Toitū Te Hakapupu project Culvert replacement for fish passage improvement, Watkin River

Cargill Contracting Ltd (CCL) assists the Otago Regional Council (ORC) with culvert replacement for fish passage improvement.

BRIEF

Client	OTAGO REGIONAL COUNCIL
Project	CULVERT REPLACEMENT FOR FISH PASSAGE IMPROVEMENT
Location	WATKIN RIVER, EAST OTAGO
Expertise	STREAM RESTORATION, CULVERT INSTALLATION, FISH PASSAGE COMPLIANCE

The ORC is leading the **Toitū Te Hakapupu** project, a vital initiative funded by the Ministry for the Environment (MfE) through the **Essential Freshwater Fund** as part of the Government's **Jobs for Nature programme**. This project focuses on improving water quality and restoring fish passage in the Watkin River catchment, where decades of land use and infrastructure development have disrupted natural water flows, creating barriers that prevent native fish from migrating upstream. The ORC engaged CCL to develop a solution to replace the perched culvert at the Watkin River site, a key step in restoring fish passage and supporting the life cycles of native species.

THE CHALLENGE

At the W1 and W2 sites in the Watkin River catchment, the existing farm culverts are perched above the stream, with significant overhangs and internal structures that restrict fish movement. This not only impacts the culturally and ecologically significant inanga (Galaxias maculatus), but also other native migratory species such as koaro (Galaxias brevipinnis), banded kōkopu (Galaxias fasciatus), and giant kōkopu (Galaxias argenteus), all of which rely on **unobstructed fish passage** to access critical upstream habitats. Resident species like the common river galaxias (Galaxias vulgaris) also face challenges due to these barriers.

Beyond fish migration concerns, ORC faces the challenge of **balancing environmental protection with land use needs**. Any work on the river must be carefully managed to **prevent sedimentation**, which could degrade water quality and harm aquatic life. The replacement culverts must be designed to **handle extreme weather conditions**, reducing the risk of bank erosion or ponding that could disrupt the river's natural flow. As this site is an active farm crossing, maintaining access for landowners while completing the work efficiently and to schedule is also a priority.

The Watkin River project present several intersecting challenges, from perched culverts impeding fish migration, to protecting an active farm crossing and the overhead Goodwood Scheme water supply line.

Pre-project site visit of the Watkin River catchment (W1),
Photo: © Cargill Contracting Ltd 2025, used with permission.

Pre-project site visit of the Watkin River catchment (W2).
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CARGILL CONTRACTING'S SOLUTIONS

Restoring the connectivity of fish habitat

At both sites (W1 and W2), CCL removed the existing perched culverts and replaced them with structures compliant with the New Zealand Fish Passage Guidelines. The design replicated natural stream conditions to allow fish passage at all life stages.

- Twin-pipe system (W1 site) and single 1800 culvert (W2 site) installed to support fish migration during dry period
- Culverts installed 30–50% below the streambed to mimic natural channel form
- All pipes placed at the same 0% gradient as the streambed, suitable for fish passage while protecting the overlying Goodwood Scheme pipeline (W2 site).
- Culverts kept within ORC's recommended 6m length to maintain hydraulic performance
- Temporary 2mm fish screens protected species during construction and removed only once sediment risks subsided
- Instream baffles and embedded substrate added to reduce water velocity and improve accessibility for native fish species

Long-term resilience

- Durability and performance were key to the culverts' long-term success. Materials and construction methods were chosen for structural integrity, erosion control, and adaptability to high-flow conditions.
- Compact AP20 bedding and AP150 fill provided strength and compaction
- Rock armouring on 2:1 slopes extended beyond culvert ends to protect against scour
- Rock headwall constructed to prevent undercutting and resist hydraulic forces

Safeguarding water quality

Maintaining clear, sediment-free water was essential. CCL put strong preventative measures in place, with ongoing monitoring and responsive management throughout the project.

- Sediment barriers installed prior to works and monitored daily
- Turbidity checked upstream and downstream using visual and meter-based methods
- Immediate response plan activated for any signs of increased sedimentation
- Environmental protections remained until vegetation was re-established and turbidity stabilised for 72 hours
- Final site clean-up ensured no residual impact on the watercourse

Environmental and cultural sensitivity

CCL's approach reflected a respect for Te Ao Māori values and the local environment, guided by strong iwi relationships and experience on culturally sensitive sites.

- Use of locally sourced rock from Evansdale Quarry minimised transport emissions
- Construction respected cultural and ecological values from prior iwi collaborations
- Comprehensive sediment controls (silt fences, hay bales, coir logs, silt curtains) protected water quality
- Oversight by ORC fish passage expert and CCL's Environmental Compliance Officer ensured best practice delivery

Site reinstatement and restoration efforts

- Post-construction efforts focused on ecological recovery, landowner collaboration, and long-term site monitoring. These steps ensured the project left a positive and lasting impact beyond the build.
- Revegetation using native species helped stabilise soil and restore habitat.
- Surface reinstated in consultation with the landowner to suit farm access needs. Options included compacted gravel, grass-seeded soil, or metal.
- Temporary environmental controls were carefully removed to avoid residual ecological disruption.
- Grading and compaction using Sheepsfoot wheels for erosion control and road durability.
- A completion report, including photographic documentation and post-rain monitoring guidance, was issued to support future maintenance and compliance.

THE RESULT

With site-specific construction methods to both sites and careful design, CCL delivered two culverts that not only restore fish passage and the biodiversity in the Watkin River catchment but also maintain the integrity of the Goodwood Scheme pipeline and allow farm operations to continue. The structure is built to last: resilient to high flows and erosion and in line with best practice standards for freshwater protection.

This project demonstrates how straightforward, well-executed techniques can have significant environmental impact. CCL's approach offers a practical model for landowners, councils, and community groups looking to improve waterway connectivity and resilience in their own catchments.
Beyond the Watkin River, this work contributes to a growing movement of ecological restoration across North and East Otago; one built on collaboration, cultural respect, and a deep commitment to doing the job right.

> It's the kind of job that makes you proud, working alongside iwi and ORC to put things right for the environment. We weren't just dropping in a culvert; we were reconnecting a waterway and giving native fish a fair go. The team really got behind it because it reflects the values we care about, doing solid work that respects the land and the people.
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> **George Terry, managing director**
> Cargill Contracting Ltd

Installation of a twin 1200mm culvert with compacted rock bedding to support fish passage and resilient flood flow on the Watkin River, April 2025.

Twin 1200mm culvert installed at Watkin River, April 2025. This structure was delivered by Cargill Contracting Ltd for the Otago Regional Council.