

Under the **FAST-TRACK APPROVALS ACT 2024**

In the matter of an application for replacement resource consents in relation
to the Tekapo Power Scheme

By **GENESIS ENERGY LIMITED**

Applicant

**GENESIS ENERGY LIMITED RESPONSE TO FURTHER INFORMATION
REQUEST 1**

15 September 2025

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MAY IT PLEASE THE PANEL:

1. Genesis Energy Limited (**Genesis**) provides its response to the further information request dated 5 September 2025 below and in **Appendix 1** (Mr Simon Coates) and **Appendix 2** (Mr Bas Veendrick and Mr Gareth Gray).
2. The panel asked for the following information:
 - 1) Regarding the potential implications, if any, of climate change (with reference to the Representation Concentration Pathways used in the PDP Hydrology Report) on the operation of the Tekapo Power Scheme (refer Canterbury Regional Council, Appendix 5: Technical Advice – Hydrology).

For example, is it anticipated that there will be changes (increase or decrease) in terms of the timing, frequency, duration and/or volume of spill flows in the Tekapo River, either through Gate 15 or the Lake George Scott Weir?
 - 2) Identify any potential environmental effects or impacts that are attributable to those potential changes to the operation of the Tekapo Power Scheme (if any), and an assessment of those effects by relevant experts as appropriate.

Summary

3. It is not possible to provide a prediction with any accuracy of how the Tekapo Power Scheme (**scheme**) will be operated at any given time in the future. While the scheme will always be operated within the limits of its consents (so those parameters are certain), there are numerous uncertainties that will influence how Genesis will manage the scheme into the future within those limits. Climate change is just one factor. Other factors include:
 - (a) changes to national and local generation demand;
 - (b) new generation options across the country;
 - (c) the integration of battery storage; and/or
 - (d) new/more efficient energy technologies.
4. The unpredictability can be seen from the current operation of the scheme (see **Figure 1**¹ below relating solely to lake levels). While climate is an important factor, the operation of the scheme also responds to a myriad of specific factors in the electricity market across New Zealand at that particular time.

¹ This figure is already before the panel in Figure 2.15 of Appendix N: [Tekapo Shoreline Effects 2022](#)

