Before a panel appointed under the Fast-Track Approvals Act 2024 **FTAA-2510-1120**

UNDER:	the Fast-track Approvals Act 2024 (**Act**)
IN THE MATTER:	an application for approvals for the Lake Pūkaki Hydro Storage and Dam Resilience Works
BY:	**MERIDIAN ENERGY LIMITED** **Applicant**

STATEMENT OF EVIDENCE OF MATTHEW MICHAEL DODSON ON BEHALF OF MERIDIAN ENERGY LIMITED

Groundwater Assessment

Dated: 15 April 2026

Counsel acting:
Stephen Christensen
Project Barrister
P 027 448 2325
stephen@projectbarrister.nz

INTRODUCTION

1. My full name is Matthew Michael Dodson.

2. I am employed by GHD Limited as a Technical Lead – Hydrogeology. Previously I was employed for 10 years by Environment Canterbury in a range of roles, from Hydrogeologist to Team Leader – Groundwater.

3. I hold a master's degree in engineering geology (1st class honours) from University of Canterbury and a current certificate for the Making Good Decisions Foundation Programme for resource management decision-makers.

4. I have been practising as a hydrogeological practitioner in New Zealand for 17 years.

5. I have been asked by Meridian Energy Limited to provide a response to the specific matters contained in the written comments on the application from persons invited by the Panel to comment under section 53 of the Act:

   a. Environment Canterbury.

   b. Department of Conservation.

6. I have prepared this statement within the limited time available to me. Consequently, it is necessarily at a high level. I am able to provide a more fulsome response ot the issues covered in this statement if the Panel requires further assistance from me.

CODE OF CONDUCT

7. I confirm that I have read the Code of Conduct for Expert Witnesses as contained in section 9 of the Environment Court Practice Note (2023), and have complied with it in preparing this evidence. I confirm the issues addressed in this evidence are within my area of expertise, and I have not omitted material facts known to me that might alter or detract from my evidence.

Environment Canterbury

8. Environment Canterbury's written comment is: "*Drawing the lake to proposed levels for extended periods of time may draw water out of the Tasman Delta. The scale of such effect is difficult to quantify, nor is there appropriate mitigation available. It is difficult to quantify how much of an effect this proposal*

may have beyond that which may occur under the pathways to lower the lake during shortage of supply scenarios. However, when considering the 'likely scenario' of 39 days (even if no shortage of supply is declared and so those provisions are not exercised), it is significantly lower than the duration anticipated by PC1 of four to seven months. The worst-case scenario (1% probability of occurring) would extend to four months. CRC considers any monitoring would be difficult to undertake and unlikely to pass the 'onerous' test. CRC considers this to be a potential effect of the proposal for the Panel to consider alongside the potential benefits of additional renewable energy supply".

9. I agree with Environment Canterbury that the impact of the activity may not be materially different from effects that could already occur under existing lake drawdown pathways during supply shortages. Under the likely scenario, drawdown could last about 39 days, which is much shorter than the 4–7 months anticipated under Plan Change 1 of the Waitaki Catchment Allocation Regional Plan. The worst case (1% probability) scenario could last up to four months.

10. I agree that monitoring effects on the Tasman Delta would be difficult and likely considered onerous, limiting its practicality and that while avoiding prolonged low lake levels could be environmentally beneficial, such mitigation may involve onerous conditions.

11. Enviroment Canterbury's other comments are:

    a) That there is limited information on Tasman Delta hydrology.

    b) That there is hydrological connection to the lake with the Tasman Delta.

    c) That extended lake drawdown to proposed levels could draw water from the Tasman Delta.

12. I partially agree with 11.a) and 11.b) and disagree with 11.c). I provide further commentary on my reasoning in the following paragraphs.

