

BEFORE THE QUEENSTOWN LAKES DISTRICT COUNCIL

IN THE MATTER of the Resource management Act (~~Act~~)

AND

IN THE MATTER of the submission by Lake Wakatipu Station Limited on the QLDC Proposed District Plan 2015 (Stream 13) to rezone a piece of land from Rural General to Rural Visitor

STATEMENT OF EVIDENCE OF PAUL GEORGE FAULKNER

Lake Wakatipu Station (Submitter #478)

9th June 2017

1. My name is Paul George Faulkner. I am a Senior Engineering Geologist at GeoSolve Limited (GeoSolve+). I have 19 years of experience in my field and hold the qualifications of B.Sc (Geological Science) and M.Sc (Engineering Geology), from the University of Leeds in the United Kingdom. I am a fellow of the Geological Society, London. I currently work with Geosolve and have been based in the Queenstown region for approximately 11 years. I have worked for Tonkin & Taylor Ltd and Geosolve during this period
2. Since 2006 I have worked on a wide variety of projects in the South Island of New Zealand with most of my work being in the Otago and Queenstown area. I have worked on many large commercial and residential developments, often in steep mountainous environments where natural hazards such as debris flow, land stability, liquefaction and rock fall are key issues. I have worked on all stages of projects during this period including re-zoning, resource and building consent and construction.
3. In this matter I have been engaged by Ben Farrell to comment on the submission by Lake Wakatipu Limited to rezone 32ha of land located on the alluvial terraces of Halfway Bay south of the Lochy River from Rural General to Rural Visitor. More specifically, I was asked to confirm what natural hazard risks are likely to affect rural visitor development on the 32ha site, and can these risks likely be satisfactorily avoided or mitigated.
4. The site+I refer to in my evidence is identified in the submission by Lake Wakatipu Station Limited.
5. Having reviewed relevant information available to me, including geological and hazard mapping, aerial video footage and aerial photography of the site, I am of the opinion that the site is likely to be subject to liquefaction, flooding and alluvial fan risks:
 - a. *Liquefaction*: Potential for this hazard to occur in low lying areas with shallow depth to groundwater (lake edge and along the Lochy river);
 - b. *Flooding*: Potential for low lying areas along the Lochy River, adjacent to Lake Wakatipu, and in the Short Burn active channel area from the mountain slope toe to Lake Wakatipu;

- c. *Alluvial Fan*: Potential for western areas of the proposed zone close to the toe of the mountain slope to be affected by alluvial fan risks e.g. flooding/stream avulsion, erosion and debris flow.
6. I consider it is highly feasible that land development (including rural visitor and residential activities) could occur on the site without giving rise to intolerable risks to human safety provided appropriate engineering assessment is undertaken and any appropriate mitigation measures are implemented.
7. Much of the geology on the valley floor is alluvial in origin (silts, sand, gravels) associated with deposition from the Lochy river. When the level of Lake Wakatipu fell (approximately 12,000 years ago) the Lochy subsequently cut down through these deposits resulting in a series of elevated river terraces above the current river level. Fan deposits from the adjacent mountain sides overlie these materials at the slope toe. The terraces, and the steep slopes between them, form much of the landforms on the valley floor.
8. The valley mountain sides are steep with glacial soils, colluvium/slope deposits, historic landslides, which are particularly prominent on the northern valley side, schist bedrock bluffs and deeply incised drainage channels.
9. No active or inactive faults are known in the immediate area, however a high seismic risk is present in the area from rupture of the Alpine Fault, which is expected to result in strong ground shaking in the Wakatipu area.
10. A summary of the natural hazards relative to the proposed area for re-zoning is illustrated on Fig 1 below. The proposed area of re-zoning has been divided into Zone A and Zone B.

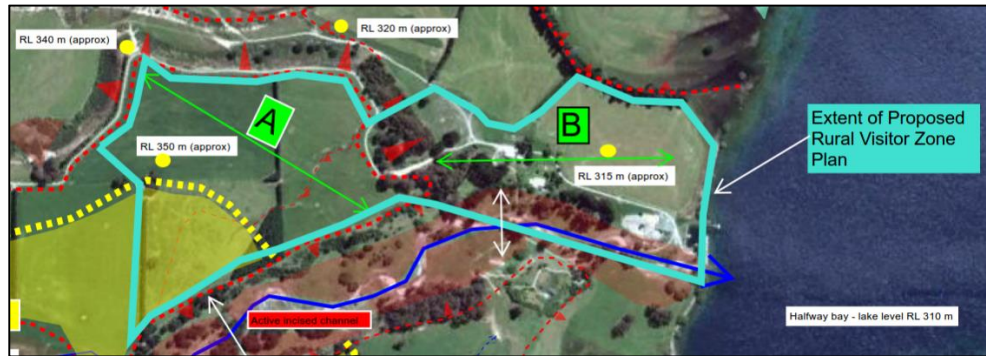


Figure 1 Natural Hazards potentially affecting the site

a) Zone A: Most of Zone A is removed from the toe of the adjacent mountainside and the associated hazards. It is elevated above the Lochy River, the Short Burn and the lake. This reduces the liquefaction and flooding risk. Detailed assessment of the alluvial fan risk on the southern side will be required, however, given the distance from the mountain toe, the wide open fields (resulting in sheet flows and non-concentration of any run-off), it is highly likely that given all sensible precautions, assessment and mitigation, this hazard will be manageable. Localised building set-backs from the terrace slope on the northern side of Zone A will also be required and can be assessed by standard techniques. Based on my assessment development within all, or part of, Zone A is considered feasible.

b) Zone B: This area is lower in elevation and is close to the Lochy River and Lake Wakatipu. The Short Burn influences the southernmost area. There is an increased risk of liquefaction due to higher groundwater levels and potential flooding risks associated with the rivers and the lake. Liquefaction is manageable through standard assessment, foundation design and construction techniques. With respect to flooding detailed assessments will be required to confirm suitable areas for development. Preliminary assessment indicates areas close to the terrace slope toe on the south western side of Zone B, are likely to be suitable for development.

11. In conclusion the potential for natural hazards has been identified within and close to the proposed area of re-zoning. Detailed assessments will be required to determine the need for any specific mitigation measures and, if required, ensure future buildings are located and designed accordingly.

Based on an appropriate level of work being completed I consider it highly feasible that land development, including rural visitor and residential activity could occur at the site.

A handwritten signature in blue ink, appearing to read "Paula", with a horizontal line extending from the end of the signature.

9 June 2017