



16 August 2024

Transpower
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Adjustment to Alert Contingent Storage Release Boundary – Draft Decision

Meridian welcomes the opportunity to comment on Transpower's draft decision to increase the buffer applied in calculating the Contingent Storage Release Boundary from 50 GWh to 320 GWh from 1 September 2024 until 1 October 2024.

Summary

Meridian strongly supports Transpower's draft decision to exercise its discretion to publish a different buffer. However, we do not think the draft decision goes far enough to resolve the potential contingent storage access infeasibility attributable to the environmental limitations on use of the low ranges of the lakes in the Waiau catchment – Manapōuri and Te Anau.

In Meridian's opinion, an allowance for *all* 150 GWh of storage in the low ranges of those lakes should be included in any buffer (not just 50 GWh as proposed in the draft decision) meaning the total buffer should be 420 GWh.

Meridian also considers it prudent for Transpower to provide the industry with long-term certainty regarding the Contingent Storage Release Boundary. The current issues can arise in any year; therefore, an enduring solution is needed rather than a one-off change for the month of September 2024 only. This would mean a buffer of 200 GWh persists from 1 October 2024 until the 4% risk curve steps up from the floor around January 2025.

The remainder of this submission is structured under the following headings:

- Access to contingent storage is currently infeasible
- In the absence of change, this could result in premature security of supply issues
- Transpower's proposal would help but does not go far enough
- An enduring solution is required as the same issues can arise in any year.

Access to contingent storage is currently infeasible

Meridian considers there to be a significant risk that Lake Pūkaki storage will continue to decline rapidly and reach 518 metres above mean sea level (AMSL). Our current modelling indicates that there is approximately a 15% chance of this occurring in the next three months and 20% chance in the next 12 months based on historic inflow sequences.

If Lake Pūkaki reaches 518 metres AMSL before the Alert contingent storage release boundary is triggered, contingent storage would not be able to be used, despite a clear national need for that storage.

This potential infeasibility of access to contingent storage is due to the small size of the 50 GWh buffer. This small buffer means that in order for any individual reservoir to gain access to contingent storage, all South Island reservoirs have to be at or about the bottom of their operating range at the same point in time. There are two issues which significantly increase the likelihood that this would not be able to occur:

- **Issue 1:** From 1 October 220 GWh of Tekapo storage moves from normal controlled storage to contingent storage under the resource consent held by Genesis. It appears Lake Tekapo may be held higher than the bottom of controlled storage in anticipation of this 1 October change. That storage management approach would mean the Alert status could not be triggered prior to 1 October as the 220 GWh comfortably exceeds the 50 GWh buffer. If Genesis did not operate this way and instead drew Lake Tekapo down further, then they may not be able to recover the lake level by 1 October and would therefore risk non-compliance with the consented minimum level for controlled storage from that date.
- **Issue 2:** Lakes Manapōuri and Te Anau are not traditional storage lakes with consented minimum lake levels. These lakes are located in a National Park and are subject to a bespoke legislative and environmental rules regime. Storage in the low

ranges is not readily accessible and there are limits on its use. Together, the two lakes have 151 GWh of storage in their low ranges. When those lake are in their low ranges, Meridian's operations are highly constrained by the Manapōuri Te Anau Development Act, the associated Operating Guidelines for Levels of Lakes Manapouri and Te Anau¹, and resource consents. These constraints make it extremely difficult to envisage that the lakes would be able to be drawn down to levels that would trigger the Alert contingent storage release boundary. Details of these constraints are appended, in short there are:

- draw down limits that apply in the low ranges (5 cm per day in Lake Manapōuri and 3 cm per day in Lake Te Anau);
- maximum durations that lake levels can be within each band of their low ranges and Meridian must use best endeavours to ensure lake levels recover and exit those ranges within the timeframes specified; and
- during equinoxial periods (March and April plus October and November) Meridian must use best endeavors to avoid the lowest band of the Lake Te Anau low ranges and the lowest *two* bands of the Lake Manapōuri low ranges (the total storage across both lakes in this equinox zone is 55.8 GWh). The equinoxial limits are similar to the Lake Tekapo situation with seasonal changes to minimum lake levels.

