Appendix 8: Technical Advice – River Values by Chris Meijer

Date	11 August 2025
To	Susannah Black, Principal Consents Planner, Environment Canterbury
From	Chris Meijer, Scientist – Water Ecology, Environment Canterbury
Project advice provided for	Genesis Tekapo Power Scheme Renewal
Documents referred to	1. Assessment of aquatic environmental effects (2023). Tekapo power scheme reconsenting: assessment of aquatic environmental effects 2. Appendix E: Draft plans referred to in the proposed consent conditions. Amended_Appendix-E-Consent-Condition-Plans-Tekapo-PS-Reconsenting-29-May-2025.pdf 3. Appendix 4 – Freshwater and Native Fish Discussion (30 June 2025) Record. Appendix-Four_-Freshwater-and-Native-Fish-Discussion-30-June-2025-Record71009594.1.pdf 4. Appendix D (Updated 25 July 2025): Proposed resource consent conditions. Appendix D (Updated 25 July 2025): Proposed resource consent conditions (PDF, 410KB) 5. Appendix 5: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice – Hydrology 6. Appendix 6: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice – Freshwater Avifauna 7. Joy, M., David, B., Lake, M. (2013) New Zealand freshwater fish sampling protocols. *Part 1 - wadeable rivers and streams*. Massey University, New Zealand. New_Zealand_Freshwater_Fish_Sampling_Protocols.pdf
Qualifications	My qualifications are a Doctor of Philosophy degree in Ecology, a Master of Science in Ecology, and a Bachelor of Science Degree in Biological Sciences, specialising in freshwater ecology. I have carried out research and professional work in the fields of freshwater quality and ecology, freshwater restoration and teaching on university courses for nearly 10 years. I have been employed by the Canterbury Regional Council (Environment Canterbury) as a Scientist - Water Ecology since May 2024.
Code of Conduct	I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. This technical report has been prepared in accordance with that Code. In particular, unless I state otherwise, the opinions I express are within my area of expertise, and I have not omitted to consider material facts that might alter or detract from the opinions that I express.

Executive summary/overview

1. Genesis have proposed no changes to the hydrological operation of the Tekapo Power Scheme (TPS) and therefore concluded that the potential effects on water quality and ecology within the Tekapo River (Takapō River) or the canal will remain unchanged.

2. Due to the impacts of climate change, it is expected that the environmental stressors on the Takapō River or the canal will change over time. This would be more problematic for the Takapō River because the diversion of flows away from this river has reduced this river's resilience to further environmental change.

3. However, no consideration has been given to mitigating potential existing and ongoing adverse water quality or ecological effects associated with the scheme. Potential mitigation for the lower Takapō River could include changing how and when water is released via Lake George Scott weir to protect downstream water quality and ecological values.

4. There is also no clarity for how the fish salvage management plan would be designed any differently than currently required to also consider native fish. I consider the advice note under Condition 14 to be insufficient for providing adequate protections to native fish.

5. The Indigenous Biodiversity Enhancement Programme (IBEP) details two specific freshwater fish values to be protected in the draft Kahu Ora strategic plan. However, the appropriateness of these two values needs to be considered because of the limited connectedness between these specified values and the direct effects from the TPS. Furthermore, one of these values to be protected, populations of upland longjaw galaxias, has no related actions detailed in the draft Kahu Ora strategic plan, so it is unclear how this IBEP value will be protected.

6. A brief overview of this advice is provided in Table 1:

Table 1: Outstanding areas of contention

Outstanding area of contention	Reason for significance	Solution
Limited consideration for native fish in fish salvage protocols.	Kōaro and longfin eels could become trapped within the scheme. Two bully species also persist within the scheme.	Reword the relevant conditions under the 'Sports fish salvage measures' to ensure all fish are considered if salvage is required.
No consideration for ongoing impacts on the Takapō River's ecological functionality	The ongoing diversion of water from the Takapō River has reduced the resilience of the aquatic community to seasonal fluctuations as well as climatic shifts.	If the compensation proposed is considered insufficient then - A permanent baseflow over Lake George Scott weir into the Takapō River would provide a persistent buffer for both water quality and ecology.