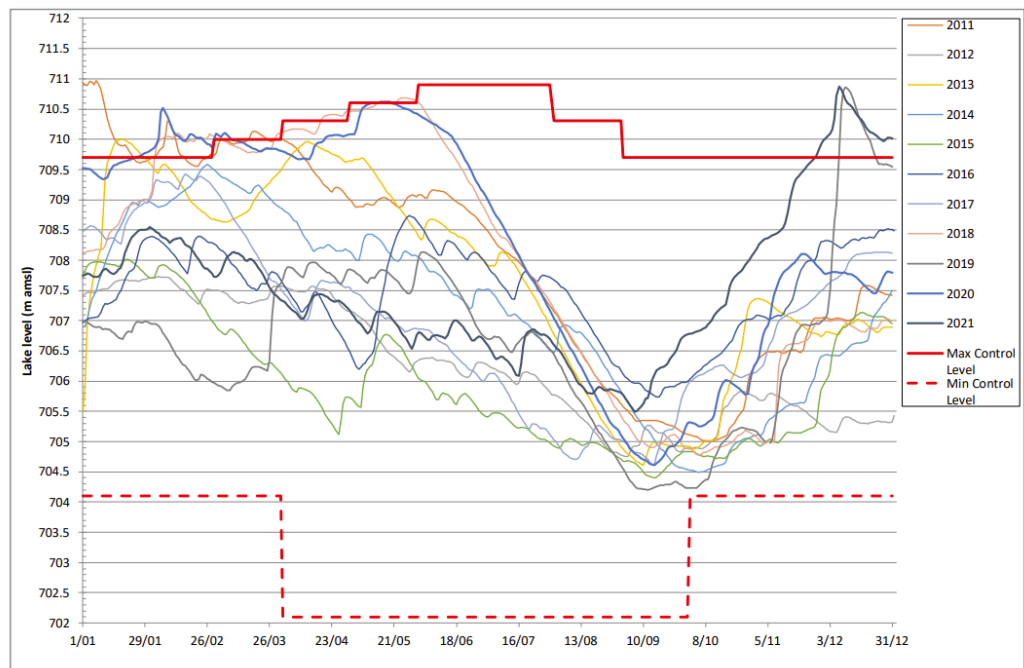


Figure 1: Lake level operating limits within daily mean level data from 2011 to 2021

5. As explained at the project overview conference on 24 July, on the advice it has received, Genesis is confident that the scheme will be able to operate within its consented limits during the term of consent even at RCP8.5. Proposed conditions 11 (water permit), 41 (Schedule One) and 42 (Schedule One)² allow Canterbury Regional Council (**CRC**):

- (a) to review management of low lake level events (any time the lake level falls below the specified minimum lake level); or
- (b) to review the effectiveness of the conditions in avoiding or mitigating any unanticipated more than minor adverse effects on water resources (at any time); or
- (c) to review the monitoring, volumes, any other rates specified in the conditions, and any management plans with particular reference to dealing with adverse effects on the environment (every seven years).

That would include a review due to future unanticipated effects of climate change on the environment affected by the scheme's operation if that eventuated.

6. The RFI refers to the technical advice provided by Mr Hamish Graham for CRC.³ Mr Graham has critiqued Genesis for relying on being able to operate

² Condition numbers as per the July 25 Draft Conditions.

³ [Appendix 5 Hydrology](#)

the scheme within the existing operating level range, without providing evidence as to whether this is possible within the various climate change projections.⁴ It is unclear what type of evidence Mr Graham is seeking. Mr Gray has confirmed that:⁵

- (a) the scheme is managed on (typically) a weekly basis taking into account inflows and lake levels and consideration of the risks of reaching the lake levels specified in consent conditions; and
 - (b) higher winter inflows can be accommodated within the existing generation capacity of up to 130 m³/s.
7. Mr Graham himself has not specifically assessed how climate change will affect the scheme operations. That is because it is not possible to do so with any certainty as there are multiple scenarios and other factors involved.
8. Genesis' position is therefore:
- (a) climate change is unlikely to change the timing, frequency, duration and/or volume of spill flows in the Takapō River during the 35-year term of the consents;
 - (b) lake levels can be managed within the consent parameters;
 - (c) no certainty can be provided as to potential implication as there are other factors in play;
 - (d) any implications can be dealt with through the review conditions; and
 - (e) there are no material adverse environmental effects different to those now that are attributable to potential changes to the operation of the scheme.

Information already before the panel

Implications of climate change on the operation of the scheme

9. Appendix K to the AEE set out the climate change impacts on Lake Tekapo inflows and hydro-electricity generation potential for the scheme. Genesis' position was also set out in the discussion between experts on 26 June.⁶

⁴ At [3].

⁵ [Appendix-Two -Groundwater-and-Hydrology-Discussion-26-June-2025-Record71009591.1.pdf](#)

⁶ [Appendix-Two -Groundwater-and-Hydrology-Discussion-26-June-2025-Record71009591.1.pdf](#)

10. In summary:⁷

- (a) the main change in inflow is likely to be an increase in flow into Lake Takapō in winter and potentially a small decrease in flow in summer;
- (b) an overall increase in flood flows into Lake Takapō is expected;
- (c) flows into Lake Takapō are anticipated to increase in winter and spring, but that is unlikely to result in increased spill flows;⁸
- (d) no or limited change in flows into Lake Takapō is expected in summer and autumn; and
- (e) the total number of extreme low flow events into Lake Takapō is anticipated to decrease.