13. In terms of information about the Tasman Delta hydrology (11.a):

a) Kerr (2009)[1] provides a comprehensive review of rainfall distribution in the Lake Pūkaki catchment using data from 27 rain gauges, located within the catchment itself. The study also analyses flow records from the Hooker River, Jollie Stream, and long-term lake levels converted into flow data. Findings indicate that the upper catchment receives substantial rainfall, which feeds the rivers and streams that flow onto the Tasman Delta.

b) Aerial photographs provide clear evidence that the Tasman Delta is a braided plain formed by the Tasman River (Figure 1). These images also demonstrate that river channels exhibit dynamic behaviour, frequently shifting positions over time and occupying a substantial portion of the delta's surface at any given moment. Furthermore, the photographs reveal significant fluctuations in the delta's extent, which are directly related to lake levels.

c) Overall, although additional information could enhance our understanding of the Tasman Delta's hydrology, it is my opinion there is already sufficient data to assess the probable changes in hydrology resulting from the temporary activity, and conclude that those changes will have a negligible effect on the Tasman Delta's hydrology as they are short-lived and similar to what is experienced already.

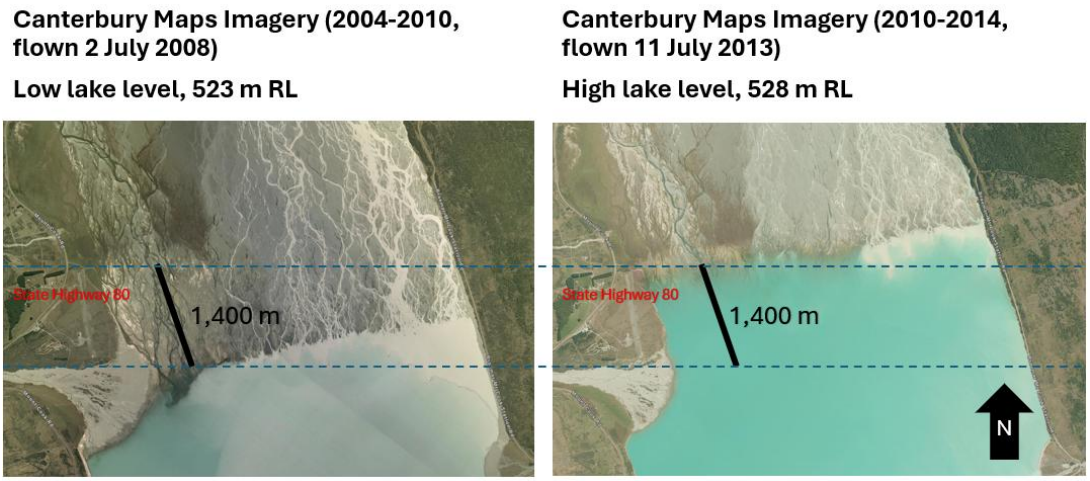

Figure 1 Aerial imagery showing a low and high lake level. Source of aerial photos Canterbury Maps, and lake levels Meridian Energy Limited

14. In terms of hydrological connection to the Tasman Delta (11.b):

[1] Kerr, T, 2009. Precipitation distribution in the Lake Pūkaki catchment, New Zealand. Phd thesis. Department of Geography, University of Canterbury.

a) It is my opinion there is a high degree of connection between the Tasman River and the Tasman Delta.

b) From previous discussion with Environment Canterbury's groundwater scientist (15 December 2025), I understand the written comments relate to the connection between the **groundwater system** and the delta. We agreed that the hydrology of the delta is dominated by surface water (Appendix A).

c) I agree that there is likely a groundwater system beneath the delta, but it is also likely connected to the river, much like the delta itself. To support this statement, I used Darcy's Law (using the method described in Environment Canterbury, 2019[2]) to estimate groundwater flow in the top 1 to 2 m and compared it with the combined mean inflow from the Hooker River and Jollie Stream (33.2 m^3/s; Kerr, 2009). Hooker River and Jollie Stream stations are located upstream of the delta. Shallow groundwater (the top 1 or 2 m) likely interacts with plants therefore potentially affects the wetland ecology. The calculation considered hydraulic conductivities of 100 and 1,000 m/day, a measured width of the delta being 4,500 m, and a surface gradient, as a surrogate for the hydraulic gradient, of 0.006 m/m (further details are in Appendix B).

