

PROPOSED TE PŪTAHI LADIES MILE PLAN VARIATION

SUMMARY OF EVIDENCE OF AMY CATHERINE PRESTIDGE ON BEHALF OF THE QUEENSTOWN LAKES DISTRICT COUNCIL

1. As directed by paragraph 12.2 of Hearing Minute 1, I set out below a summary of the key points of my evidence. I have prepared a statement of evidence in chief dated 29 September 2023, and a statement of rebuttal evidence dated 10 November 2023 and provided answers to written questions from submitters dated 24 November 2023.
2. **Appendix A** of this summary provides a written response to the Hearing Panel Minute: Pre-Hearing Questions dated 21 November 2023.

Succinct summary of key points of my evidence

3. Providing potable water supply to the TPLM development area is feasible. New reticulation from the Shotover Country Water Treatment Plant and borefields will be necessary once demand exceeds what the existing DN150 water pipe is able to convey. Reservoirs are also a necessary part of the network, and the position of these is dictated by the level they need to be set at for serviceability of the development and for continuity of the wider network. The system should minimize the number of pipes and reservoirs needed to avoid multiple adjacent assets performing the same job and needing maintenance and renewals in the future.
4. Providing wastewater service to the development area is feasible. Minimal additional capacity exists in the current discharge pipes in SH6, so new reticulation through to the Shotover Wastewater Treatment Plant is necessary to fully service the development area. Whilst the first developer (or developers) may be able to utilize the existing spare capacity, QLDC will need to consider the risk to the structural integrity of the pipe in determining how much flow is added and how many additional connections can be made. However, there is ability to stage the construction from the west to the east and use temporary pump stations within each development until such time as the terminal pump station and internal gravity reticulation is in place. The position of a terminal pump station is flexible, but due to the fall of the land, gravity pipes will direct the wastewater towards the eastern end of the TPLM.
5. Management of stormwater in the development area is feasible. Agreement between the experts participating in the conferencing was reached and this follows with my assessment of the feasibility and risk in managing the stormwater.

6. To provide a fit-for-purpose treatment solution, separating the flows from the TPLM development area and from Slope Hill is recommended as they have different types of contamination. This allows first-flush treatment to be targeted to the gross pollutants (like plastics), heavy metals and petro-chemical contaminants found in urban environments; it also allows a more natural method of extracting fine sediments from the Slope Hill runoff.
7. To reduce the possibility of stormwater discharging towards Lake Hayes, the TPLM development area is proposed to soak to ground all stormwater up to and including the 1% AEP event. This exceeds the current QLDC Code of Practice requirements but is considered a feasible solution to mitigate concerns around the health of the lake through contaminated stormwater discharges. This is considered possible through the high infiltration rates documented in the TPLM land, especially towards the southern extent of the land.
8. Slope Hill is a significant source of the stormwater that flows across the TPLM area. Capturing this flow into a swale or similar at the base of the hill would allow the two areas to be managed separately and with a specific, appropriate solution. Testing indicated that infiltration rates near Slope Hill are lower than seen elsewhere and so soaking all rainfall up to and including the 1% AEP event may not be possible. This means that there needs to be flexibility to allow some flows to pass overland to the east. This would involve development engineers working with QLDC in detailed design to confirm extent of flow able to discharge to ground, and to agree the extent to which overland flows are released. Regardless, the design is restricted by the requirement to only discharge up to the pre-development flows by QLDC's Code of Practice. Further hydraulic modelling for the whole TPLM area is necessary to accurately benchmark this and provide clear guidance to the development engineers and I have recommended some further amendments to the provisions to address this. The provisions require an integrated, catchment-wide approach to stormwater. In order to enable this, a working hydraulic model using QLDC's modelling specification would be required to fully capture the Ladies Mile catchment. It would be beneficial for the model to then sit with QLDC for use across the catchment.
9. This means that overland flow towards Lake Hayes will potentially occur, but only from Slope Hill for rainfall events under the 1% AEP event. It should be noted that flows from Slope Hill in a 1% AEP event will need to be soaked to ground unless this is not feasible. Developers will be required to apply best endeavours to achieve soakage of the 1% AEP event. If this threshold cannot be met, developers will be

required to achieve as close as possible to the 1% AEP, with a 5% AEP event being the absolute minimum threshold. There is potential for sediments in the overland flow water, because it is very difficult to treat for sediment with large volumes and velocities of flow.

