

PROPOSED TE PŪTAHI LADIES MILE PLAN VARIATION

SUMMARY OF EVIDENCE OF JOHN FRASER GARDINER 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. Key constraints that influenced decisions around the disposal of stormwater runoff from the TPLM Variation Area include a Waka Kotahi requirement for no flow across SH6 in a 1% AEP event, a desire on the part of numerous parties to protect the water quality in Lake Hayes, large volumes of runoff from Slope Hill entering the TPLM Variation Area and a lack of downstream stormwater systems capable of taking stormwater runoff from the TPLM Variation Area.
4. After undertaking a review of existing documentation relating to Lake Hayes, topography and ground conditions, numerous means of stormwater disposal were tested including various piped scenarios. However, after field testing of soils confirmed high soakage rates, soakage was selected as the preferred means of stormwater disposal.
5. Soakage disposal is preferred as it:
 - (a) Allows for a reduction in the flow of stormwater runoff to Lake Hayes (from the current situation) in all but extreme rainfall events;
 - (b) Utilizes the underlying aquifer to transport stormwater away from Lake Hayes thus mitigating against any further degradation in the Lake Hayes water quality;
 - (c) Removes the need for expensive infrastructure to be installed through existing residential areas with disruption and risk;
 - (d) Is capable of preventing any flow of runoff across SH6 (from the land north of SH6); and

- (e) Best mimicked the natural water cycle thus adopting water sensitive low impact design principles and incorporating the principles of Te Mana o te Wai.
6. It is proposed that a “swale” along the toe of Slope Hill generally along the line of the proposed Collector Road will be constructed to catch stormwater runoff from Slope Hill and limit it’s ingress into the area rezoned for development north of SH6. As the runoff from Slope Hill is not being modified by development it may possibly be treated differently in terms of stormwater treatment.
 7. Initially two centralized devices were promoted to collect and dispose of stormwater runoff from the TPLM Variation Area but QLDC indicated that it was unable to take a lead in implementing these. It has subsequently been proposed that a series of stormwater management devices be constructed by landowners across the TPLM Variation Area with flexibility being provided as to their location and form of construction. To limit the future maintenance burden on Council and the community it is recommended that the number of devices be limited thus requiring a degree of cooperation between landowners to effect a suitable solution. Four devices have been suggested north of SH6 in addition to the swale mentioned at paragraph 6 above however this is a matter of some disagreement between the stormwater experts.
 8. Secondary flowpaths will need to be constructed and coordinated throughout the TPLM Variation Area to ensure that excessive runoff generated by extreme rainfall events is managed through the Variation Area in a controlled way. These flowpaths will connect the piped networks envisaged along with the various stormwater devices constructed thus “integrating” the stormwater system across the entire Variation Area. Of necessity overflows will follow the natural topography of the land and in infrequent extreme events overflow runoff will flow towards Lake Hayes and may enter the lake. I note that any flows entering Lake Hayes in extreme rainfall events are likely to be less than will occur in the existing situation as the stormwater devices will capture and discharge the bulk of the runoff and it is flows in excess of the design storm (i.e. the 1% AEP) that will overflow.
 9. The key factor in effecting a robust solution is the in the ongoing assessment and management of the overland flowpaths that will be required across the Variation Area and failure to implement robust flowpaths will put the entire system at risk. It is recommended that a Stormwater Management Guideline be prepared which provides tools for designing the stormwater management devices and a framework for

assessment of individual resource consent applications in the context of the entire area so as to mitigate against the risk of a fragmented implementation.

Latest position on the matters remaining in dispute (including any answers through the question process)

10. During conferencing all of the experts agreed with this technical position and if there is any disagreement it is around the number of stormwater devices that are permitted across the Variation Area.

Dated: 5 December 2023

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

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

11. Stormwater runoff naturally flows to Lake Hayes. In the current situation there are no controls in place stopping the flow of runoff to Lake Hayes and while it is uncertain how much runoff might reach Lake Hayes given high soakage rates of the local soils it is inevitable that in large events runoff in excess of that which soaks away will reach the Lake. Post development, the rules intend for stormwater runoff from storms up to and including the 1% AEP event to be collected, controlled, treated and discharged to the underlying aquifer which runs away from Lake Hayes. As a consequence, post development less stormwater runoff will flow to Lake Hayes than is likely to be the case in the current situation. It is however impractical to manage storm events greater than the 1% AEP via soakage and it is only prudent to provide overland flowpaths to cater for these extremely large and infrequent events together with any unforeseen events such as a blockage or failure. Given existing QLDC and ORC requirements for sediment control, I do not consider that that any additional planning provisions are required outside of what has already been included (including the further recommendations made by Ms Prestidge).

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?

12. See 1.28 above. The intent is to have no discharge to Lake Hayes in events up to and including the 1% AEP which I consider is achievable based on the work that we have completed.

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

13. The receiving environment will be Lake Hayes as the TPLM Variation Area is part of the natural catchment for Lake Hayes.

