Appendix 9: Technical Advice – Groundwater by Ben Wilkins

Date	20 August 2025
To	Susannah Black, Principal Consents Planner, Environment Canterbury
From	Ben Wilkins, Senior Groundwater Scientist, Environment Canterbury
Project advice provided for	Genesis Tekapo Power Scheme Renewal
Documents referred to	1. Assessment of environmental effects for Genesis Energy Limited dated April 2025. 2. Appendix K: Hydrological and hydrogeological analysis Prepared for Genesis Energy Limited by PDP, dated April 2025. 3. Appendix D (Updated 25 July 2025): Proposed resource consent conditions. Appendix D (Updated 25 July 2025): Proposed resource consent conditions (PDF, 410KB)
Qualifications	Master of Science in Geography (Dist) University of Otago I am a Senior Groundwater Scientist and have worked at CRC for 5.5 years. My role at the CRC involves the investigation of Canterbury's aquifer systems, analysis of the state and trends of groundwater in the region and providing expert technical advice on groundwater for resource management planning, reviewing resource consent applications and compliance monitoring and enforcement.
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. The Tekapo Power Scheme (TPS) dominates the landscape of the Mackenzie Basin and significantly alters the flow of water. Groundwater is similarly affected by the Tekapo Power Scheme, with water from operational decisions (e.g., spills) and infrastructure affecting the groundwater resource, both in terms of quantity and quality.

2. Groundwater provides a connection between wetlands and lake levels in Lake Tekapo (Takapō), spill events down the Tekapo River (Takapō River) and leakage from the Tekapo Canal. Therefore, groundwater levels affect the functioning of hydrologically connected wetlands and ecosystems. Losses from the Tekapo Power Scheme also provide an unknown input to the water balance and a dilution effect related to groundwater quality.

3. Potential changes to scheme operation in response to climate change and electricity demand, albeit within operating levels, has the potential to have ongoing impacts on groundwater levels.

4. No long-term groundwater monitoring was required to be undertaken through the current resource consents or is proposed in the future as part of the replacement resource consents the subject of the Fast Track application. Therefore, Canterbury Regional Council (CRC) does not currently fully understand the effect of the TPS has on groundwater or potential changes in the future. Any groundwater monitoring data would be valuable. Regular groundwater monitoring would show how groundwater levels vary with lake level, spills, river flows and canal losses.

5. CRC understands Genesis have a number of monitoring wells installed for dam safety, while other wells have been used to understand the effects of lining sections of the Tekapo canal. CRC anticipates that the groundwater level data from these wells could easily be shared to help understand the effects of the TPS on groundwater.

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
Groundwater level monitoring.	Groundwater levels are significantly modified by the Tekapo Power Scheme and are strongly controlled by its operation.	Genesis to provide groundwater levels to CRC from existing dam safety monitoring through a consent condition.

Agreement with the Applicant

7. I have not provided further discussion for where I agree with conclusions of the Applicant. Accordingly, this technical advice just addresses the issue of groundwater monitoring.

Benefits of the project

8. The regional and national benefits of the TPS in relation to renewable electricity generation are acknowledged. I do not consider that additional monitoring in relation to groundwater will have any effect on these benefits.

Outstanding areas of contention and significance of these

Discussions with Applicant

9. On 26 June 2025 I had a Technical Discussion with Applicant's groundwater and surface water experts to clarify information and discuss monitoring. The outcomes of these discussions have been provided to the Panel as Appendix Two to the Legal Submission for the project overview conference.

Outstanding areas of contention

10. There is some uncertainty about how the TPS operation will change in response to climate change and future electricity demand. Within the operating levels, there could be increased variation, in addition to longer periods of high or low Takapō Lake levels.

Significance of these matters

11. Groundwater will be affected by changes in TPS operation from climate and electricity demand. With no groundwater monitoring CRC lacks an understanding of the current groundwater response to TPS operation, which makes future groundwater resource management challenging.

Solutions and/or Conditions sought

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

13. A consent condition is recommended that requires Genesis to provide CRC with groundwater level records (at a monthly or higher frequency) from their existing monitoring wells that are currently measured for dam safety. Genesis will provide these records in an appropriate format to CRC annually.

14. Providing CRC with groundwater levels is not onerous because Genesis already measures groundwater at these wells and the only additional step is to send CRC the data. Therefore, no new infrastructure needs to be installed or increased monitoring needs to be undertaken.

15. The benefits of providing groundwater level data are significant as the TPS covers a large area, that modifies the groundwater resource. Groundwater monitoring will allow CRC to have some idea of the TPS's impact on groundwater over the future 35-year duration. Providing data to CRC from existing groundwater monitoring is proportional with the scale and significance of this consent.

Table 2: Solutions			
Issue	**Solution**	**Condition wording**	**Consideration against FTAA**
Groundwater level monitoring	Genesis to send data from existing groundwater monitoring to CRC as part of the annual reporting requirements.	Provide all groundwater level data collected as part of the consent holders dam safety assurance (or equivalent) programme. Data shall be provided electronically in a spreadsheet with following format: (1). Bore name or location coordinates (2). The height of the measuring point in relation to the ground level (3). Date and standing groundwater level. The data described above shall also be provided to CRC upon request.	The Tekapo Power Scheme and its operation significantly alters groundwater flow. Sending existing groundwater level monitoring to CRC is not too onerous because the only additional step is to send CRC the data. If there was no condition to provide groundwater monitoring associated with the Tekapo Power Scheme, there would be 70 years without monitoring and no understanding of the effect of changing climate and power demands on groundwater and groundwater supported ecosystems.