10. It should also be noted that for the whole area, it is not feasible to prevent overland flows above the 1% AEP event. So very infrequently there will be flow towards Lake Hayes. Even if reticulation to convey flows into Hayes Creek were installed, the limit of the design is still the 1% AEP event. It will not be possible to prevent all overland flow from ever entering Lake Hayes. But by soaking as much stormwater as possible, the frequency of discharge towards the lake is reduced to levels only seen over 'decades' rather than yearly.

Dated: 5 December 2023

Appendix A - Response to Hearing Panel Minute: Pre-Hearing Questions

1.28 Are there sufficient (objectives, policies and rules) for stormwater and ESC (erosion and sediment control) to avoid additional adverse effects on Lake Hayes? If not, what changes are required?

11. It is not anticipated that there will be additional adverse effects from the current situation. In considering my response to this question, I have reflected on the provisions and have recommended some additional amendments to Mr Brown as follows:
 - (a) Rule 27.7.28 be amended to require flows from Slope Hill to be soaked to ground for the 1% AEP event or if not possible, *as close to 1% as is possible*, down to an absolute minimum soakage requirement of the 5% AEP event (rather than the rebuttal version which simply required the 5% AEP to be soaked to ground if a 1% AEP was not feasible).
 - (b) Information requirement (ix) also requires the climate change adjusted rainfall to use the RCP8.5 (2081-2100) values for all post-development analysis(as recommended in the Stormwater JWS).
 - (c) I also recommend that a new information requirement be included to require that a single pre-development full catchment hydraulic model encompassing Slope Hill and the full TPLM Variation Area for all critical design storms up to and including the 1% AEP Event be prepared (so that a baseline discharge to Lake Hayes can be measured).
12. In addition to the above changes, I also note that the QLDC Code of Practice (**CoP**) already has clear requirements around restricting post development outflows to the pre development levels in terms of flowrates, which would apply even if the TPLM Variation provisions did not exist. The new draft Code of Practice is due for issue in early 2024 and includes design requirements such as: Low Impact Design, to limit conveyance via pipes, encourage soakage to ground and consequently reduce silts, suspended solids and pollutants into receiving waters; Water Quality Design, to require a Best Practicable Options approach, which includes requirement for devices to treat first flush of 20 mm of rainfall runoff and soak to ground a minimum of 5 mm of rainfall runoff. This treatment is required for all commercial or industrial developments, >2000 AADT roads and >10 car carparks.
13. In addition, under the CoP digital twin models are already required to be used for analysis of larger catchments, with QLDC able to request copies for their review

and/or records, so the requirement for a pre-development full catchment hydraulic model already reflects existing requirements.

1.29 The Candor3 report notes that the Council has made it clear that landowners are expected to manage stormwater within the development areas with no discharges to Lake Hayes:

(a) *Is that achievable?*

14. Refer to Mr Gardiner's response which I agree with.

(b) *What will the stormwater receiving environments be when the stormwater system capacity is exceeded?*

15. Refer to Mr Gardiner's response which I agree with.

1.30 The Candor3 report comments the "the magnitude of the rainfall event that will generate surface water flows from the masterplan area is unknown". Has further work been done to quantify the event size?

16. No, specific surface infiltration testing (measures how fast the topsoil will accept water through it) is needed to calibrate hydraulic models to show at what point stormwater flow will start flowing over the land and towards Lake Hayes. It should be noted that if the land is fully saturated prior to a 1% AEP event (such as what has been happening in the North Island over the past couple of years), the flooding would look similar to what is showing in the model included in my report attached to my evidence in chief dated 29 September, page 29, Figure 6-1.

17. Refer to Mr Gardiner's response for further commentary, which I agree with.

1.31 If the development in TPLM increases the risk of surface water runoff to Lakes Hayes, what could be done to avoid increased sediment and other contaminants entering the Lake?

