

23 April 2015



Queenstown Lakes District Council
C/- RCP
PO Box 1061
QUEENSTOWN 9300

Attention: Ant Beale
abeale@rcp.co.nz

Dear Ant

QLDC OFFICES AND LIBRARY - DSA PEER REVIEW
HG REF: 1011-138142-01

INTRODUCTION

We have completed our desktop review of the Detailed Seismic Assessment of the above property. Our review included communication with the design engineers, Holmes Consulting Group (HCG), via a spreadsheet to log the queries and responses. The spreadsheet has been enclosed with this letter.

SUMMARY

Our review found that HCG has undertaken a suitably detailed assessment of the property for phase 1 of the works. The phase 2 part of their review will include further investigations of critical and as yet unknown areas identified in phase 1.

The rating of 35% Design Base Earthquake (%DBE) reported by HCG is a fair reflection of the likely performance of the structure.

Our only outstanding concern is the assessment of the 1st floor structure. This has been assumed to be adequate due to its lightweight nature, but given that it covers almost 50% of the gross floor area of the property we believe it should be assessed in more detail to determine its performance.

CONCLUSION

We believe that the rating of 35%DBE derived by the Detailed Seismic Assessment is a fair reflection of the likely performance of the structure. The rating is primarily limited by the capacity of the concrete frames' flexural capacity. However, several other details are likely to reach their capacity at a level soon after this rating, primarily due to the liquefaction hazard.

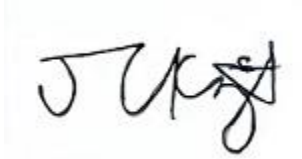
We agree that it would be unrealistic to target a rating exceeding 50%DBE as part of any strengthening works due to extensive foundation remedial work being required to withstand the affects of liquefaction.

We trust this meets your current requirements. Please contact us should you require further assistance for the review of phase 2 of the assessment.

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Yours sincerely
Harrison Grierson

A handwritten signature in black ink, appearing to read 'JK Knight', enclosed in a light grey rectangular border.

James Knight
Senior Structural Engineer / Associate

enc Peer review log spreadsheet

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Structural Peer Review Log

JOB NAME QLDC Offices ad Library - DSA
 HG JOB NUMBER 1011-138142-01
 STRUCTURAL ENGINEER Holmes Consulting Group (HCG)
 DATE 23/04/2015

REVISION RECORD
 15/04/2015 Initial Issue to RCP
 21/04/2015 HCG Response to HG
 23/04/2015 HG Final comments/resolution



No.	ITEM / ELEMENT	HG INTERPRETATION OF HCG ASSESSMENT	HG COMMENTS	HCG RESPONSE	AGREED RESOLUTION	STATUS
1.0	DSA					
1.1	DSA report received dated 2/10/14	Note	Includes T&T report dated September 2014	N/A		Closed
1.2	Liquefaction	T&T report and HCG report both identify that liquefaction will occur, partially at 50%DBE and fully at 70%DBE	We agree that the building rating is going to be limited at 50%DBE unless significant ground works are undertaken to provide resistance to differential settlement.	N/A		Closed
1.3			Page 4-4. Report mentions that double tee seating is not an issue, but only based on liquefaction not occurring. We recommend that this statement is revised to clarify that the assumption is that liquefaction does not occur until 50%DBE.	This is covered in Section 4.4.4 'Consequence of Liquefaction' which describes the implications of liquefaction on the double tee seatings.	Agreed	Closed
1.4	Retaining wall	The southern portion of the structure retains ground to the ground floor storey	Whilst this is unlikely to reduce the response of the building, the additional loads induced by the retained soil in an earthquake should be included in the analysis as springs (Mononobe-Okabe method for example)	As you've indicated (and as noted in our report), retaining loads were not considered explicitly in the analysis as the effects of these were considered unlikely to be significant (due to the relatively small extent of retaining and the concentration of retaining loads in the corner of the building with greatest length of wall available to resist these actions directly - refer to Section 4.6.1). Should further investigation be desired, retaining loads should be derived by the geotechnical engineer and investigation of the as-built condition of the retaining walls should be carried out in order to inform the structural assessment.	Agreed - a further assessment will confirm the assumptions that the retaining actions are not significant.	Closed
1.5	Lightweight roof	No analysis or inspection has been carried out on the timber roof structure	Whilst this element is unlikely to affect the overall building rating, it can affect the ability of the building to be occupied following an earthquake. Does the roof have sarking or any form of bracing/diaphragm to aid distribution of the EQ forces and help tie the walls together at roof level.	Site observation indicated that the roof has lightweight metal cladding over timber framing, with a mixture of timber sarking and plasterboard internal linings.	This observation and description should perhaps be included in the report?	Closed
1.6	Lightweight first floor structure	No analysis or inspection has been carried out on lightweight first floor structure.	Again, whilst this element is unlikely to affect the overall building rating, it can affect the ability of the building to be occupied following an earthquake. Are the walls tied to the roof framing affectively? Relatively simple remedial works can be carried out to improve the performance of these lightweight structures in an EQ.	We have assumed that reference is being made to the small second floor timber deck area that forms part of the roof plane? Observation of the wall/floor connections was not possible without carrying out destructive investigations. As such, typical timber framed construction was assumed and was not considered likely to be critical.	We may be confused - we are referring to the first floor structure, this is a 2 storey building isn't it? The photograph in Figure 3-1 clearly shows a second storey, whilst the ETABS model in Figure 4-2 shows only a single storey (except for the small double storey section to the south). Considering that this portion of the building is nearly 50% of the GFA we think it is worthy of assessment along with the lightweight roof structure.	Open
1.7	Foundation pressure	Bearing pressure of 100kPa has been assumed.	Is this allowable bearing pressure or ultimate bearing pressure (at EQ state). How sensitive are the foundation to this limit? What is the largest bearing pressure under the foundations?	A ULS bearing capacity of 100 kPa was assumed. If the bearing capacity is exceeded, the pier foundations on the north elevation will rock before developing the flexural capacity of the masonry piers. This mode of behaviour is ductile, and the overall behaviour of the building is not considered to be significantly affected.	Agreed	Closed
1.8	Diaphragm connections	To be investigated further	Has this investigation been actioned? Is the building sensitive to these connections?	As noted in the report, details of the connection of the first floor extension to the original structure were unknown, and further investigations were recommended in Section 4.7. If these connections were to fail, seismic performance of the building would be relatively unpredictable, due to the disconnection between the original portion of the building and the addition.	Agreed that this detail need further investigation.	Closed