

**BEFORE THE HEARINGS PANEL
FOR THE QUEENSTOWN LAKES
PROPOSED DISTRICT PLAN**

IN THE MATTER of the Resource Management Act 1991
AND
IN THE MATTER of Hearing Stream 14 – Wakatipu Basin

STATEMENT OF EVIDENCE ANTHONY CHARLES STEEL

On behalf of X-Ray Trust and Avenue Trust

Dated this 13th day of June 2018

MACALISTER TODD PHILLIPS

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QUALIFICATIONS AND EXPERIENCE

1. My name is Anthony Charles Steel
2. I am a Civil Engineer with over 30 year's experience in the infrastructure and environmental engineering fields. I graduated from the University of Canterbury in 1984 with a Bachelor of Engineering Degree – Civil Engineering.
3. I am the Managing Director of Fluent Infrastructure Solutions Ltd. Our company specialises in the design and implementation of three waters infrastructure.
4. I have completed multiple infrastructure reports, designs and reviews throughout New Zealand and overseas over the last 25 years. During that time I have worked on infrastructure projects in the Queenstown Lakes District including earthworks, roading, streets, water supply, wastewater and stormwater upgrades. I am currently the Design Team Leader for the 3-Waters infrastructure for the Queenstown Central Development on Frankton Flats – between Countdown and Mitre 10 Mega.
5. I have also worked on the self-sufficient infrastructure design of developments around Lake Wakatipu including Lakeside Estates and Jacks Point.
6. I have considerable experience in Project Management and Contract Administration and Observation works to implement designs completed by myself and my design team.

EXPERT WITNESS CODE OF CONDUCT

7. I confirm my obligations in terms of the Environment Court's Code of Conduct for Expert Witnesses contained in the Practice Note 2014. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I confirm that I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

INVOLVEMENT IN THE PROJECT

8. In this matter our company has been engaged by X-Ray Trust and Avenue Trust (the Submitters) in June 2018 to provide engineering advice relating to the 3-Waters servicing (water, wastewater and stormwater) for the proposed development layout shown on the proposed structure plan at 413, 433 and 471 Speargrass Flat Road. I have viewed the Proposed Zoning Structure Plans prepared by Blakely Wallace Associates dated 8 June 2018 and emails from Louise Taylor of Mitchell Daysh Ltd (Planners) and base my evidence on the proposed structure plan presented on drawing L01 and correspondence with Mitchell Daysh Ltd.
9. I have prepared my evidence based on my:
 - (a) Expertise as a senior infrastructure engineer,
 - (b) Familiarity with the above-mentioned documents; and
 - (c) Familiarity with the application site and surrounding area

SCOPE OF EVIDENCE

10. Proposed Development

Following email correspondence with Louise Taylor of Mitchell Daysh Ltd I understand that the proposal includes up to 24 new dwellings on lots of various sizes. The location of the proposed housing development areas are highlighted in the Blakely Wallace Associates Drawing L01 as the orange zones (development nodes) with areas of 0.437, 0.408, 0.384, 0.615 and 1.191 hectares.

11. Water Supply

Based on the Queenstown Lakes District Council (QLDC) Land Development and Subdivision Code of Practice, 2015 it has been assumed that on average there will be 3 people per dwelling using 700 L/person of water per day. I have made a preliminary estimate that the peak daily water demand would be around 50 m³/day and that the peak hour water demand would be around 3.85 L/s. This estimate also includes irrigation requirements for a typical dwelling's garden but would not include irrigation for larger rural or lifestyle areas.

The lots are not currently within the QLDC water scheme boundary. There is however an existing QLDC owned 150mm diameter MPVC water main located nearby in Speargrass Flat Rd. It is possible that there is adequate flow capacity and pressure in this water main to service the development. Given the moderate size of the proposed development and its location outside the scheme boundary it is likely that QLDC would require hydraulic modelling of the estimated water demands coming from this development to determine whether or not the development can be serviced from the existing water supply reticulation.

The modelling would determine whether the peak hourly flows could be supplied at a minimum pressure of 300 kPa at the boundary and a minimum pressure of 100 kPa at any fire hydrant in the development based on a total fire-fighting flow demand of 25 l/sec.

If the modelling determines that the existing water supply cannot deliver the fire hydrant flows or pressures, on-site water storage meeting the volume requirements of the Fire Service Code of Practice SNZ PAS 4509:2008 standards could be provided on site for the Fire Service to extract water to fight fires.

If the modelling determines that the existing water supply cannot meet the estimated peak hourly flow demands or pressures this could also be mitigated by supplying the water to the development during low demand periods into on-site storage and then using a variable speed booster pumping system downstream to meet the instantaneous flow demands.

If the modelling determines that the development cannot be serviced by the existing reticulation at all then it is possible that a new groundwater source could be developed on site to supply the water demand for the lots, with on-site firefighting water storage. This option would require onsite drilling investigations to identify a suitable water source or a review of the capacity of any existing bores located in the land or nearby.

12. Wastewater

Based on the QLDC engineering standards of 3 people per dwelling and wastewater flows of 250 L/person/day I have made a preliminary estimate that the average daily wastewater production would be around 18 m³/day and peak wet weather flows would likely be around 1L/s.

The lots are not currently within the QLDC wastewater scheme boundary. There is however an existing QLDC owned 150mm diameter MPVC gravity wastewater main located in Speargrass Flat Rd in front of Lot 471 Speargrass Flat Rd. It is likely that there is adequate capacity in this wastewater main and the wider wastewater reticulation network to service the proposed development. Given the moderate size of the proposed development and the location outside of the scheme boundary it is likely that QLDC would require hydraulic modelling of the existing wastewater system to assess whether the proposed development can be serviced from the existing wastewater reticulation.

Due to the relatively flat gradients in the lower parts of each lot and along Speargrass Flat Road, it is possible that minimum grades required for wastewater gravity mains collecting wastewater from the houses may not be achievable. If minimum grades are not achievable a wastewater pump station or pumping stations may be required to convey the wastewater from the site to QLDC's wastewater reticulation network.

If modelling determines that the development cannot be serviced by the existing wastewater reticulation then it is possible that wastewater could be treated and disposed of on site meeting the requirements of NZS1547 On-site Domestic Wastewater Management: 2012 and QLDC's Land Development and Subdivision Code of Practice: 2015. It is estimated that approximately 2,500 – 5,000 m² of land would need to be made available for the disposal of treated wastewater to ground for wastewater flows coming from 24 houses. Based on Blakely Wallace Associates Drawing L01 there is sufficient area available to do this. The actual disposal area required still however needs to be confirmed by onsite soil and soil permeability investigations.

13. Stormwater

Based on Blakely Wallace Associates Drawing L01 the proposed impact of development on the properties at 413, 433 and 471 Speargrass Flat Road from a stormwater perspective is minimal. Following a review of the topography and soils on the site, the collection and disposal of stormwater can be achieved such that post-development flows will not exceed pre-development flows leaving the site thereby complying with QLDC's Land Development and Subdivision Code of Practice: 2015. This can be achieved by a combination of in-ground on-site storage and/or soakage to the ground.

A handwritten signature in black ink, appearing to read 'Anthony Steel', written in a cursive style.

Signed Anthony Steel

13 June 2018