The sum of the above means we expect triggering that Alert status and accessing contingent storage to be extremely challenging, if not impossible, in many scenarios. The lack of certainty that this results in is counter-productive to the orderly planning that is required to be prepare for use of contingent storage if required (for example Meridian needs to plan civil works to armour the face of the Pūkaki dam to the extent lake levels fall to contingent storage levels).

In the absence of change, this could result in premature security of supply issues

Meridian therefore strongly supports Transpower exercising its discretion to publish a different buffer. Meridian agrees with Transpower that in the absence of a change that enables earlier access to contingent storage, security of supply issues are reasonably likely to arise. In our opinion, any such security of supply issues would be premature and unnecessary since there is contingent storage that can first be used to alleviate the situation if the trigger settings are appropriately calibrated.

¹ [https://www.dia.govt.nz/Pubforms.nsf/NZGZT/NZGazette168.pdf/\\$file/NZGazette168.pdf#page=23](https://www.dia.govt.nz/Pubforms.nsf/NZGZT/NZGazette168.pdf/$file/NZGazette168.pdf#page=23)

This risk of contingent storage access infeasibility is not reflected in the system operator's security of supply modelling, which assumes contingent storage will be accessible. This means Transpower's current risk status understates the extent of system risk.

If Lake Pūkaki continues to fall but access to contingent storage is not triggered, resource consent conditions would require Meridian to hold the lake level at 518 meters AMSL. In that scenario, Meridian could only generate with any inflows. Inflows into Lake Pūkaki are currently barely detectable and there is an increased likelihood in Winter that any precipitation will fall as snow and not enter storage lakes until Spring. To comply with resource consent conditions and hold the lake level steady, Meridian would therefore need to withdraw significant generation capacity from spot market offers for the Waitaki scheme.

Meridian's resource consents would require it to maintain minimum Waitaki River flows at all times (although minimum flows can be reduced with the agreement of Environment Canterbury to reflect reduced natural inflows). The most efficient way to maintain minimum river flows would be to operate to maintain approximately 200-400 MW of baseload generation across the Waitaki Scheme varying depending on daily inflows. Meridian would have limited ability to use the limited short-term buffers in lakes Ruataniwha, Benmore, and Aviemore to shift generation into peak periods (and out of off-peak periods). We estimate this could allow peak and off-peak shaping of Meridian generation but only +/- 100-200 MW dependent on daily inflows. These would be significant reductions in energy output and peak capacity compared to current operations.

Transpower's draft decision paper confirms this risk outlook and that there would be:

- energy risks due to insufficient thermal fuel to cover the hydro shortfall on a sustained basis;
- peak capacity risks as hydro peaking capability would be limited; and
- power system stability risks.

In the absence of a change to the buffer these risks could see the lights go out unnecessarily ahead of the use of contingent storage. That would be a failure for the system operator and a very poor and avoidable outcome for New Zealand consumers.

Transpower's proposal would help but does not go far enough

The draft decision paper proposes changing the Contingent Storage Release Boundary from 50 GWh to 320 GWh from 1 September 2024 until 1 October 2024. This would be a marked improvement on the status quo. However, significant risks remain.

In Meridian's opinion, the proposal would successfully address Issue 1 (described above) by increasing the buffer by 220 GWh to account for the step change in Tekapo storage on 1 October 2024.

However, the proposal would not adequately address Issue 2 (described above) and would leave in place the risk that Lake Pūkaki and other storage reservoirs reach the bottom of their controlled storage, but access to contingent storage is not triggered because environmental controls mean that lakes Manapōuri and Te Anau cannot be drawn down to the trigger level.