		and/or - The occasional flushing flow of sufficient magnitude would ensure sediment is periodically flushed from the river, and periphyton growths are limited.
The appropriateness of the two freshwater fish values to be protected under the draft Kahu Ora strategic plan, and inability to assess the efficacy of proposed actions under the IBEP.	Only two freshwater fish values are listed in the draft Kahu Ora strategic plan. Given the scale of potential impacts from the scheme, it is important that the actions aligned with these two values are routinely assessed for their efficacy.	Greater clarity of the 10-year outcomes for the Kahu Ora strategic plan, with better linkages between reviews of the annual plan (Condition 34) and reviews of the strategic plan (Condition 30).

Agreement with the Applicant

7. I have not provided further discussion for where I agree with conclusions of the Applicant.

Benefits of the project

8. There are some ecological benefits from the TPS for the introduced salmonid species and two native bullies who are abundant within the scheme[1]. However, this lake-fed canal environment is generally unsuitable for sensitive macroinvertebrates and two threatened native fish species, kōaro and longfin eel. There are also ongoing ecological effects of operating the scheme, namely the reduction in flow into the Takapō River. However, I acknowledge the application does not seek to provide a flow in the Takapō River and doing so will potentially impact on the renewable electricity benefits of the TPS.

9. The draft Kahu Ora strategic plan details two specific values for threatened freshwater fish that need to be protected[2]; bignose galaxias and lowland longjaw galaxias above barriers in the Forks Stream catchment, and protecting sites that support upland longjaw galaxias.

[1] Assessment of aquatic environmental effects (2023). Tekapo power scheme reconsenting: assessment of aquatic environmental effects

[2] Appendix E: Draft plans referred to in the proposed consent conditions. Amended_Appendix-E-Consent-Condition-Plans-Tekapo-PS-Reconsenting-29-May-2025.pdf

Outstanding areas of contention and significance of these

Discussions with Applicant

10. I have had expert discussions with Genesis and its experts, and those conversations have addressed some issues that I had initially raised, specifically elver transfer into Lake Takapō and screening of the scheme intakes[3]. Elver transfers were proffered to be managed as part of the generators' agreement with the Waitaki Rūnaka.

Outstanding areas of contention

11. Nonetheless, I have three outstanding areas of contention:
    a. The limited consideration for native fish within the existing fish salvage conditions (Schedule One, Conditions 9-14)[4].
    b. The lack of consideration for ongoing impacts on the Takapō River's ecological functionality.
    c. The appropriateness of the two freshwater fish values to be protected under the draft Kahu Ora strategic plan, and inability to assess the efficacy of proposed actions under the IBEP.

Significance of these matters

12. The constructed Tekapo Canal does not represent a suitable environment for kōaro and longfin eels to complete their lifecycle, so any individuals residing within the scheme would not be contributing the wider population. Both species are currently listed as 'At Risk – Declining', so minimising the potential impacts on their populations is both locally and nationally important. Nonetheless, all fish should be considered if a fish salvage is required.

13. There is inherent uncertainty in predicting the magnitude of potential changes from climate change, but there is more certainty for the direction of change[5]. The ongoing diversion of flows away from the Takapō River has reduced the resilience of the river's ecological community to seasonal fluctuations and further perturbations from climate change, along the ~47-km reach between the Lake George Scott weir and Lake Benmore.

14. The prevalence of reduced stable flows has had ongoing detrimental impacts on the macroinvertebrate community in the Takapō River. The excessive periphyton growth, including didymo blooms, and poor water quality over summer, such as high temperatures and lower oxygen concentrations, are likely underlying stressors for

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[3]Appendix 4 – Freshwater and Native Fish Discussion (30 June 2025) Record Appendix-Four_-Freshwater-and-Native-Fish-Discussion-30-June-2025-Record71009594.1.pdf

[4] Appendix D (Updated 25 July 2025): Proposed resource consent conditions. Appendix D (Updated 25 July 2025): Proposed resource consent conditions (PDF, 410KB)

[5] Appendix 5: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice – Hydrology

macroinvertebrates. I consider that the higher natural turbidity from lake flows would likely reduce the prevalence of excessive periphyton growths, but flushing flows could also be used to reduce the prevalence, magnitude, and duration of didymo blooms.

