

8 December 2022

Buckland Hall Community Centre Inc
 c/o Ian Farrant, Chairperson
 (emailed to:ian@farrant.nz)

Buckland Hall – Supplemental Letter

In June 2021, Martin Bennett, on behalf of the Buckland Hall Committee, engaged EQ Struc Ltd to conduct a Detailed Seismic Assessment (DSA) of the Buckland Hall” building located at 18 Logan Road, Pukekohe, Auckland. As Part of the engagement, EQ Struc was asked to investigate reported sagging of the subject building’s roof. This letter is being written at the request of Ian Farrant, on behalf of the Buckland Hall Committee, to address items discussed during the 10 November 2022 meeting between EQ Stru and the Buckland Hall Committee.

Seismicity of the Auckland Region

The whole of New Zealand has the potential for seismic events. However, the Auckland area, including Pukekohe, can expect less severe seismic events than other parts of the country. The DSA report reflects this lower seismicity by using Z=0.13 in the assessment calculations. Refer to Figure 1 below and to section 4.2.2 of the DSA report.

Z-VALUES AND SHORTEST MAJOR FAULT DISTANCES D FOR NEW ZEALAND LOCATIONS (North to South)

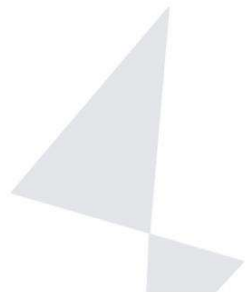
#	Location	Z	D(km) ¹	#	Location	Z	D(km) ¹
1	Kaitiaki	0.10	-	48	Racthi	0.26	-
2	Paihia/Russell	0.10	-	49	Ohakune	0.27	-
3	Kaikōhe	0.10	-	50	Waiouru	0.29	-
4	Whangarei	0.10	-	51	Napier	0.38	-
5	Dargaville	0.10	-	52	Hastings	0.39	-
6	Warkworth	0.13	-	53	Wanganui	0.25	-
7	Auckland	0.13	-	54	Waipawa	0.41	-
8	Manakau City	0.13	-	55	Waipukurau	0.41	-
9	Waiuku	0.13	-	56	Tahape	0.33	-
10	Pukekohe	0.13	-	57	Marton	0.30	-
11	Thames	0.16	-	58	Bulls	0.31	-

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Figure 1 – Excerpt from NZS1170.5 showing Z-values

Use of Standard MBIE Terminology

The DSA report uses the terminology “severe structural weakness” and “critical structural weakness” to describe parts of the existing building. This terminology is consistent with the



MBIE guidelines for earthquake assessment. The following definitions are taken verbatim from C2.1.2:

- Severe Structural Weakness - structural weakness that is potentially associated with catastrophic collapse and for which the capacity may not be reliably assessed based on current knowledge.
- Critical Structural Weakness - The lowest scoring structural weakness determined from a DSA.

We recognize that terminology such as “severe” and “critical” may be alarming. However, use of this terminology is required by the MBIE guidelines and is standardised across all DSA reports.

Gravity Deficiency

During our investigation of the subject building, it was determined that the existing frames are over-stressed under gravity loading. In carrying out this assessment, we first determined the “capacity” of the existing structure based on the material strength, age and type of construction, etc. We then determined the expected “demand” loading using NZS1170. Using these values, we calculated the Demand-Capacity Ratio “DCR” for the existing structure. We calculated a DCR much greater than 1.0, which indicates that the existing structure is significantly over-stressed. For reference, new buildings are designed with a DCR of no more than 1.0.

Calculations of expected material strength are based on lower-bound material properties, whereas expected loading is based NZS1170 which provide the characteristic loads for buildings. The characteristic load is the peak load over the building’s design life with a 5% probability of being exceeded. This gives rise to the situation at hand, where an existing building is not code-compliant but still has some strength to withstand the current loads. Unfortunately, any assessment of the building which does not use the lower-bound material properties strength and characteristic loads would be outside the scope of the New Zealand Building Code and is not something that EQ Struc can provide.

Conclusion

We recommend that retrofit works be undertaken at the earliest possible time. The retrofit should address both the gravity and seismic concerns. EQ Struc is not aware of any legislative

restrictions which would prohibit occupying the building prior to the retrofit works being carried out. The subject building may be occupied at the discretion of the Buckland Hall Committee.

We trust that this clarifies the issues at hand. If you required any further information, please contact the undersigned below.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Lars Wyatt".

Lars Wyatt

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A handwritten signature in black ink, appearing to read "Peter Liu".

Peter Liu

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