consult with whānau, hapū and iwi and/or the relevant post Treaty settlement governance entity where applicable.

F.2(b) DOC will provide advice and support to the Organisation to consult with whānau, hapū and iwi as appropriate.

F.3 DOC will advise the Organisation if any specific provision under a Treaty of Waitangi Partnership or Accord applies or if there are Treaty settlement obligations under a Deed of Settlement or Deed of Recognition with implications for the Activity.

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

Section G: What procedures, guides and standards apply to the Activity?

G.1 The Organisation must either follow DOC's Standard Operating Procedures, guidelines or standards communicated to it by DOC or may follow its own operating procedures that have been approved by DOC.

G.2 (a) DOC will provide to, and discuss with, the Organisation the relevant sections of DOC's Standard Operating Procedures (SOPs), guidelines and standards that apply to the conduct of the Activity.

G.2(b) DOC will inform the Organisation of any new and updated SOP, guideline and standard during the term of this Agreement, and advise the Organisation if it will need to continue to follow the earlier version or change to the new version.

G.2 (c) The following operating procedures, guidelines or standards apply to the Activity being undertaken by the Organisation on the Site.

Planting

- Planting is carried out in accordance with the EMP. Of particular note - *"Use species that will not require large amounts of maintenance to keep the walkway open. Leave gaps at top of the causeway unplanted so that views are retained."*
- Flax, toi toi or cabbage trees are not to be planted on the causeway beside the track.

Predator Trapping

- Traps are to be used in accordance with the Department of Conservation 'Best Practice' documents (refer to *Trapping Best Practice – for Community Agreements, available on request*)
- The placing and use of the following traps for non-native predators are authorised: DOC 150/200/250s.
- Carcasses or offal must be disposed of at least 50m from public tracks, any building, picnic area, campsite or running water.
- Use of temporary, removable, or biodegradable markers must be used to mark trap lines and locations. An acceptable alternative is that an up-to-date map detailing the trap locations is made readily available to the organisation and DOC.
- Signs/interpretation boards that explain presence of predator control and the associated tracks will be erected at locations marked on site-specific maps, agreed to by DOC prior to installation of signage.

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

Weed control

- Any application of herbicide spray must be undertaken, in accordance with the Otago Regional Council Air Plan, by an approved GrowSafe herbicide handler (NZS 8409:2004 Management of Agrichemicals).
- Any application of herbicide gel is approved in accordance with the manufacturer's label instructions.
- Any cutting of vegetation is to be with the use of hand tools if possible to minimise health and safety risks, environmental risks, and disturbance.

Egg Pricking

- Ensure that the nest is correctly identified as belonging to Canada/Feral Geese.
- Any offal is to be disposed of discretely and a suitable distance away from tracks and areas frequented by the general public.

General

- Leave No Trace (www.leavenotrace.org.nz)
- Ministry for Primary Industries Check, Clean, Dry cleaning methods to prevent the spread of Didymo (www.biosecurity.govt.nz/didymo)
- Tracks and Outdoor Visitor Structures SOP (Standards New Zealand)

Section H: Health and Safety

H.1 DOC will specify in the Special Conditions in Schedule 3 any:

(i) place within the Site that is not covered by this Agreement;

(ii) equipment or tools that must not be used except with DOC's prior written agreement.

Section I: What happens if the Hawksbury Lagoon society causes damage?

I.1 Where the Organisation can be covered by DOC's General Liability Policy for third-party personal injury and property damage the Organisation agrees to accept that cover and abide by the conditions outlined in this Agreement.

Section J: Staying in touch with each other

J.1 DOC and the Organisation will meet yearly to review progress with achieving the aims outlined in section A, or work plan if appropriate.

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

J.2(a) DOC and the Organisation have appointed the following persons to communicate on their behalf on all matters relating to this Agreement:

For the Organisation:
Name: Ruth Ferguson
Position: Chairperson
Phone [redacted]
Email: [redacted]
For DOC:
Name: Ben Davies
Position: Ranger - Community
Phone contact: [redacted]
Postal Address: Level 1 John Wickliffe House
Email: dunedinoffice@doc.govt.nz

J.2(b) If the appointed representative for either party changes, the affected party will notify the other party of the change as soon as practicable.

J.3 The Organisation will also provide the following information requested by DOC:

N/A

J.3(c) DOC will use the information supplied under this provision by the Organisation in a report to Government on voluntary contributions to conservation.

