Appendix 3: Groundwater technical expert advice

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	11/03/2026
To	Jeremy Ecker, Consent Planner
From	Kate Bailue, Environment Canterbury Senior Scientist - Groundwater Resources
Project advice provided for	RMA253705 - Meridian Energy Limited - Lake Pūkaki Hydro Storage and Dam Resilience Works.
Documents referred to	Lake Pūkaki Reservoir Hydro Storage and Dam Resilience Works. Groundwater Assessment. GHD Ltd. 16 September 2025 Lake Pūkaki Fast-track Consent Substantive Application. Ecological Impact Assessment. Tonkin & Taylor Ltd. October 2025
Qualifications and Experience	Bachelor of Environmental Science degree (Honours) from La Trobe University, Victoria, Australia. With 17 years of experience within the groundwater science field.
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. 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**
Potential changes in wetland hydrology for the Tasman Delta are not addressed	Wetlands that are hydraulically connected to Lake Pūkaki via groundwater. Lowering of lake levels could reduce groundwater levels and flows to wetlands, affecting wetland function.	Expected duration at lower levels is likely to be limited to several weeks over the projected 3-year period. Extending duration of these lower levels has potential to increase the level of uncertainty and possible effects.

Agreement with the applicant

2. The applicant describes the worst-case scenario as being when the lake falls below 518 mRL in early September and does not recover to above 518 mRL until December (longest duration of no more than 4 months). Based on the modelling, Meridian describes over the hydro storage management period 2026 – 2029, there is an estimated 3-4% probability that lake

levels might fall below 518.0 mRL in any given week over this period[1]. This equates to approximately 39 days operating at lake levels under 518 mRL over the three-year period.

3. I generally agree with the applicant's description of the existing environment, which includes descriptions of the climate, hydrology, geology and topography of the area that surrounds Lake Pūkaki.
4. I broadly agree with the applicant's hydrogeology description, noting that available historic groundwater information around Lake Pūkaki is limited. I also agree that the proposed groundwater conceptual model identifies the lakebed composed of silty and clayey materials that are likely to restrict interaction between the lake and surrounding aquifers.
5. I also agree that a number of the wetlands are located above the lake levels, which supports the interpretation that groundwater flows downslope, towards the lake and discharges to the surface in places (Figure 10).
6. I agree that the potential effects of lowering the lake are lower groundwater levels in nearby wells (impacts to other groundwater users) and potentially impacting water levels that may affect the hydrology function of nearby wetlands.
7. I also agree with the applicant's assessment of the four domestic wells that occur within 500 m of the lake edge, which aligns with CRC's well data in the Wells database. After discussions with GHD on 10 December (refer to paragraph 10), a 500 m cut off distance for assessing potentially affected wells was agreed.
8. For the four domestic wells identified, two wells have groundwater levels below 510 mRL, below the lowest lake level. Therefore, I agree they are unlikely to be impacted by lower lake levels. For the other two wells, one has a thick silty layer, which would limit hydraulic connection to the lake, and the other wells have recorded water levels much higher than the lake (559 mRL). For these reasons, I agree with the applicant that they are also unlikely to be impacted by lower lake levels.
9. I have not assessed wells owned by the applicant that are used mainly for water level observation or geotechnical monitoring.
10. The Ecological Impact Assessment by Tonkin & Taylor (2025) describes 17 wetlands that are connected to Lake Pūkaki. Of these wetlands, only the Tasman River Delta was assessed as very high ecological value. The remaining four wetlands were of high value and 12 wetlands of moderate value

Benefits of the project

9. I acknowledge there are significant regional and national benefits from an energy production point of view. My understanding is that this application will enable Meridian to plan better and utilise water stored in Lake Pūkaki for generating power.

Outstanding areas of contention and significance of these.

Discussions with applicant

10. I watched a recording of an online presentation (dated 7 Oct 2025) by the applicant that provided an overview of the proposal.

