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 VICULP LAL ON BEHALF OF MERIDIAN ENERGY LIMITED

TEKAPO B POWER STATION TAILRACE WEIR & CHUTE CONDITION ASSESSMENT

Dated: 15 April 2026

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

INTRODUCTION

1. My full name is Viculp Lal.

2. I hold a Bachelor of Engineering degree in Civil Engineering, which I obtained in 1997, from the University of Delhi, Delhi, India. From 1998 to 2012, I was employed in various positions in the Design and Engineering Division of NHPC Ltd., a state-owned hydropower utility in India.

3. I relocated to New Zealand in 2012 as a skilled migrant, and have been employed at Damwatch Engineering Limited, Wellington, since 2012. I currently hold the post of Principal Structural Engineer at Damwatch.

4. I am a Chartered Engineer and Fellow of the Institution of Engineers, India. I am a member of Engineering New Zealand, and currently a member of the NZ Society on Large Dams, the NZ Geotechnical Society, and the International Society for Rock Mechanics.

5. I have been practising design and engineering of dams and hydroelectric infrastructure for over 27 years, with emphasis on structural engineering aspects and dam safety, from conceptualisation to commissioning, and operation/ retrofit/ rehabilitation of structures. My experience at Damwatch has focussed on structural and seismic assessments and reviews, and remediation/ rehabilitation/strengthening options for existing dams and hydroelectric infrastructure for a range of clients in New Zealand and internationally. I recently reviewed the structural condition of the Pukaki spillway, following which I was involved in the design and construction supervision of repairs to the spillway and stilling basin concrete, for remediation of damage from generalised abrasion and freeze-thaw attack.

6. In my capacity as a structural engineer, I assessed the structural condition of the concrete structures in the Tekapo B tail race channel, and this is documented in the Damwatch memo titled "*Pūkaki Fast-Track Application – Review Panel Overview Conference Summary Memorandum – Tekapo B Power Station Tailrace Weir & Chute*" dated 25th March 2026.

7. I have been asked by Meridian Energy Limited to provide responses 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. These are:

a. Genesis Energy Ltd.

b. Technical Advice – Structural Engineering – by Jan Stanway (WSP New Zealand report 2-38161.00 titled “Tekapo Submerged Weir, Structural Condition Assessment”)

c. Technical Advice – Water Engineering – by Mark Groves (WSP New Zealand memo 2-38161.00 titled “Tekapo B Power Station Submerged Weir – Damwatch Document Reviews”)

8. 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

9. 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.

RESPONSE TO COMMENTS

Purpose of the Concrete Weir and Sills

10. As described in the Damwatch memo dated 25th March 2026, the purpose of the concrete weir is to contain the tailwater pool at a certain level, and the purpose of the downstream concrete sills in the channel is to provide containment of riprap in the compartments created by the concrete sills along the channel. The interpretation of concrete condition, integrity, strength, and stability must be made in the context of this function. In this context, the concrete weir would fail to provide as-designed functionality if it fails to maintain the tail water pool at the as-designed level. Similarly, any downstream concrete sill would fail to provide as-designed functionality if it permits riprap that was placed upstream of the sill to be displaced downstream across the sill (under hydraulic actions by flowing water).

Responses to Comments by Genesis Energy NZ

Reference Document: COMMENTS BY GENESIS ENERGY LIMITED (8 April 2026)

Table 1: Responses to comments by Genesis Energy

No.	Reference	Comment	Response
1	Pages 6 to 7	Comment no. 29	The comment discusses the concept of “intended service life”, and exceedance of this life in the context of the tailrace channel and concrete weir and sills. In this context, the term “intended service life” is analogous to the term “specified intended life” stated in Clause B2.3.1 of the Building Code (2004). In civil and structural engineering, design codes and building codes use the term “design life” or “service life” for the purpose of defining durability and performance requirements for a structure, and materials used in the construction thereof. This term does not automatically limit the service life of any structure unless it can be demonstrated that the integrity, stability, and strength of the structure has been compromised to an extent that it cannot provide the functionality that it was designed for. There are many structures in New Zealand and around the world that are still in operation despite being well past their “intended service life”. This is mainly because the condition and integrity of the structures is considered sufficent for providing the as-designed functionality, and risks, if any, associated with continued operation are considered acceptable. The use of a structure beyond its “intended service life” requires condition assessments, which may involve material investigations and testing, structural surveillance and monitoring, and risk management plans, if necessary. The concrete weir and sills in the tail race channel, despite minor defects, have not been destabilised since construction, nor has their integrity and strength been compromised to an extent that they cannot perform their primary function of riprap containment – i.e. prevention of downstream displacement of riprap across the weir or sill. The comment on the structure being well past its “intended service life” therefore does not automatically render the structure unfit for as-designed purpose. nor does it create a presumption that the structure is likely to be unfit for its as-designed purpose.