11. Mr Graham critiques Genesis for not having gone on to assess what the RCPs mean for the scheme's operation.⁹ To the extent that it is possible to do so, given the other factors influencing the scheme's operation cannot be guaranteed either, Genesis has considered the effects of climate change. During the expert discussion:¹⁰

- (a) Mr Veendrick recorded that drawdown would still occur largely as at present:
 - (i) the general pattern of relatively low inflow in winter and relatively high inflow in summer would be retained; and
 - (ii) changes in lake levels due to climate change would be difficult to predict because of uncertainties in what the climate change effect would be and the timing of that effect; and
- (b) Mr Gray indicated that the general pattern of the existing lake levels is unlikely to change:
 - (i) higher winter inflows can be accommodated within the existing generation capacity of up to 130 m³/s; and

⁷ [Tekapo Power Scheme – Hydrological and Hydrogeological Analyses](#) at iv and 4.1.3.1–4.1.3.4. The four Representation Concentration Pathways (**RCPs**) were referred to in respect of different aspects. The scenarios are RCP2.6 (low emission pathway), RCP4.5 (moderate emission pathway), RCP6.0 (moderate-high emission pathway) and RCP8.5 (high emission pathway).

⁸ Mr Veendrick and Mr Gray both consider that projected changes as a result of climate change are unlikely to change spill flows. See [Appendix-Two -Groundwater-and-Hydrology-Discussion-26-June-2025-Record71009591.1.pdf](#)

⁹ At [10].

¹⁰ [Appendix-Two -Groundwater-and-Hydrology-Discussion-26-June-2025-Record71009591.1.pdf](#)

- (ii) increased lake inflows would likely result in increased generation in winter while still managing to the consented lake levels taking into account the risks of reaching the lake levels specified in the consent conditions.

12. Mr Graham critiques Genesis for not assessing potential climate change impacts between 1991 and present.¹¹ **Figure 2** below¹² shows the lake levels between 1926 and 2022.

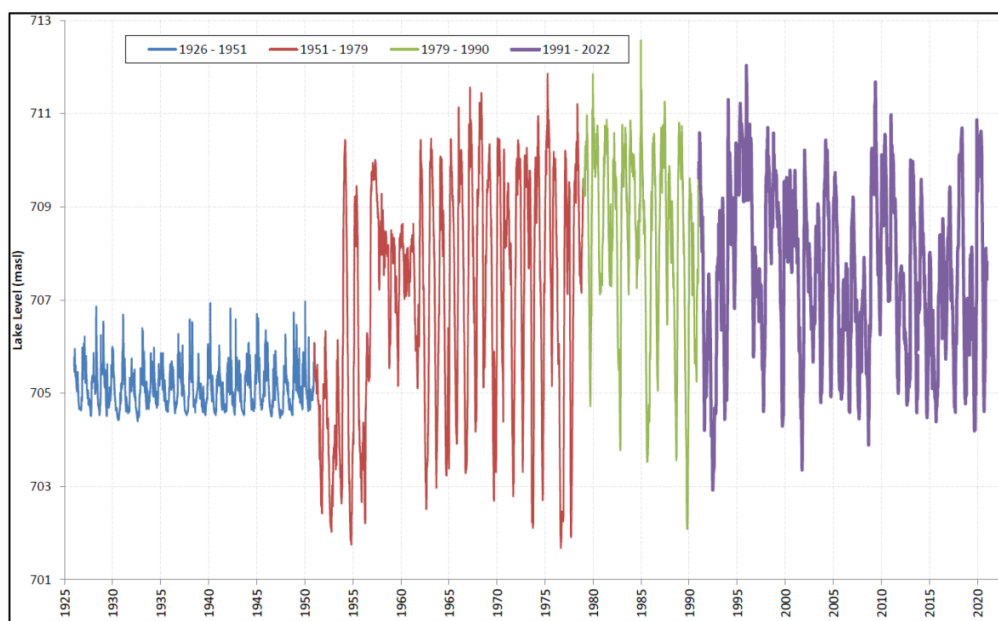


Figure 2: Takapō Lake Levels

13. There are various factors affecting the lake level which make it difficult to isolate any climate change effects. For instance, energy demands, energy generation and yearly variations (including from the El Niño-Southern Oscillation).
14. Mr Graham asserts that lake levels may be closer to the maximum or minimum operating range more frequently than currently due to change in climate and energy demand.¹³ The scheme's operation already differs month to month and year to year in response to such matters. The variations by month and year are shown earlier in **Figure 1**.

