BEFORE THE QUEENSTOWN LAKES DISTRICT COUNCIL

IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	Plan Change 54 – a Request for a private plan change to the Queenstown Lakes District Council Operative District Plan by Northlake Investments Limited

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STATEMENT OF EVIDENCE OF ANTHONY STEEL

STORMWATER

Dated: 10 July 2023

Counsel:
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Introduction

1 My full name is Anthony Charles Steel.

2 I hold the following qualifications:

a. Bachelor of Engineering (Civil), Chartered Professional Engineer (CPEng).

3 I hold the following professional memberships:

a. Chartered Member of Engineering NZ.

4 Managing Director of Fluent Infrastructure Solutions Ltd.

5 I have over 30 years experience in Civil infrastructure design, project management and contract administration. These works have included several stormwater designs and reviews.

Code of Conduct

6 Although this is a Council hearing, I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and agree to comply with it while giving evidence.

7 Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

Scope of Evidence

8 My evidence is presented on behalf of Northlake Investments Limited (**NIL**), the Requestor in these proceedings.

9 In preparing my evidence, I have reviewed:

a. The Stormwater Management Concept dated January 2022 prepared by Fluent Solutions Limited (**Stormwater Management Concept**) appended to the Paterson Pitts Group Infrastructure Report which formed part of the PC54 Request.

b. The relevant parts of the Queenstown Lakes District Council Operative District Plan.

c. The relevant parts of the Council Section 42A Report, with particular reference to the accompanying assessment by:

i. Kate Purton of Beca – Stormwater.

10 Subject to any points of difference, clarification or addition detailed below, my evidence for this hearing comprises:

a. the Stormwater Management Concept;

b. the relevant parts of the Section 42A Report which I agree with and adopt, other than as stated below;

c. this evidence.

11 I have been asked to respond to the evidence of Kate Purton of Beca dated 9 June 2023 titled "Northlake Private Plan Change 54 Stormwater Review", with particular reference to the analysis and rationale resulting in the recommendations in paragraph #39 which read:

> *"39. I therefore recommend that the proposed PC54 provisions are modified to include the following requirements:*
>
> *a. To mitigate downstream flood risk, peak flow attenuation to limit post-development peak flow to 80% of pre-development peak flow for the 2-year, 5-year, 10-year, 20-year and 100- year events.*
>
> *b. To mitigate downstream erosion:*
>
> *a. Retention or volume reduction of at least 5 mm runoff depth in any storm, plus*
>
> *b. Extended detention storage draining down over 24 hours, for the difference between the pre- and post-development runoff volumes from the 95th percentile 24-hour rainfall event minus the 5 mm retention.*

Response to 39.a: Mitigating downstream flooding risks

12 Paragraph #39.a focuses on mitigating downstream flood risk, which was addressed in paragraph #20 which states:

> *"Where there are multiple individual developments (or stages of development) in a catchment with detention basins providing peak flow attenuation, the cumulative effect of increased volumes and resulting increased coincidence of peak flows can result in higher than pre-development peak flows downstream. Achieving no net increase in peak flow downstream of all development requires that individual developments (or stages of development) be attenuated to a lower peak than pre-development (some guidelines recommend targeting 80% of pre-development peaks)."*

13 While I agree with the technical aspects presented in the first sentence of the above statement which conclude "*… can result in higher that pre-development peak flows downstream*", it is important to emphasise that this is a suppositional statement. That outcome might or might not occur, depending upon the analysis of the impacts or resultant hydrological response of a particular case. In this case flood modelling has been undertaken and will continue to be refined during the design stages of the development. This is common practice for land development projects which incorporate detention basins and other stormwater management devices to mitigate downstream flood impact risks. Whether or not achieving no net increase will require additional attenuation will depend upon the result of the necessary analysis.

14 In the Stormwater Management Concept, Section 7.0 outlined relevant clauses of the Queenstown Lakes District Council Land and Subdivision Code of Practice (**COP**) to the stormwater management of Stage 18 and Catchment A as a whole. I note in particular Clause 4.2.7 of the COP which states:

> *"Downstream impacts could include (but are not limited to) changes in flow peaks and patterns, flood water levels, contamination levels and erosion or silting effects, and effects on the existing stormwater system. Where such impacts are more than minor, mitigation measures such as*

peak flow attenuation, velocity control, and treatment devices will be required."