15. Consequently, initiating a permanent baseflow over Lake George Scott weir into the lower Takapō River would restore some of this innate ecological resilience, for both macroinvertebrates and fish. While periodic flushing flows could limit periphyton growth and flush some fine sediment from the river, the overall ecological functionality would still be limited by the baseflows between flushing events. Therefore, I consider the increase in baseflows to be more important for water quality and ecology values in the lower Takapō River.

16. Improving the ecological functionality of the lower Takapō River would have potential flow-on benefits for those species, such as freshwater avifauna[6].

17. In order to limit the scheme's ongoing effects, the IBEP would ideally focus work primarily, but not exclusively, on those waterbodies directly affected by the Waitaki or Tekapo power schemes. However, the only values to be protected for freshwater fish are not directly affected by the Waitaki or Tekapo power schemes[7]. Regardless of whether protecting these values is appropriate, there are no actions listed within the Kahu Ora plan that are relevant to protecting populations of upland longjaw galaxias, so it is unclear how these populations would be protected.

18. I consider that, while there is undoubtedly a lot of work planned for the Takapō River within Kahu Ora, there are likely to be limited benefits to water quality and ecological values within this river. Therefore, for the TPS, the Kahu Ora programme does not seek to directly mitigate the potential effects on water quality and ecological values, rather it is proffered as compensation.

19. I consider it necessary to include ecological values in the Kahu Ora plan, given the ongoing impacts on the Takapō River. However, I believe determining the appropriateness of this compensatory approach is a matter for the decision-maker to explore in the context of values beyond water quality and ecology.

20. Regardless of whether the Kahu Ora plan involves mitigation or compensation, it should be held accountable for delivering its intended outcomes. While I acknowledge that the IBEP has been proffered, I recommend that the IBEP include explicit outcomes for populations of indigenous taxa, such as stable or increasing trends in the density of endemic galaxiids in the Fork Stream catchment protected via trout removal. I also recommend an additional consideration in the 5–10-year reviews of the strategic plan that there is an independent assessment of resource allocation principles including whether funding and resourcing are adequate to achieve its objective and associated outcomes.

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[6] Appendix 6: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice – Freshwater Avifauna

[7] Appendix E: Draft plans referred to in the proposed consent conditions. Amended_Appendix-E-Consent-Condition-Plans-Tekapo-PS-Reconsenting-29-May-2025.pdf

Solutions and/or Conditions sought

21. Table 2 provides a summary of solutions or conditions sought and reasons for these.

Table 2: Solutions			
Issue	**Solution**	**Condition wording**	**Consideration against FTAA**
The lack of native fish consideration within the existing fish salvage conditions	Remove the advice note under Condition 14 and add an additional clause to Condition 15 to ensure the intention to protect both sports fish and native fish is enforceable for compliance monitoring.	Suggested edits/additions (**bold**): Additional clause – *15. The FSMP must include:* **(h) Provision for native fish which may be identified when undertaking any of the activities described above, including wherever practicable their relocation to an appropriate area.**	This would not be more onerous than already required. This change to the condition wording ensures consideration for native fish to be salvaged when a fish salvage would already be required under the existing conditions. This all would be captured within the Fish Salvage Management Plan required under Condition 14. Consequently, I consider that the draft Fish Salvage Management Plan in Appendix E[8] will need to be reviewed and updated to clearly consider all fish species.