GROUP/ORGANISATION

SIGNED for and on behalf of

Organisation
Hawksbury Lagoon Incorporated:

by Ruth Isabel Ferguson
[redacted]

Date: 24 December 2021
Phone number: [redacted]
Email: [redacted]

DIRECTOR-GENERAL OF CONSERVATION

SIGNED by Elizabeth Anne Wallace, Operations Manager, Coastal Otago District pursuant to an Instrument of Delegation dated 9 September 2015 from the Department of Conservation:

[redacted]

Date: 24 December 2021
Address: Level 1 John Wickliffe House, 265 Princes Street, Dunedin
Phone number: 03 477 0677

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

Note: A copy of the Instrument of Delegation may be inspected at DOC's office at 18-32 Manners Street, Wellington 6011.

Schedule 2

STANDARD TERMS AND CONDITIONS

1 **What activity has been authorised?**

1.1 The Organisation is authorised to carry out the Activity (described in **Section E of Schedule 1**) in accordance with this Agreement, subject to any consents that may be required to undertake the Activity.

1.2 The Organisation will:

(a) exercise reasonable skill, care and diligence in carrying out the Activity;

(b) take responsibility for the actions and omissions of its workers (including volunteers and contractors) and others who carry out the Activity under its direction and control;

(c) not commence the Activity until the Agreement has been signed by both parties and the safety plan has been reviewed and accepted by DOC in accordance with clause 6.6 of this Schedule.

2 **Renewals**

2.2 If **Section C of Schedule 1** provides for a right of renewal and if the Organisation has, in the opinion of DOC, complied with all the terms and conditions of this Agreement. DOC will offer the Organisation a renewal of this Agreement on the same terms or on any amended terms agreed between the parties (but excluding the right of renewal) for a further period agreed between the parties. DOC will provide three (3) months' written notice to the Organisation of the offer.

2.3 The Organisation may accept the offer of renewal in writing to DOC before the Agreement ends. In that case, the Agreement will be renewed and will then end on or before the Final End Date set out in **Section C of Schedule 1.**

3 What if things change?

3.1 The Organisation must not transfer this Agreement to another party or allow another party to carry out the Activity without the prior written consent of DOC. DOC may choose to decline consent under this clause or grant consent subject to conditions.

3.2 Any change to the Activity or to the boundary of the Site will be subject to a prior Variation of Agreement at DOC's reasonable discretion.

4 **What about protecting the environment?**

4.1 The Organisation must take every care to avoid damaging indigenous flora and fauna or the habitat of indigenous fauna when carrying out the Activity.

4.2 The Organisation must take every care not to transfer unwanted organisms such as weed seeds, pathogens or pests, such as Argentine ants and plague skinks (as listed under the Biosecurity Act 1993), when carrying out the Activity.

4.3 Except where permitted by this Agreement, the Organisation must ensure it does not:

(a) cut down vegetation; or

(b) damage any natural feature or historic resource on the land; or

(c) light any fire on the Site;

without DOC's prior written approval.

5 **What about obligations and breaches of the Agreement?**

5.1 In conducting the Activity the Organisation must comply with all statutes, regulations, by-laws or other enactments, or any Conservation Management Strategy or Plan affecting or relating to the Site and facilities or affecting or relating to the Activity as well as the procedures, guidelines and standards set out in **Section G of Schedule 1** and all other reasonable notices and directions of DOC. DOC may in his/her discretion appoint a person to monitor and review compliance of these requirements.

5.2 A breach by the Organisation of any provision referred to in clause 5.1 of this Schedule is deemed to be a breach of this Agreement.

5.3 If the Organisation breaches clause 5.1 of this Schedule, in any way that is not insignificant in DOC's view, DOC will give notice to the Organisation of the breach and provide a reasonable opportunity for the Organisation to remedy it.

5.4 If there is no proof of the Organisation working to remedy the breach DOC may choose to fix the breach after giving notice to Hawksbury Lagoon Incorporated.

5.5 DOC will advise the Organisation of what DOC's reasonable cost to fix the breach is and the Organisation must pay that sum to DOC unless the Organisation can show to DOC's satisfaction that there are special circumstances as to why DOC should either waive or reduce that sum.

6 **How will the Organisation address Health and Safety?**

6.1 The Organisation must carry out the Activity in a safe and reliable manner to provide and maintain, as far as is reasonably practicable, a safe working environment for its members and other persons (including any employees, volunteers and contractors) while carrying out the Activity.

Group/Organisation's initials [redacted] *DOC's initials* [redacted]

6.2 DOC and the Organisation are committed to working together to ensure, so far as reasonably practicable, that safety hazards and risks related to the Activity are identified, assessed and managed.

6.3 Each party must notify the other of any adverse natural event, hazard or activity on the Site or the surrounding area of which it becomes aware during the term of this Agreement which may affect Hawksbury Lagoon Incorporated's activities or public safety on the Site.

6.4 The Organisation must appoint a spokesperson or persons with whom DOC will communicate on all health and safety matters relating to the Activity.