15 I believe Clause 4.2.7 of the COP adequately encompasses requirements to minimise adverse peak flood impacts of downstream infrastructure. Utilising existing (previous Catchment A stages) and ongoing flood modelling analysis of the overall developed Northlake area will determine design decisions within Stage 18 to ensure there are no peak flow impacts to downstream infrastructure, considering the whole development. This will mitigate any downstream flood risks.

16 Additionally, the 2-year, 5-year, 10-year, 20-year, and 100-year storm events will be analysed to ensure that peak flows of these events do not negatively impact downstream infrastructure. As demonstrated in the Stormwater Management Concept the preliminary design and analysis of storm events has considered all storm events stated above except for the 5-year storm event. The 5-year storm event can be included in design decisions moving forward.

17 That part of the statement in paragraph #20 which reads "… *Achieving no net increase in peak flow downstream of all development requires that individual developments (or stages of development) be attenuated to a lower peak than pre-development (some guidelines recommend targeting 80% of pre-development peaks)"* appears to be made without being supported by any data or analysis. The statement that "*some guidelines recommend targeting 80% of pre-development peaks*" does not reference any guidelines, appears to be an arbitrary number which does not relate to the specific conditions within the project site, and may not be necessary to mitigate flood risks downstream.

18 NIL can continue to use the developed catchment wide model to analyse downstream flood risks from the proposed Stage 18 works and consider all of Catchment A within Northlake when making design decisions to mitigate downstream flood risks. I do not agree with imposing additional arbitrary percent reductions in flows for various storm events in order to mitigate downstream flood risks.

Any such reduction should only be imposed if the relevant catchment analysis concludes that such a reduction is necessary.

Response to 39.b: Mitigating downstream erosion

19 Point 39.b focuses on mitigating downstream erosion, which was addressed in paragraph #21 which states:

> *"Peak flow attenuation does not mitigate the increase in frequency of runoff or the increase in volume, both of which can contribute to increases in downstream erosion. This also needs to be addressed."*

20 The above statement is another suppositional statement about an outcome which may or may not eventuate.

21 As stated in the response to 39.a, I believe Clause 4.2.7 of the COP adequately addresses the requirements relevant to potential increased erosion in downstream flood effects. The impacts of the 2-year, 5-year, 10-year, 20-year, and 100-year storm events will be analysed considering increased volumes and flow velocities in relation to risks of increased erosion in downstream infrastructure. If detailed flow analysis demonstrates that additional risks of erosion are present, best management practices can be used to reduce those risks.

22 I therefore do not agree with the additional recommended requirements outlined in paragraph #39.b.

Work required for engineering approval

23 I have been advised that there is a debate about the timing (in the development process) of the detailed analysis required in respect of stormwater infrastructure in order to achieve the outcomes anticipated by the District Plan and the COP. I have been requested to provide a summary of the work that has to be carried out in order to determine stormwater infrastructure requirements.

24 Following approval of the Outline Development Plan we would expect that the overall extent of the stormwater infrastructure would be determined using stormwater modelling and that a preliminary design and preliminary design report would be produced outlining

what is proposed as part of the Resource Consent application for Stage 18. Following acceptance of the Resource Consent the detailed design, drawings and specifications would be produced as part of the Engineering Approval documentation submittal. This will involve further stormwater modelling to confirm pipeline materials, inverts, sizes and grades and details around stormwater detention structures taking into consideration final ground and road levels and other services.

Summary

25 I believe the responses provided above, including the detailed modelling and existing COP requirements, sufficiently demonstrate that the additional requirements outlined in paragraph #39 of the Memorandum provided by Beca are not required for Plan Change 54 as there is no detailed rationale behind the proposed additional provisions and that detailed stormwater modelling may determine something otherwise in order to meet the District Plan requirements.

26 As stated in paragraph #17 of the Memorandum, detailed stormwater analysis, flood and erosion risks to downstream infrastructure assessments and design decisions will be made at the resource/subdivision consent and/or engineering approval stages.

27 The work required to determine stormwater design decisions is extensive, detailed and expensive. That work is normally carried out when subdivision consent has been obtained and engineering approval is required. I see no reason for that work to have to be carried out at an earlier stage in the land subdivision and development process.

Anthony Charles Steel

10 July 2023