d) Groundwater flow in the upper 1 to 2 m is estimated to range from 0.03 m^3/s to 0.59 m^3/s, representing only about 0.1% to 1.8% of the combined average delta inflow, of 33.2 m^3/s. This calculation shows that groundwater contributes a relatively minor portion to the overall flow in the delta, with the Tasman River serving as the primary hydrological source for groundwater.

15. In terms of lake drawdown drawing water from the Tasman Delta (11.c):

a) As outlined in paragraphs 14, it is my assessment that the hydrology of the Tasman Delta is dominated by the Tasman River. As illustrated in Figure 1, when lake levels decrease, the river maintains its connectivity to the lake and continues to be the primary source of recharge to the groundwater system beneath the delta. The Tasman River continues to exhibit dynamic behaviour, with braids across the surface of the delta.

[2] Environment Canterbury, 2019. Coastal groundwater discharge in the Waimakariri zone. Report No. R19/79, Environment Canterbury Technical report.

Department of Conservation

16. The Department of Conservation's comments regarding wetland hydrology relate to the importance of maintaining a range of lake levels and allowing wetlands to be inundated periodically. I understand from the technical work of others that these comments are generally important factors for the functioning of wetlands located on the edge of a lake.

17. In my opinion, however, these concerns are driven by not fully understanding the proposal. Dr Susan Walker's evidence, paragraph 24, states her understanding of the proposal as: "*The project seeks resource consents for water takes from Lake Pūkaki. Takes would occur over three consecutive winters from winter 2026 at levels lower than the present minimum permitted level of 518 metres RL to a minimum level of 513 metres RL*".

18. The project aims to obtain Fast-Track Consent for three years, allowing the lake levels to be reduced from below 518 m RL down to a minimum of 513 m RL, enabling the use of stored water for electricity generation. The intention is that during dry periods, water held in reserve can be released to produce power. It is possible that Meridian Energy Limited might not need to use this stored water within the three-year timeframe.

19. The Waitaki Power Scheme will otherwise operate as it has done previously, meaning lake levels will fluctuate in response to rainfall and therefore occasionally inundate wetlands along the lake edges. Hence the conclusion "*Given the large range of lake levels that occur now (518 to 532.5 m RL), it is considered* ***unlikely*** *that there will be a change to wetland hydrology if the lake operates between 518 and 513 mRL for limited periods of time over the next three years*" (GHD, 2025[3]).

20. Dr Walker's Attachment 5, reproduced below as Figure 2, indicates that the Lake Pūkaki lake level fluctuates over a large range, therefore I do not see the need for a condition to control the lake level further. I am also advised by Meridian Energy Limited that the current application does not involve the consent that authorises 'normal' lake level utilisation, which I understand Dr Walker's proposal relates to.

[3] GHD, 2025. Lake Pūkaki Reservoir Hydro Storage and Dam Resilience Works Groundwater Assessment. Prepared for Meridian Energy Limited