The proposal provides for a 50 GWh allowance in the buffer for low range storage in the lakes Manapōuri and Te Anau. It is not clear to Meridian why Transpower has landed on this number. Transpower notes that in 2019 when the buffer was first introduced, Meridian recommended a 75 GWh allowance in the buffer to account for half of the low range storage in the two lakes of the Waiau catchment, on top of a buffer for measurement fluctuations and variability across storage lakes and any other operational uncertainties. Transpower says it has based its decision on that outdated view, but it has in fact proposed only a 50 GWh allowance in the buffer (rather than 75 GWh) to recognise low range constraints in the Waiau catchment.

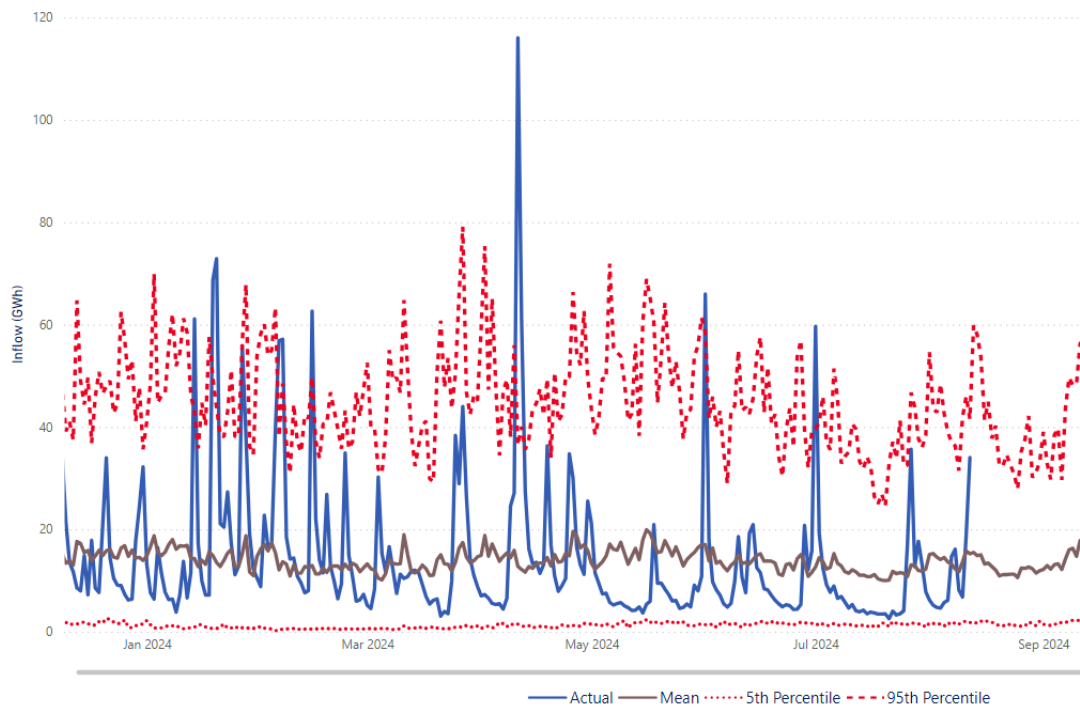
Since 2019 Meridian has carried out further analysis, and our focus has been sharpened by the current risks. In our opinion, the simplest approach would be to include the full 150 GWh of storage in the low ranges of lakes Manapōuri and Te Anau as part of the buffer on the Alert release curve on an ongoing basis. This would result in a total contingent storage release boundary of 420 GWh made up of:

- Tekapo contingent storage (220GWh) to reflect the shadow constraint until 1 October;
- an allowance for the low ranges of Waiau catchment storage (150 GWh); and
- a buffer (50GWh) to account for other operational uncertainties and variability across different reservoirs.

