



Memorandum

TO: Ellie Watson

CC: Richard Matthews (Mitchell Daysh)

FROM: Andrew Balme

DATE: 1 September 2025

RE: High-level civil infrastructure constraints involved in enabling continuous flow down the Takapō River

Introduction

This memo outlines a high-level assessment of the primary civil infrastructure constraints involved in enabling continuous flow—of any volume—down the Takapō River. The views expressed are based on a high-level review of potential options, and the risks associated with these.

There are several aspects to consider when assessing how it could be possible to provide for this flow including:

- Operability of existing structure for generation and safe management of lake levels and flood passage.
- Ability to safely inspect and maintain existing structures is paramount. This requires the ability to isolate and dewater parts of the structures.
- Compliance requirements and establishing the flow in a way that avoids non-compliance during routine operations.

The existing structures are not designed to support continuous flow. Introducing a minimum flow can compromise their safe operation, including lake level management, flood passage, and essential inspection and maintenance activities that often require isolation and dewatering.

Passage of flow through / around Lake Tekapo Control Structure (Gate 16)

Whilst there are several options that could potentially be utilised to create a continuous flow over or through the existing structure, e.g. a siphon, a bypass around the existing structure through an entirely new structure is considered the most technically feasible option to consider for delivering a safe and effective continuous flow. This would involve substantial civil works to construct a bypass tunnel or channel under the State Highway 8 alignment without compromising the structural integrity of the existing Control Structure. The full extent of such works will depend on the magnitude of flow and may require strengthening works to State Highway 8 at the lake outlet to support the road over top of such a structure; depending on the nature of the bypass structure, a bridge may be required to support the highway across the bypass. A downstream discharge structure with energy dissipation features, for example a controlled discharge valve or a hydraulic stilling basin structure, would also be required to prevent river channel erosion.

Passage of flow through/around Lake George Scott

The existing spill weir at Lake George Scott cannot feasibly provide continuous flow passage without imposing significant operational constraints on Gate 17 and the Tekapo Canal, risking flow disruption and consequent resource consent compliance breaches, and causing additional spill which is a poor use of valuable water resources. A separate bypass structure would likely be required to establish a continuous flow path from Lake George Scott into the Takapō River. Despite the absence of a State Highway, the civil works would still require a high level of complexity to ensure safe operation of all structures and not impose risk to the existing structures. The diversion would need to take water off the river some distance upstream of the existing Lake George Scott

structures and re-enter the river channel downstream of the existing spillway to allow for safe operation, inspection, and maintenance of all structures. The same provisions for erosion protection highlighted above (for Gate 16) would apply, for example discharge and energy dissipation structures, and this would still require reasonable civil works.

Summary

Creation of a continuous flow from Lake Takapō into the Takapō River downstream of Lake George Scott is not a simple case of opening the gates at the Lake Tekapo Control Structure and letting the water spill over the Lake George Scott Weir. A high-level review of potential options has found the most technically feasible option would be to construct new bypass structures at both locations. The magnitude of flow will drive the scale of the civil infrastructure required, but in any case, the works will not be simple or low impact.

Signed:

A handwritten signature in black ink, appearing to read 'ABalme'.

Andrew Balme

Engineering Manager Civil & Dam Safety