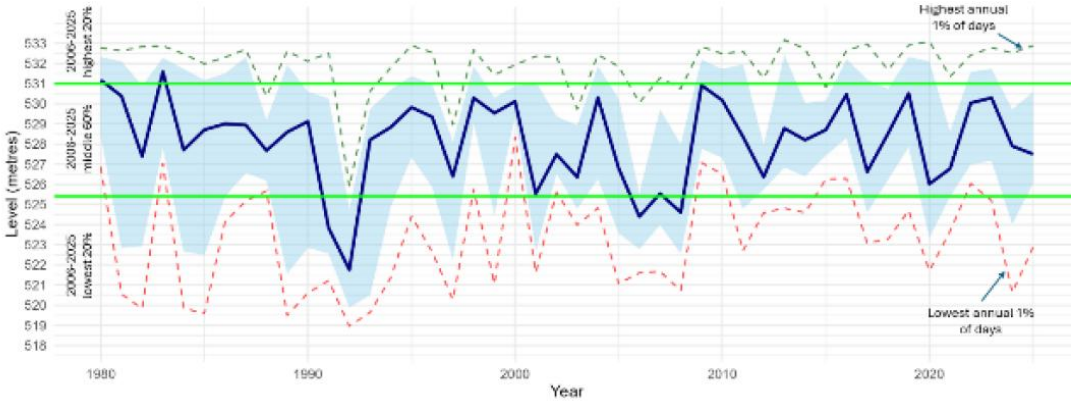

Figure 2 Graph of Lake Pūkaki levels grouped by calendar year from January 1980 to December 2025, showing the median levels for each year (linked by the dark blue line), the annual 20 to 80% ranges (blue shading), and the extremes in each year (1st and 99th percentiles of levels as red and green dashed lines). The horizontal green lines show the boundaries of the 20th to 80th percentiles (the 'middle 60%') across the last 20 years of lake level data. Source Dr Walkers evidence, Attachment 5.

Conclusion

21. After reviewing the comments and evidence from Environment Canterbury and Department of Conservation, I remain confident in the opinions and conclusions expressed in GHD (2025), Appendix J of the substantive application.

Dated: 15 April 2026

Matthew Michael Dodson

Appendix A

Email correspondence with the Environment Canterbury groundwater scientist

[redacted]@ecan.govt.nz>
Sent: Tuesday, December 16, 2025 11:12:55 AM
To: Matt Dodson [redacted]
Subject: RE: Meridian - Pukaki fast track consent discussion

Kia ora Matt,

Yes, I agree with the first point and have passed that opinion to our planners.

For the second point - impacts on the Tasman Delta, while I agree that the hydrology will be dominated by surface water, I am still concerned we don't know enough about the subsurface to understand the hydraulic connection and the effect of lake lowering on the delta. The advice below is what I provided to our planners yesterday:

I am still not convinced we have enough information to determine the impact of lowering lake levels on the delta. While I agree partly with Matt's response that the delta will be dominated by surface water and likely act as an interconnected braid fan, there is also likely to be a braid plain aquifer, which would be connected to the delta via the subsurface. Without knowing water levels and elevations, I'm not sure how the braid plain aquifer would be impacted by the lowering of the lake and its connection to the hydrology of the delta.

I am still a bit unsure of how this process is supposed to be undertaken, so please let me know if you'd like to chat further on anything.

Cheers,
[redacted]

IN-CONFIDENCE

From: Matt Dodson [redacted]
Sent: Tuesday, 16 December 2025 11:02 am
[redacted]e@ecan.govt.nz>
Subject: RE: Meridian - Pukaki fast track consent discussion

Kia ora [redacted]

Following out catch up had a chat with our planners. They are looking for an understanding around unresolved issues. Can you indicate if our discussion and email below address your concerns, or if any are still outstanding?

Cheers,

Matt Dodson
MSc (Hons.)
Technical Lead - Hydrogeology

[redacted]@ecan.govt.nz>
Sent: Monday, 15 December 2025 2:24 pm
To: Matt Dodson [redacted]
Cc: Amy Callaghan [redacted]
Subject: RE: Meridian - Pukaki fast track consent discussion

Thanks, Matt. Your timing was perfect, since I just got an email from our CP asking about the outcome of our discussion.

Have a great Christmas and New Year.