6.5 The Organisation must:

(a) ensure that its members (and any contractors), agents, and invitees are competent and physically able to carry out the work and receive appropriate training before carrying out the Activity.

(b) ensure that all contracts between the Organisation and any contractor contains, at a minimum, the same requirements as clauses 5.1 and 6.6 of this Schedule.

(c) unless otherwise agreed, take on-site responsibility for the safety of members and the public while carrying out the Activity.

6.6 The Organisation must:

(a) prepare, and provide to DOC, a safety plan which meets the Department's requirements relating to the Activity. Safety Plan - DOC-6479582

(b) not start the Activity until DOC has reviewed and accepted the safety plan.

(c) schedule an annual review of its safety plan, and if it makes any amendments ensure these are reviewed and accepted by DOC. This review is in addition to any review that DOC requires under clause 6.8 of this Schedule.

6.7 DOC will:

(a) check and provide advice to help the Organisation complete or improve its safety plan;

(b) support the Organisation to be able to identify and manage risks associated with the Activity where the Activity is on public conservation land.

6.8 If, either in the opinion of DOC, or if the Organisation notifies DOC of a safety incident or risk on the Site, circumstances warrant a review of the safety plan, the Organisation must review the safety plan and, DOC must, where appropriate, review and decide whether to accept it.

6.9 The Organisation must record and report to DOC any significant event, such as a death or an injury which requires immediate hospitalisation, any near misses with the potential for a fatality or serious injury, within 24 hours of its occurrence and within 3 days for a less serious incident.

7 What if the Organisation causes damage?

7.1 DOC's General Liability Insurance Policy covers the Organisation for third-party personal injury and property damage associated with all or part of the Activity it carries out on the Site if:

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

(a) The Organisation has a safety plan in place for the Activity accepted by DOC in accordance with clause 6.6 of this Schedule and the Organisation, its contractors, clients and invitees, comply with DOC's Standard Operating Procedures and guidelines and standards listed in **Section G of Schedule 1** and the safety plan accepted by DOC when carrying out the Activity.

8 **When can the Agreement be suspended?**

8.1 DOC may suspend this Agreement in whole or in part where:

(a) in DOC's opinion, there is a temporary risk to public safety or to any natural or historic resource, however arising; or

(b) there has been a serious breach of the terms of this Agreement.

8.2 DOC may lift any suspension under clause 8.1 of this Schedule, in any of the following circumstances, when DOC decides(a) any risk to public safety or natural and historic resources caused by:

(a) a natural event or activity has been remedied or mitigated;

(b) any activity of the Organisation has been eliminated, remedied or mitigated by the Organisation;

(c) The Organisation has rectified, remedied or mitigated any serious breach of this Agreement to DOC's satisfaction.

9 **When can the Agreement be ended?**

9.1 The Organisation may surrender this Agreement, either in whole or in part, with 14 days' written notice to DOC subject to any conditions DOC considers reasonable and appropriate.

9.2 DOC may end this Agreement either in whole or in part by 14 days' written notice to the Organisation or such sooner period as appears necessary and reasonable to DOC where:

(a)The Organisation breaches any term of this Agreement that, in DOC's opinion, is capable of being rectified; and DOC has notified the Organisation of the breach; and the Organisation does not rectify the breach within 14 days of receiving notification, or such other time as specified by DOC; or

(b) The Organisation breaches any terms of this Agreement and in the opinion of DOC the breach is not capable of being rectified; or

(c) The Organisation ceases to conduct the Activity, or conducts it in a manner unacceptable to DOC; or

(d) where the Organisation is convicted of an offence under legislation affecting or relating to the Site or Activity.

9.3 DOC may end this Agreement immediately without notice where:

(a) any of the events leading to a suspension of the Agreement under clause 8 of this Schedule cannot be remedied to DOC's satisfaction; or

Group/Organisation's initials	[redacted]	*DOC's initials*	[redacted]

(b) there is, in DOC's opinion, a permanent risk to public safety or to the natural and historic resources of the Site.

9.4 Notwithstanding any ending of this Agreement, any party who breaches the Agreement remains liable for the breach.

10 **What if the parties have a dispute?**

10.1 The parties will try to settle any dispute arising from this Agreement by full and frank discussion and negotiation or, if necessary, any other informal means for resolving it without harming any other rights they may have.

11 **What is the relationship of the parties?**

11.1 The parties agree to work together and, subject to the terms of this Agreement, to co-operate with each other in the carrying out of the Activity on the Site.

11.2 Nothing expressed or implied in this Agreement is to be construed as:

(a) Constituting the parties as partners (in terms of the Partnership Act 1908), joint venture or agency.

(b) Giving the Organisation any right of exclusive occupation or use of the Site.