[8] Appendix E: Draft plans referred to in the proposed consent conditions. Amended_Appendix-E-Consent-Condition-Plans-Tekapo-PS-Reconsenting-29-May-2025.pdf

Ongoing impacts on the lower Takapō River's ecological functionality	A permanent baseflow into the lower Takapō River via the Lake George Scott weir. I consider this change to be necessary to provide protection against seasonal fluctuations and climatic shifts in the lower Takapō River. Some combination of a baseflow and flushing flows. I consider this the ideal solution to achieve the benefits listed above as well as periodic flushing of fine sediment and turnover of riverbed substrate. Periodic flushing flows into the lower Takapō River via the Lake George Scott weir. I consider this outcome the lowest priority of the three but would suggest this if the other two are ruled out.		If the decision makers are not satisfied in relation to the compensation to achieve improved ecological values as detailed in the IBEP, then consideration could be given direct mitigation of the scheme.
Lack of explicit and clear outcomes for freshwater ecological values within the IBEP.	Include an amendment to the IBEP to explicitly state the outcomes for the populations of indigenous flora and fauna that are targeted under the IBEP.	Suggested edits (**bold**) to proposed Condition 25: Additional clause – *25. In accordance with the objective of the IBEP as set out in condition 23 the IBEP will:* **(d) include outcomes to maintain or increase indigenous plant, fish,**	This proposal for the IBEP to include explicit outcomes for taxa populations would not be more onerous than existing provisions within the draft Strategic Plan. Outcome monitoring actions already listed include invertebrate, lizard and avifauna population trend monitoring. This additional condition ensures outcomes

		invertebrate, lizard and avifauna populations within catchments affected by the Waitaki or Tekapo power schemes. This should precipitate clear and measurable outcomes for targeted taxa/populations that are monitored by the approved method. This provides an unambiguous outcome that is enforceable and links to a compliance action.	address the primary ecological concern – population declines. Therefore, I consider this an appropriate addition if the decision maker decides that compensation is an acceptable approach for the IBEP. Using approved monitoring methods means that robust data is generated to track progress towards the key implementation milestones and outcomes in the strategic plan. For example, fish monitoring methods could be adapted from the New Zealand Freshwater Fish Sampling Protocols: *Part 1 – wadeable rivers and streams*[9].
Recommended considerations included in the proposed 5–10-year reviews of the IBEP do not include funding and resourcing adequacy despite the impact this may have on achieving the Strategic Plan outcomes.	Provision for independent review that incorporates the priorities given in section 4.5 of the Strategic Plan as well as potential adjustment of funding and resourcing for achieving IBEP objectives and associated outcomes.	Suggested edits/additions (**bold**): **Condition 30 (f) Review will consider resource allocation principles, the balance of risk across the catchment, past investment and the adequacy of funding and resourcing to the IBEP objectives and associated outcomes.** These considerations (excluding the	These provisions ensure independent and comprehensive review to determine the efficacy of the IBEP provisions.

[9] Joy, M., David, B., Lake, M. (2013) New Zealand freshwater fish sampling protocols. *Part 1 - wadeable rivers and streams*. Massey University, New Zealand. New_Zealand_Freshwater_Fish_Sampling_Protocols.pdf

		last) are those recommended by the current draft Kahu Ora strategic action plan (Page 50). Additional wording on 'outcomes' is also recommended to be added to Conditions 28 and 30 to create explicit linkages back to those outcomes provided in the strategic plan: Condition 28. d) Identify the key implementation milestones **and outcomes** to be achieved over the Strategic Plan Period in accordance with the priorities; and… e) Identify the monitoring that will be used to demonstrate the achievement of the milestones **and outcomes** that are set out in the Strategic Plan over the Strategic Plan Period; and... Condition 30. b) Identify whether the key milestones **and outcomes** set out in the Strategic Plan were achieved; and … c) Identify whether the monitoring undertaken was appropriate for demonstrating whether the milestones **and outcomes** in the Strategic Plan were achieved; and	

		d) Identify if any milestones **or outcomes** were not achieved, and if so, the causes of non-achievement and any matters that should be revised in the next Strategic Plan. Edit condition 34(d) to refer to the Strategic Plan objectives and associated outcomes (links to condition 25d.): 34(d). Identify progress towards achievement of the Strategic Plan **objectives and associated outcomes.**	