This alternative approach would reflect the limited control that can be exercised in the low ranges of lakes Manapōuri and Te Anau, which makes them unlike typical controlled storage. The environmental restrictions that apply in the low range means there is extremely limited operational control of that storage. Below are examples of the issues that could arise if the allowance in the buffer for the low ranges of Waiau catchment storage is only 50 GWh:

- Meridian’s best estimate is that it would take around a month in a no-rain scenario and with perfect foresight to draw both lakes down to within 50 GWh of the absolute minimum while complying with the required daily draw down rates. This means that if all other reservoirs reach the bottom of their controlled storage, there may still be an extended period where it is impossible to access contingent storage (and the associated security of supply risks would arise). The estimated one month timeframe to draw down through the low ranges also assumes the maximum draw down rates can be achieved when in reality the Te Anau lake control gates are not designed to pass high flows at low lakes levels so there are physical limits on how quickly water can be passed from Te Anau to Manapōuri, meaning the maximum draw down rate is often unachievable.
- The no-rain scenario described above is also extremely unlikely based on the historic precipitation patterns in the Waiau catchment. Fiordland receives regular inflow events and even a small event would extend the time required to lower the two lakes to the level needed for South Island controlled storage to cross the Alert contingent storage release boundary. The chart below shows recent inflows and the regular small top ups that are common in the Waiau catchment:

Waiau inflows (Te Anau and Manapōuri)



It is also worth noting that a single day of inflows can be larger than the 50 GWh buffer proposed in the draft decision to account for Waiau operational limitations. This means other lakes could be positioned to enter contingent storage the next day and have to stop due to a single rainfall event in the Waiau catchment and nowhere else. Such an event would prevent actions necessary to maintain security of supply.

- Even if the two lakes in the Waiau catchment could get low enough to cause a security of supply Alert and the release of contingent storage, any Alert would be short-lived. The timeframe of any Alert would be curtailed not necessarily because the security of supply situation had eased but because the Operating Guidelines require Meridian to restore lake levels in the Waiau catchment within set return times. Those return times are increasingly short as lake levels get lower. The detail is appended but in summary to get within 50 GWh of the absolute minimum across both lakes:
 - lake Manapōuri would need to be inside the second lowest band of the low range; and
 - lake Te Anau would need to be in the lowest band of the low ranges.

The Operating Guidelines only allow the lakes to remain at those levels for 20 or 21 days respectively before the level must be raised to preserve the lakeshore and ecology. This means that in practice any security of supply Alert could only persist for three weeks, even if all other reservoirs were at or below the bottom of their main range. Manapōuri generation would need to reduce significantly (perhaps entirely)

ahead of the return time to ensure the return time was met and after three weeks when the Alert status ended, generation from other reservoirs would then also need to pull back to get out of contingent storage as soon as practicable as required by resource consents, leading to the same security of supply concerns identified by Transpower in the draft decision paper. The return times also mean that it would be extremely difficult, if not impossible, for actual storage to drop from the 4% Alert curve down towards the 10% Emergency curve, even in a scenario with severe security of supply risks.

- Furthermore, during equinox periods (October and November, March and April) Meridian *cannot* enter the second lowest band of the low range at lake Manapōuri or the lowest band of the low ranges at lake Te Anau (collectively 56 GWh of storage). The absolute minimum lake levels are effectively higher in those months. We understand that the system operator's model does not account for this and assumes the full 150 GWh of Waiau storage in the low ranges is available for use at all times. The 56 GWh that cannot be accessed is obviously a larger number than the current 50 GWh buffer that Transpower proposes will remain after 1 October 2024. Therefore, *on its own* and irrespective of anything else, the equinox minimum levels would make triggering an Alert and accessing contingent storage impossible during the equinox months that the floor and buffer are in effect. Furthermore, in the periods prior to the equinox periods the anticipation of those raised limits must be factored into how storage is used.

Finally, by adopting a buffer that accounted for the full Waiau low range storage, that storage would effectively be decoupled from the contingent storage release boundary. That would enable increased Manapōuri peaking capacity to offset the loss of capacity in other hydro schemes (particularly the Waitaki) during times of contingent storage operation.²

An immediate and enduring solution is required

In Meridian's opinion, an immediate and enduring solution is required as the same contingent storage access infeasibility issues have the potential to arise in future years as well as the current year. The infeasibilities exist now (and will exist in future years as well);

² Meridian has previously provided Transpower with information on Waitaki scheme constraints during contingent storage operations, but we would be happy to provide any further information that might be of use.

the risk does not only arise from 1 September 2024, nor does it end suddenly on 30 September 2024.