Cheers,
[redacted]

IN-CONFIDENCE

From: Matt Dodson [redacted]
Sent: Monday, 15 December 2025 1:34 pm
[redacted]@ecan.govt.nz>
Cc: [redacted]
Subject: RE: Meridian - Pukaki fast track consent discussion

[redacted]

Thanks for your time this afternoon. Quick email to cover what we discussed:

1. Question - Would be beneficial to understand the technical reasoning for applying a 500m cut off distance for potentially affected wells: Response: 2 main reasons. First is that any potential effects will be greatest at the edge of the lake and reduce with distance. Secondly, due to the geometry of the aquifers near the lake edge, where there are existing bores, means they are unlikely to be connected to the lake. As examples, a) bores near Glentanner are in a steep gravel fan deposit, which is likely recharged by a combination of rainfall and stream discharge. b) bore near the headwater of the Twizel River which are likely in outwash gravels, and again probably recharged by local rainfall and possible losses from streams.
2. Question - impact on Tasman Delta: Response: In our opinion, the Tasman Delta hydrology is dominated by surface water and likely acts as an interconnected braid fan. Lowering the lake level is unlikely to materially change groundwater inputs from the lake margins, into the delta itself.

Have a great break, and kind regards,

Matt Dodson
MSc (Hons.)
Technical Lead - Hydrogeology

Appendix B

Estimate of groundwater flow

I used a method similar to one previously employed by Environment Canterbury (Environment Canterbury, 2019) to estimate how much groundwater from the Waimakariri zone flows into the ocean. This approach relies on Darcy's Law[4], expressed as Q = Aki or Q = wTi (see Table 1). The parameters and values used in these calculations are listed in Table 1, and the results are compared with Kerr's (2009) combined mean inflow from Hooker River and Jollie Stream (33.2 m³/s) as shown Table 2.

Table 1: Parameters and sources used in the estimation of discharge into the lake

Parameter	Symbol	Value used	Units	Information source	Used in the calculation
Flow rate	Q		m^3/s	-	Product of equation
Cross sectional area	A	-	m	-	No
Hydraulic conductivity	k	100 1,000	m/day	Range of literature values for Sand (coarse) and sand gravel mixtures[1]. These values were chosen based on observations of the surface geology of the delta (see Figure 3, Figure 4 and Figure 5).	No
Aquifer depth	B	1 2	M	Concentrating on the upper part of the groundwater system, that is likely to impact plants	No
Aquifer width	w	4,500	m	Measured in Canterbury Maps.	Yes
Transmissivity	T	100 2,000	m^2/day	Estimated from multiplying k by B	Yes
Hydraulic gradient	i	0.006	m/m	Assumed to be the same as the topographic gradient	Yes
[1] Values are based on various sources, including CIRIA (2000)[5], Fetter (2001)[6], Kruseman and de Ridder (2000)[7] and Look (2014)[8].					

Table 2: Results

Scenario	1	2	3	4
Aquifer depth (m)	1	1	2	2
Transmissivity (m^2/day)	100	1,000	200	2,000
Flow rate (m^3/s)	0.03	0.29	0.06	0.59

[4] Darcy's law - Wikipedia (https://en.wikipedia.org/wiki/Darcy%27s_law)
[5] CIRIA, 2017. CIRIA C760: Guidance on embedded retaining wall design, London, CIRIA.
[6] Fetter, C.W. 2001. Applied Hydrogeology. Fourth Edition. Prentice Hall.
[7] Kruseman, G.P. and de Ridder, N.A. (2000). Analysis and Evaluation of Pumping Test Data. 2nd Edition, International Institute for Land Reclamation and Improvement.
[8] Look, B.G. 2014. Handbook of geotechnical investigation and design tables. Second Edition. CRC Press. Taylor & Francis Group, London, UK.

% combined mean inflow from Kerr (2009)	0.1%	0.9%	0.2%	1.8%

Figure 3 Exposure of the geology near to the Tasman Delta. Photo taken just west of Braemar Mount Cook Station Road, along one of the cuttings for the Alps to Ocean cycleway

Figure 4 View of the Tasman Delta, showing gravels and fine material on the surface

Figure 5 View of the fine-grained material collecting on the surface near one of the braids of the Tasman River