(c) Granting any ownership or interest in the Site to the Organisation.

(d) Affecting the rights of DOC and the public to have access across the Site.

12 **Power, Rights and Authorities**

All powers, rights and authorities of DOC under this Agreement and any notice required to be given by DOC may be exercised and given by DOC or any officer, employee or agent of DOC.

13. **The Law**

13.1 This Agreement is governed by, and to be interpreted in accordance with, the laws of New Zealand.

Schedule 3

Special Conditions:

- No chainsaw use – per the Health and Safety Plan - DOC-6479582

Group/Organisation's initials	[redacted]	*C's initials*	[redacted]

Appendix 1(a)

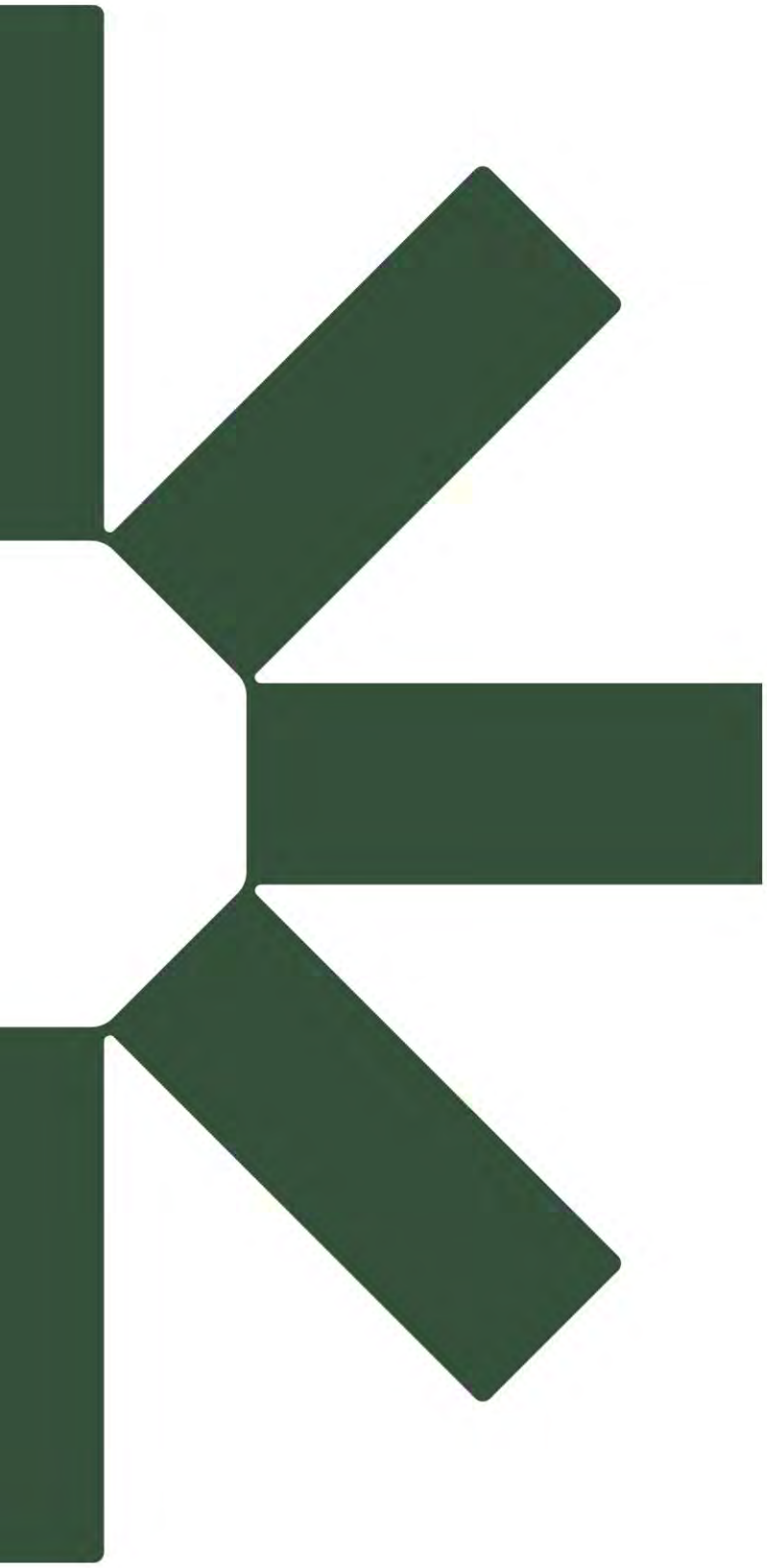
Above: Hawksbury Lagoon Wildlife Refuge Government Purpose Reserve (blue)

Appendix 1(b)

Key

Sign

Bridge



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