The change to the buffer should take effect as soon as Transpower makes its decision and Transpower should finalise a decision as soon as possible (we understand that Transpower expects to communicate a final decision by 26 August 2024). Industry participants, particularly operators of reservoirs that contain contingent storage, need immediate clarity regarding how the current infeasibilities will be overcome under the electricity risk curve framework. Operational planning relies on this clarity.

In Meridian's opinion, the solution put in place should also be an enduring one that applies in all future years as well as the current year. Transpower appears to signal that an enduring solution may need to be considered on a longer timeframe with less urgency via wider changes to the 'default' buffers in the SOSFIP. We do not have a strong opinion on the process to be followed but stress the importance of this work to deliver an enduring solution and provide certainty regarding contingent storage access processes.

In the meantime, the settings for the remainder of this year (including after 30 September 2024) need to resolve the current risk that triggering release of contingent storage would likely be infeasible. In particular, any part of the buffer that is intended to address Issue 2, (i.e. the lack of control over storage in the low ranges of lakes Manapōuri and Te Anau) should persist right through until the floor and buffer are expected to cease and the risk curves increase around January 2025. Under the draft proposal that would see a 100 GWh buffer persist from 1 October 2024 until the 4% risk curve steps up from the floor, comprised of:

- 50GWh to account for the lack of control over storage in the low ranges of lakes Manapōuri and Te Anau; and
- 50 GWh to account for other operational uncertainties and variability across different reservoirs.

However, as stated earlier in this submission, Meridian considers the best way to ensure feasibility of contingent storage access and prevent premature security of supply risks is to increase the buffer to 200 GWh from 1 October 2024 until the 4% risk curve steps up from the floor, comprised of:

- 150GWh to account for the lack of control over storage in the low ranges of lakes Manapōuri and Te Anau; and
- 50 GWh to account for other operational uncertainties and variability across different reservoirs.

Meridian encourages Transpower to focus on overcoming the existing infeasibilities that could make accessing contingent storage impossible and bring about avoidable and premature security of supply risks. Parts of the draft decision paper appear to be motivated by concerns that use of contingent storage now could increase risks in Winter 2025. The focus right now should be on ensuring that contingent storage can be accessed when there is an evident system need, otherwise significant, premature, and avoidable security of supply risks would arise. A lot can happen between now and 2025 and Transpower should not accept a high-risk position now due to concerns regarding a risk that may or may not eventuate in 2025. The industry will continue to take prudent steps both to manage the current situation and any 2025 risk that emerges, including procuring industrial demand response via Methanex and NZAS and delivering on generation and storage investments.

Meridian would be happy to discuss the contents of this submission. Please contact me if you have any queries.

Nāku noa, nā



Sam Fleming
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Appendix A: Summary of Operating Guidelines as referred to in resource consents

Lake		Level(m)	GWh (from 0)	GWh (in band)	Max Duration	Annual Max	
Manapōuri	below	176.8	55.2	17.7	107	214	
Manapōuri	below	176.5	37.5	17.6	66	132	
Manapōuri	below	176.2	19.9	17.6	20	40	Equinoxial Zone
Manapōuri	at or below	175.9	2.3	2.3	5	10	Equinoxial Zone
Manapōuri	absolute minimum	175.86	0				
Te Anau	below	201.5	95.8	29.9	88	176	
Te Anau	below	201.3	65.9	29.9	46	92	
Te Anau	below	201.1	35.9	35.9	21	42	Equinoxial Zone
Te Anau	absolute minimum	200.86	0				

Draw down limits

Lake	cm/day	
Manapouri	5	averaged over 4 days, with all 4 days in the low range
Te Anau	3	averaged over 4 days, with all 4 days in the low range

Equinoxial Periods:

March, April, October and November

Avoid lake levels below 201.1m for Lake Te Anau and below 176.2m for Lake Manapouri