[1] GHD, 2025. Lake Pūkaki Hydro storage and dam resilience works. Substantive Application under the Fast Track Approvals Act 2024. 5 Meridian Energy Limited. 05 November 2025.

11. I met online with Matt Dodson GHD Technical Lead - Hydrogeology on the 10 December 2025 to discuss two aspects of the proposal. These included:

    a. How the 500 m cut off distance was chosen to assess potentially affected wells? We both agreed that any potential effects would be greatest at the edge of the lake and would reduce with distance. Furthermore, we agreed that due to the geometry of the aquifers near the lake edge, where there are existing bores, they are unlikely to be connected to the lake. We both agreed that a 500 m cut off was suitable, given the silty nature of the aquifers that surround the lake.

    b. How lowering of Lake Pūkaki could potentially impact the hydrology of the Tasman Delta? GHD's response to this was that because the Tasman Delta is dominated by surface water and likely acts as an interconnected braided fan. Lowering the lake level is unlikely to materially change the groundwater inputs from the lake margins into the delta itself. I disagreed, as the braid fan is likely to extend into the sub-surface as a braid fan aquifer, which is likely to play a role in connecting the lake to the delta. It is unknown if lowering the Lake below 518 mRL would impact this connection.

Outstanding areas of contention (wetland hydrology)

12. There is a lack of information regarding the frequency and duration Lake Pūkaki would be operating at the lower level (below 518 mRL). Meridian undertook modelling to determine the probability of the lake being operated below 518 mRL. There is little detail provided in the application regarding the inputs of this model (which uses inputs of hydrological and meteorological data and forecasts of energy supply/demand), and whether they are considered appropriate. Therefore, I cannot comment on whether the modelled results are plausible, including the modelled worst-case scenario.
13. The applicant provides a summary of the hydrological influences of each wetland. Most wetlands have been assessed as having limited hydrological connectivity to Lake Pūkaki. However, the Tasman River Delta was assessed as having a 'high' hydrological connectivity to the lake because the delta interacts with the lake at 525 mRL.
14. Given the relatively short duration (up to 39 days) of operating the lake below 518 mRL and limited hydrological connective of the wetlands to the lake, I agree with the applicant that for most wetlands the level of effect is likely to be low. However, I am unsure about how the Tasman Delta hydrology could be impacted by the proposal, given the high hydrological connectivity to the lake.
15. The current consents allow for Lake Pūkaki to operate the lake level in the range of 518 – 532 mRL. The applicant describes that because the current consents allow for a large range in lake levels already, there would unlikely be a change to the wetland hydrology from the proposal. I am unsure if this is a valid argument; this would imply the existing consents of the WPS would form part of the existing environment. There could be a dipping point, in which lowering the lake level could limit the hydraulic connection between the lake and delta which has the potential to impact the delta hydrology.

16. Without more detailed knowledge of the delta's hydrology and how it interacts with the lake it is difficult to assess the potential impact of lowering lake levels on the Tasman River Delta.
17. Hydrology advice by Dan Clark (dated 24 February 2026) highlighted that the application does not include a hydrological assessment of the reduction of spills to the Pūkaki River (via Gate 19) that would result due to lower lake levels. This reduction of spills to the Pūkaki River will likely impact recharge to groundwater along the Pūkaki River, that may potentially cause ecological impacts to wetlands found along Pūkaki River. However, in the Ecological Assessment Tonkin & Taylor (2025) describe spills from Gate 19 are expected to be of a similar frequency and therefore the magnitude of the effect on riparian vegetation along Pūkaki River is expected to be negligible. Further hydrological assessment of the change in spill events is needed to understand future ecological effects.

Significance of these matters

18. It is difficult to understand and assess the anticipated changes to groundwater levels that may occur from lowering Lake Pūkaki. This is particularly relevant to the Tasman River Delta, where it has been identified to have a high connection with Lake Pūkaki and very high ecological value.

Solutions and/or Conditions sought

19. None