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 PATRICK LEES ON BEHALF OF MERIDIAN ENERGY LIMITED

Freshwater Ecology Assessment

Dated: 15 April 2026

Counsel acting:
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INTRODUCTION

1. My full name is Patrick Lees.

2. I am a Freshwater Ecologist at Tonkin & Taylor Limited (T+T). I hold a Bachelor of Science from University of Canterbury.

3. I have been practising freshwater ecology for over 16 years across Aotearoa New Zealand and have worked at T+T for six years as a Senior Freshwater Ecologist. Prior to this I worked at Pattle Delamore Partners and Environment Canterbury as an Aquatic Ecologist.

4. 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. Canterbury Regional Council (*CRC*)

5. 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 to the issues covered in this statement if the Panel requires further assistance from me.

CODE OF CONDUCT

6. 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.

Canterbury Regional Council – Dr Tina Bayer

7 I have reviewed Dr Bayer's comments attached to the CRC s53[1] report and understand that Dr Bayer considers the proposed activity may have adverse effects particularly on the littoral zone of Lake Pūkaki.

8 My response provides clarification of the following matters with respect to my effects assessment on the littoral zone:

[1] CRC s53 report, Appendix 1, Lake Water Quality and Ecology.

a. Littoral habitat values and where potential areas of higher value littoral habitat occur.

b. Modelled eased operation water level scenarios.

c. The potential effect from the proposed lowering of lake water levels on littoral habitats.

9 The EcIA (Section 4.1.2 and 4.1.3) describes that littoral habitats range in value from moderate to high and are spatially variable and dependent on the bathymetric features of the lake. Where an intact littoral zone is present and able to develop and be sustained, these areas are providing important habitat functions and ecosystem services at a local scale for higher trophic species (such as fish) and to the lake ecosystem.

10 I have further reviewed aerial photography, and the reporting completed for PC1[2]. This has provided some context to the potential location of higher value littoral habitats. Based on my review, these are likely present in protected embayment's with lower gradients and shallow water depths up to approximately 20 m. These areas are usually located at outlets of lake tributary streams and rivers or where bays are present.[3] These areas likely provide a suitable environment for a higher diversity of littoral communities to develop (including macroinvertebrates, fish, bryophytes and periphyton), relative to steeper littoral zones located throughout much of the lake.

11 I have additionally reviewed information on the potential for the Tasman River Delta to provide an area of high-quality littoral habitat. My review showed that the Tasman River Delta is a large low gradient area of the lake. During current and any future lake level drawdown events, exposure of the wider delta area will occur. I note that historic research[4] has shown that the Tasman River Delta habitats, at or < 518 m RL, are likely impacted by the inundation (both continual and historic) and have a high proportional composition of fine inorganic sediments, turbid water, wave action, and active channel movement/

[2] James, M. 2012. Assessment of the impacts of lowering Lake Pūkaki below its consented level. Aquatic Environmental Sciences Ltd. Prepared for Meridian Energy Ltd

[3] A rudimentary assessment of aerial imagery (Google Earth Pro; image date 18/12/2023) showed that low gradient embayment's, bays, and the Tasman River Delta proportionally equates to c. 35% of the lake's circumference.

[4] Sanders, M. D. 1996. Effects of fluctuating lake levels and habitat enhancement on black stilts (Himantopus novaezelandiae Gould, 1841). PhD thesis, University of Canterbury, Christchurch, NZ.

erosion. These factors may limit the development of a higher value littoral zone within the delta area.

12 In addition, the PC1[5] reporting and historic research[6] has stated that fish within Lake Pūkaki likely rely on a wide range of food sources and is dependent on what is available. The native fish that are commonly present (e.g., toitoi (common bully; *Gobiomorphus cotidianus)* and kōaro (*Galxias brevipinnis*)) could switch to other food sources depending on what is currently driving the food web in that localised littoral zone at that time and at that lake level. For example, at very low lake levels if there is a reduction in periphyton and associated invertebrates, fish will likely switch to other macroinvertebrate food sources that are present at deeper depths, such as chironomid larva which persist within the benthos at c. 20 m depths.

13 The eased operation model predicts that where hydrological sequences drop below 518 m RL these are short in duration (approximately 1.5 – 2 weeks)[7] and not deep, and at the most down to 516 m RL. For example, of the 21 modelled sequences to drop below 518 m RL in the first year, 18 result in a drop between 518 – 516 m RL and only one sequence drops below 515 m RL. Additionally, a worst-case scenario, e.g., where the lake level drops below 518 m RL for a duration of 4 months, is extremely low and is approximately 1 %.

14 The above provides context to how a drawdown may occur during the eased operation. Based on the modelled output, only a portion of the eased operational range (518 to 513 m RL) is likely to be utilised. The impact on the littoral zone is more likely to be in a range of a 2 – 3 m change and not the entire 5 m. Similarly, the eased operation results in the lake level being on average below 518 m RL for approximately 1.5 - 2 weeks a year during the modelled three-year period.

15 In addition, the eased operation proposed by Meridian to intermittently access the additional storage is for a time-bound period of three years, until the end

[5] Page 23 - 24 in James (2012).
[6] e.g., Rowe, D., Graynoth, E., James, G., Taylor, M., Hawke, L. 2003. Influence of turbidity and fluctuating water levels on the abundance and depth distribution of small, benthic fish in New Zealand alpine lakes. Ecology of Freshwater Fish 2003: 12: 216-227.
[7] Based on there being approximately a 3 - 4 % probability that lake levels in any given week will be below 518 m RL. Therefore, on average the lake level will be below 518 m RL for approximately 1.5 – 2 weeks during the three years of eased operation.

of 2028. This means that at the culmination of the three years any effect from the eased operation on the littoral zone will cease.

16 The EcIA uses the EIANZ Ecological Impact Assessment Guidelines[8] as a framework to assist in determining the magnitude of effect and overall level of effects to lake littoral habitats due to the drawdown of the lake below 518 m RL. In my opinion the low magnitude of effect described in the EcIA is appropriate for describing any potential temporary effect to littoral habitats. This is due to the lowering of the lake resulting in a discernible change to baseline conditions. Where the baseline conditions are where the littoral zone habitat has adapted to a lake with high water level variability. However, any change to littoral habitats will be temporary (e.g., short and not deep) and once water levels return to within the normal operating range the underlying habitat composition and attributes of the littoral habitat will be like the pre-lowering scenario. Similarly, there is likely only a minor temporary effect on the range of species that utilise littoral habitats.

17 Overall, I confirm that my assessment in the EcIA stands, and that the proposed lowering of the water level will result in an overall low to very low effect on lake littoral habitats.

Dated: 15 April 2026

Patrick Lees

[8] published by the Environment Institute of Australia and New Zealand (EIANZ). Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. (2018). Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.