¹¹ At [12].

¹² This figure is already before the panel in Figure 28 of the AEE and Figure B1 in Appendix K.

¹³ At [15].

15. Following the conferencing on 26 June, Mr Gray provided further information to CRC describing how Genesis manages the operation of the scheme (now set out in **Appendix 2** and below).
16. Despite the information above being provided, Mr Graham critiques Genesis for not verifying that there is space in the scheme capacity to accommodate changes to climate and energy demand.¹⁴ It is simply not possible to conclusively verify that. If it were, Genesis would have done so. And presumably Mr Graham would have too. Instead, Genesis has provided the best information available. The review conditions will be available if Genesis' best predictions are wrong.

Effects attributable to potential changes to the operation of the scheme

17. Genesis' position remains that there are no effects attributable to potential changes to the operation of the scheme.
18. Effects of climate change on avifauna,¹⁵ herpetofauna,¹⁶ terrestrial invertebrates,¹⁷ vegetation,¹⁸ native fish,¹⁹ water quality,²⁰ and lakeshore geomorphology²¹ were broadly considered. Adverse effects of climate change are not effects of the scheme as they will happen with or without the scheme. But the scheme contributes to helping New Zealand reach its emission targets which will ultimately help mitigate the adverse effects of climate change.
19. As above, Genesis' position is that the scheme can be operated within its consented limits. If that is not correct, there are review conditions that enable consideration of alternative actions or conditions that may be required.

Additional information

Electricity system influences

20. Mr Coates has confirmed that:

The effects of climate change on the Tekapo Power Scheme (TPS) are highly uncertain but are considered likely to be twofold:

¹⁴ At [16].

¹⁵ [Appendix-Q-Avifauna-Tekapo-PS-Reconsenting.pdf](#) at 6.1.

¹⁶ [Appendix-P-Herpetofauna-Tekapo-PS-Reconsenting.pdf](#) at 1.4.

¹⁷ [Appendix-O-Terrestrial-Invertebrates-Tekapo-PS-Reconsenting.pdf](#) at 7.1.

¹⁸ [Report Template](#) at 5.5.

¹⁹ [Tekapo Power Scheme: Native fish assessment of ecological effects](#) at 7.1–7.4.

²⁰ [Tekapo power scheme reconsenting: assessment of aquatic environmental effects](#) at i and 2.5.

²¹ [Tekapo Shoreline Effects 2022](#) at 5.3–5.4.

1. Climate change may affect the nature and timing of inflows into Lake Tekapo, for example, by increasing winter inflows and causing more extreme weather events.
 2. More broadly, in an effort to decarbonise and mitigate climate change, particularly through building wind and solar power, New Zealand's electricity supply is likely to become more volatile, creating a greater need for flexibility.
21. Mr Coates explains that higher winter inflows would enable greater winter generation which "will be beneficial to the electricity market, as winter is the period of highest demand." Mr Coates emphasises that:
- ... the operation of the TPS depends not just on inflows, but also on a wide range of other factors, such as electricity market arrangements, technological developments, and the wider electricity system. ...
22. Full details are provided in **Appendix 1**. In summary, the key points are that:
- (a) the demands of the electricity system itself into the future are unpredictable; but
 - (b) more water in winter will enable greater generation at the time of highest demand; and
 - (c) the scheme is significant in providing flexibility into our electricity system.