18. There should be no increase in water discharging to Lake Hayes, and therefore there is less opportunity for increased sediments and other contaminants entering the lake. In addition, all stormwater should be collected into devices such as soakpits, swales, basins, stormfilters etc to allow sediments and contaminants to be settled out or go to ground. This would allow for the more heavily sediment-laden water to be collected in the initial stages of a rain event, and if there continues to be rainfall that turns to overland flow, the water is no longer collecting as much sediment and contaminants from surfaces such as roofs, road, paved areas etc. But once very large storm events are underway, there is the possibility that 'reanimation' of materials from elements such as swales and basins may occur and be carried downstream.

1.32 Are potential overland flow paths and treatment systems sufficiently provided for, including for first flush events, in particular towards Lake Hayes? Is there sufficient provision to keep the overland flow from Slope Hill away from TPLM?

19. It should be noted that any first flush events are not allowed to flow overland. They must be captured and treated. The QLDC CoP specifies stormwater capture and treatment for pavements and elements of private property, and for specific overland flow paths to be considered above both the first flush storm and the maximum design storm. The new requirement to manage the full 1% AEP event stormwater means that the TPLM development area would not be releasing stormwater overland in anything less than the 1% AEP event. The topography of the area will assist with overland flow from Slope Hill, where if swales are installed, the normal fall will be to the east, and therefore less likely to overtop towards the south and the TPLM.

1.33 Would further investigation as to priority of flows east/west to avoid impacts on Lake Hayes be beneficial?

20. There is no feasible option to pass stormwater east to west due to the fall of the land. Any reticulation would be infeasibly deep to install.

1.34 Given the reliance on multiple landowners, what is the risk of a non-integrated stormwater system being delivered? Are there examples of a proposed 'integrated' stormwater system, and its associated planning provisions involving neighbours working together / written approval / limited notification and, if so, how well have they worked, especially with a sensitive and significant receiving environment? In particular, what lessons would the examples provide for the proposed provisions?

21. I do consider that there are risks to achieving an integrated system. This is why having guidance for both developers and council consenting staff (through guidelines) to indicate acceptable solutions and methods of integration (which can't easily be translated into plan provisions) are preferable.
22. To facilitate the coordination of the developers, a method such as a Stakeholders Deed adopting a "no better, no worse off" approach could be utilised to set out expectations and limitations for the staged construction approach. I understand that this is something QLDC's development engineers are currently considering, as a mechanism outside of the TPLM Variation provisions, to help achieve integration. However there is a risk that it may not follow through with all land owners signing up.
23. A deed would set out obligations and timeframes for access to progress development construction. It would set out easements, access rights and 'as of right' provisions that enable dependant developers to step in and construct at their own cost the required parts of the whole integrated system (at no financial consequence to the offending landowner), so long as the system completed is in accordance with the setout plans, provisions and parameters agreed up front as part of the Stakeholder Deed. There will need to be a surveyed plan as schedule to the Deed. In effect no

developer can single-handedly stall the overall development of the required stormwater systems needed to allow Ladies Mile, and those having to enforce the conditions of the Deed may need to cover the costs of the work, but would not be prevented from developing. Therefore, no better off but no worse off. I note that such an approach is not required by the TPLM Variation provisions, but it is one way in which the Council and developers could better work together.

24. Refer to Mr Gardiner's response for further commentary on integration, which I agree with.

1.35 How could the development of TPLM be best staged to deliver an 'integrated' stormwater system (and could this align with potential transport related staging above, and if so how)?

25. Refer to Mr Gardiner's response which I agree with.

1.36 Would Council-led delivery of stormwater infrastructure be appropriate / provide a better outcome than seeking individual landowners to coordinate delivery and why? Was this considered as an option as part of the s.32 evaluation? What mechanisms might be applied to allow the Council to recover costs from developers, if appropriate?

26. It may provide a faster and more cohesive method to get a complete system designed. It would reduce complexity of many individuals pulling an integrated solution together. However, the costs to commence and complete this work are often large and not provided up front by developers. This is what is preventing QLDC from assisting in the current situation. Mr Gardiner has addressed the mechanisms further in his response.