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?*

14. No further work has been completed. The reason that the size of the event that will generate surface water flows is uncertain is due to a number of factors. The variable soakage rates of the soils across the TPLM Variation Area is one factor. In many areas the soils have *extremely high* soakage rates, in other areas just *high* soakage rates. Surface depression storage in the natural state also plays a part as there will be localised ponding in very heavy rainfall events and dependent on the soakage rates of soils in the depression location you may or may not get runoff away from the depression. Channelisation due to farm drains is another factor. The investigation needed to determine exactly what is happening in the current situation would have to be extensive across all properties north of SH6 within the TPLM Variation Area together with those to the east down to the shores of Lake Hayes.
15. Even were the investigation carried out and the size of the storm event that will create surface flows determined it is of minimal value at a plan change level in engineering terms. The provision of overland flowpaths, etc. is still prudent and circumstances will exist in which there may be overflow to Lake Hayes. These circumstances will be limited to very infrequently occurring storm events. The 1% AEP event or 1 in 100 year storm event is defined as a storm that has a probability of occurring once within a 100 year window for example. A 0.5% AEP event or 1 in 200 year storm event is defined as a storm that has a probability of occurring once within a 200 year window.

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?*

16. In my opinion, controlled development in the TPLM Variation Area considerably decreases the risk of surface water runoff and contaminated material (including sediment) running into Lake Hayes. That is the intent of the chosen means of stormwater disposal.

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?*

17. Overland flow is adequately provided for in my opinion but is a key area that could easily be significantly strengthened through a stormwater management guideline to ensure appropriate integration.

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

18. The TPLM Variation Area generally runs west to east from the Shotover to Lake Hayes and the recommended solution deals with this. If the question is asking could flows to Lake Hayes be avoided by diverting flows from east to west (ie. discharging against the natural flow) and discharging runoff to the Shotover River the answer is that additional investigation is not warranted. Candor3 looked at this possibility early in our assessment of options. Due to topography any pipework would of necessity have to be in the order of 27m deep at it's deepest point to allow this pipeline to function adequately. The cost and risk inherent in construction of a pipeline of this depth is prohibitive and we did not pursue it as a serious option.

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?

19. The word "integrated" is worthy of some discussion to provide clarity. Any drainage system is integrated in the sense that all pipes are connected in a logical manner from the top of the catchment to the discharge point. If there are sections of channel within the network rather than pipes the channel is still graded to suit the constraints of the catchment. Overland flowpaths are also integrated into the system in that they are sited to catch overflow from the piped system when the pipe capacity is exceeded. They form a continuous alternative path for flood waters to follow from the top of the catchment to the bottom.
20. In this instance there are two factors that differentiate the stormwater solution from many other systems. Firstly we are relying on soakage via a series of "basins" as the primary means of disposal. Pipework from development will drain to each basin in a manner determined at the time of detailed design. The basins are not interconnected and at this level there are a series of "integrated" stormwater solutions that deal with sub catchments rather than the overall TPLM Variation Area. As discussed throughout my evidence it is critical that provision is made for secondary flowpaths to control overflow runoff for storm events greater than the 1% AEP event or for unforeseen circumstances where part of a network may block or a basin does not perform as expected and overflows occur. It is these secondary flowpaths that will provide overall "integration" of the stormwater system and it is critical that this is achieved.

21. Because the TPLM Variation Area is very flat it is extremely important that flowpaths are coordinated across the entire area. Because the location and form of the stormwater soakage devices are not being specified through a Structure Plan it will be critical at design and consent stage that the stormwater solution proposed for each individual development is considered in the context of the entire TPLM Variation Area. Designers and QLDC will need to ensure that proposed design levels of devices are such that solutions on other land holdings can be effected without undue impact and that on completion of all developments there are coherent connected secondary flowpaths throughout the TPLM Variation Area. Given the constraints across the catchment, the potential problems and means of avoidance are best highlighted by way of drawings and diagrams rather than via words hence the suggestion that a Stormwater Management Guideline be created as a framework for decision making.

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)?

22. Staging is difficult to control because individual landowners have different timelines, financial profiles, etc, etc. and I can see no sensible way of allowing for staging as a consequence.

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?

23. A Council led solution would alleviate a lot of the potential issues and would most likely result in a better outcome than having individual land owners operating in isolation. There is little doubt that there will be disagreement from landowners as to the siting of communal devices if they feel that they are being disadvantaged and QLDC would potentially have to utilise its legislative power to force a solution if consultation and negotiation did not deliver the required outcome.

24. There are a number of mechanisms that have been utilised in similar circumstances across New Zealand to facilitate and fund infrastructure solutions and fairly and equitably share the cost amongst developers.

25. The most suitable mechanism that is currently available in my opinion is funding via the Infrastructure Funding and Financing Act. This is effectively a Government loan to deliver the works with repayment of the loan by way of a special rate applied to each completed dwelling. The advantage of this mechanism is that QLDC does not have to borrow directly and therefore there is no financial impact on QLDC and the solution is

completely equitable in that every property owner contributes to the cost of infrastructure that they use.

26. Another mechanism would be for QLDC to fund the work and recover the cost via a Development Contribution. There is a process that Council would have to follow to allow this to happen and would involve Council having to find the funds up front with recovery over a period of many years.
27. Development Agreements are another mechanism that has worked in some areas where all developers in an area have come together and agreed to fund works according to a formula that they have created. In most successful examples Council has taken a central role as “facilitator” holding the contributions of each developer and distributing funds to other parties (consultants, contractors, developers) in accordance with the Development Agreement. Typically the more parties to any agreement the less likely that it will be possible for the parties to agree.