Responses to Comments by Jan Stanway

Reference Document: WSP New Zealand report 2-38161.00 titled “Tekapo Submerged Weir, Structural Condition Assessment”

Table 2: Responses to comments by Jan Stanway

No.	Reference	Comment	Response
1	Sections 2.2.6 and 2.3.6	Concrete Condition When Exposed (freeze-thaw attack)	Freeze-thaw attack on the concrete may occur in cold climates if the structures are intermittently wet and dry, or if there is a shallow pool of water over the concrete structures, without any flow. The damage typically occurs over many cycles of freezing and thawing of water inside the pores (tiny voids) in concrete. This typically takes a few years in the case of concrete hydraulic structures subject to intermittent flow e.g. concrete lined spillways. The damage to the concrete from freeze-thaw action is expected to be surficial, and likely to occur over a few years. This could be monitored as part of a monitoring programme. The likelihood of freeze-thaw attacks is relevant to the winter season only when freezing temperatures are expected, and when this coincides with periods of no flow.
2	Section 3	Remaining Service Life	See response to Genesis comment no. 29, in *Reference Document: COMMENTS BY GENESIS ENERGY LIMITED (*8 April 2026) Table 1: Responses to comments by Genesis Energy
3	Section 3.2	Recommend-ations	There is currently no evidence from the dive inspections to conclude that the strength of the construction joints has been drastically compromised or that an entire weir/sill has deteriorated in material integrity and strength. The recommendation to drill new dowels into the weir and sills to strengthen the construction joint is therefore not justified. It is noted in the DamWatch memo that the steel mesh used in the Weir and Sills was used only as a former to contain the riprap for the concrete pour – it was not for providing strength to the structure. The dowelled connection between the two lift of concrete poured in the weir and sills was provided during construction for tying together the two stages of concrete, as explained in the Damwatch memo. Because of their embedment in concrete, they continue to provide strength to the construction joint. The concrete weir and sills have not been displaced or deformed to date, as stated in Section 2.3.4 of the reference document. This lack of displacement or deformation is evidence that the integrity, stability, and strength of the concrete weir and sills has not been compromised.

No.	Reference	Comment	Response
			The surficial concrete defects and isolated steel bar exposures observed in the dive inspections do not suggest that an entire weir or sill has become vulnerable to destabilisation or has been compromised in strength or integrity to an extent that it cannot provide the as-designed functionality of riprap containment.

Responses to Comments by Mark Groves

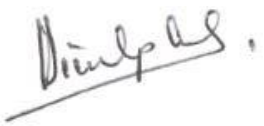
Reference Document: WSP New Zealand memo 2-38161.00 titled "Tekapo B Power Station Submerged Weir – Damwatch Document Reviews"

Table 3: Responses to comments by Mark Groves

No.	Reference	Comment	Response
1	Section 6.2.2	Implications of loss of connection of the weir and sill caps from the concrete base	The development of the potential failure mode involving toppling (downstream rotation) of the capping concrete is based on the assumption that ALL starter bars (dowels) at the construction joint may have significantly deteriorated in material condition and strength. There is currently no evidence from the dive inspections that this is the case and hence, the likelihood of development of this potential failure mode cannot be ascertained from the existing information on construction joint condition/integrity. The recommendation to strengthen the construction joints in the concrete weir and sills by drilling new dowels is based on the interpretation that the strength of the joints may have been compromised drastically. There is currently no evidence from the dive inspections that this is the case and hence, the recommendation is not justified.
2	Section 6.2.4	Implications of surface contamination	*The discussion on "biogenic attack" on the concrete has been presented without any evidence of the likelihood of this phenomenon.* *Microbial corrosion of concrete, or "biogenic attack" is commonly observed in concrete exposed to highly corrosive environments such as sewage treament/ conveyance systems, or aggressive offshore environments, or structures storing stagnant, acidic water. The associated failure mode of concrete is surficial in nature and involves weakening of the surface concrete over a period of time and flaking away of weakened layers.* *However, the occurrence of microbial corrosion of concrete in pristine freshwater environments is an area of active research and there is currently a lack of evidence on such phenomena in concrete structures in freshwater environments.*

No.	Reference	Comment	Response
			In the case of the tail race channel, the fresh water flowing over the concrete structures is very unlikely to create conditions conducive to mirobial corosion. Any conclusion on this phenomenon would need thorough investigation of water qualiy, and microbial character of the biological growth on the concrete. *References:* • *Microbial enhanced corrosion of hydraulic concrete structures under hydrodynamic conditions: Microbial community composition and functional prediction - ScienceDirect* • *Review on Microbially Influenced Concrete Corrosion - PMC* • *Characterization of microbial-induced concrete corrosion by combining morphology observation and fluorescence staining - ScienceDirect* • *Biogenic Sulfuric Acid Attack and Case Studies*
3	Section 6.2.4	WSP Recommend-ations	The recommendations to further investigate the condition of the concrete and to monitor the condition of the structures during operation of the tailrace are based on a conservative interpretation of the dive inspections, suspected condition of concrete, but without any conclusive evidence on concrete condition. It may be possible to investigate and monitor the concrete, provided safe access to the structures is possible over the long-term, while water is being conveyed by the channel (whether in a submerged or free flow environment). It is considered that the contingency and risk management planning outlined in the Damwatch memo (Section 8) is sufficient to address uncertainties related to the tail race channel, and any risk mitigation requirements arising out of returning the channel to service for conveying water in a free flow environment. These mitigation measures are detailed in the evidence by Dr. Grant Webby.

Dated: 15 April 2026



VICULP LAL