Hydrology and operation

23. As set out in **Appendix 2**:

- > An increase in average annual inflow to Lake Takapō for both the Mid-Century as well as for End - Century.
- > The main change in inflow is likely to be an increase in flow in winter and potentially a small decrease in flow in summer. Most studies generally predict relatively small changes in flow for spring and autumn.

...

... a recent study from Purdie estimated the changes in lake inflow due to climate change over a 30-year period (current - 2020 and future – 2050). It is noted that this study states that due to the relatively short timeframe of 30 years between current (2020) and future (2050) the impact of different emission scenarios (i.e. low (RCP 2.6), mid-range (RCP 4.5) and high emissions (RCP 8.5) scenario) on inflows was found to be small. Although impacts on inflows are significant overall, the 30-year period examined was not long enough for clear distinctions between different emissions scenarios to emerge, distinct from that which is already 'locked in' by past emissions. Therefore, only the mid-range emissions scenario (RCP4.5) outcomes are discussed in the paper. With regard to Lake Takapō inflows the results indicate:

- > A moderate increase in annual inflows of approximately 6%.
- > A large seasonal change in inflows with an increase in winter flow of 26% and a decrease in summer flow of 10%. The modelled increase in flow in spring and autumn is more moderate at 2% and 6% respectively.

24. Full details are provided in **Appendix 2**. In summary the key point is that the implications of climate change over the consenting period are highly unpredictable, but the predicted focus is an increase in inflows into Lake Takapō over winter and a decrease over summer.

Operational matters

25. As mentioned above, following conferencing Mr Gray provided information to CRC as to how Genesis manages the operation of the scheme. That management process is set out in **Appendix 2**.

26. In relation to what this means in practice, as stated in **Appendix 2**:

... an increase in winter inflows of 26% in the months of June, July and August results in an increase in lake level of up to 0.7m at the 95th percentile inflow sequence. This is small in comparison with the approximate 10 metre range in lake levels shown in Table 1 and Appendix B of the PDP Hydrology Report. This shows no extra risk of spill from Lake Takapō given the lake is drawn down over winter to meet demand during winter months and to be ready for the increase in spring inflows. The 95th percentile inflow sequence indicates that the lake level continues to fall in a controlled fashion through the winter period utilising normal generation patterns.

The risk of spill in the following months is not increased by this inflow increase, highlighted by the fact that high lake levels then occur at the same time of the year as a 'normal' historical inflow sequence. Further to this, a reduction in mean summer inflows further reduces risk of spill.

In addition, the lake level risk management process described above means that generation will be restricted when lake levels approach the minimum levels specified in the consent conditions.

27. In summary, the key point is that the operation of the scheme is already managed in such a manner to respond to the current uncertainties and the predicted changes resulting from climate change are not expected to result in any material operational changes.

Legal basis

28. Given the matters above, it is not clear what effect(s) the panel is considering. Genesis must operate the scheme within the parameters of its consents. On the basis of the advice of its experts, Genesis' position continue to be that:

- (a) the scheme can operate within its current operating limits even under RCP8.5; and
 - (b) there are no material adverse effects attributable to potential changes to the operation of the scheme.
29. There is a potential benefit of greater winter inflows into Lake Takapō. As explained by Mr Coates that is when there is maximum demand for electricity. Increased flow not only allows additional generation at the time of maximum demand, but it also enhances the ability for the storage to provide 'flex' to the system. Therefore, the projected 26% increase in winter inflow would provide system benefits and be efficiently utilised to generate electricity through the winter period.
30. As noted by Mr Gray and Mr Richard Matthews,²² the presence of the scheme may mean that lake levels are unlikely to fall as low as they otherwise might in the absence of the scheme, because of the risk-based management approach Genesis operates to comply with the lake levels required by consent conditions.

Dated this 15th day of September 2025



David Allen / Chelsea Easter
Counsel for the Applicant

²² [Appendix-Two -Groundwater-and-Hydrology-Discussion-26-June-2025-Record71009591.1.pdf](#) at 3.