



GEO-LOGIC
L I M I T E D

5022.06a

21 December 2021

Nelson City Council
PO Box 645
NELSON

Attention: Jacqui Hewson

Peer Review of *Nelson Regional Liquefaction Assessment Report*

Scope

We were provided with a Nelson Regional Liquefaction Assessment report for the Nelson Region prepared by BECA (BECA, 2021) and requested to undertake a geotechnical peer review to ensure that the updated mapping follows the criteria of a “Level A” assessment as per the MBIE guidelines (MBIE, 2017).

In your email of 02 November 2021, you advised that Council “...*want to ensure that the updated mapping followings the criteria of a Level A assessment as set out in the MBIE guidance.*”

In your email of 05 November 2021, the scope was set out as a peer review limited to a desktop analysis to:

1. Provide an assessment whether the BECA report has followed the Level A assessment and used information that aligns with ‘Level A – Basic Desktop assessment – Information typically used’ as outlined in Table 3.2 of the ‘Planning and Engineering Guidance for potentially liquefaction-prone land September 2017’
2. If the result of 1, specify (if any) aspects of the BECA report/mapping have/haven’t satisfied Level A assessment or where the assessment has gone further into a Level B or above assessment (set out in Table 3.2)
3. Provide commentary on a regional scale, from a local geologists perspective if there are any areas of the mapping you consider need further consideration/appear to be geological anomalies in the mapping from a liquefaction vulnerability. Particularly the eastern margin of the Tahunanui assessment that was initially includes in the 2013 assessment and subsequently removed in 2014/2017.

We are familiar with the geology of the Nelson area and previously undertook a related Data Compilation report for the NCC (Geo-Logic, 2013) with our “*Nelson City Council Liquefaction Hazard Review, Drill Hole Data Compilation, Nelson*” (Geo-logic, 2010). The brief in that report was: *Our work was a desktop exercise consisting of compilation and geological review of readily available existing information associated with drilling in the Nelson region.*

Our work for this, the current peer review, has been undertaken as per an NCC Services (Umbrella) Contract for Geotechnical Peer Review Services (Contract ID: A2733127) dated 14 September 2021 with scope and budget as setout in your email of 02 and 05 November 2021.

ENGINEERING GEOLOGY & GEOTECHNICAL SERVICES

Tel 64-3-546 7425

Email geoquest@geo-logic.co.nz

Web www.geo-logic.co.nz Postal PO Box 880, 2/13A South Street, Nelson 7010, New Zealand

Discussion

Previous Work Undertaken by Geo-Logic

We previously undertook a review of available drill hole data which was compiled and presented in our Liquefaction Hazard Review (LHR) with an emphasis on the Tahunanui Area of Nelson (Geo-Logic, 2013). One of the findings of our preliminary review of the compiled drill hole data was that insufficient information was known (at the time of that assessment) to undertake a LHR in the Tahunanui area designated as “Areas of Potential Liquefaction Hazard”. That report identified that further work was needed to determine the susceptibility of that area to liquefaction.

As detailed in the BECA report considerable additional work has been subsequently undertaken.

Evaluation of the BECA “Level A” Assessment

The MBIE Engineering and Planning guidance report designates a “Level A” as a Basic Desktop Assessment. It notes “The level of detail that is required for a liquefaction assessment will be governed by the intended purpose (or purposes), and how uncertainty in the assessment could affect objectives and the decisions to be made. For example, a region-wide liquefaction assessment for a regional policy statement would require a lower level of detail than a site-specific liquefaction assessment for design of a new residential subdivision. However, the overall principles of liquefaction assessment remain the same regardless of scale.”

The level of detail for a “Level A” Basic Desktop Assessment is explicitly described in Table 3.1 to consider only the most basic information about geology, groundwater and seismic hazard to assess the potential for liquefaction to occur. It notes “The primary focus is identifying land where there is a High degree of certainty that Liquefaction Damage is Unlikely (so it can be ‘taken off the table’ without further assessment).”

The BECA Assessment report (BECA, 2021) notes “The output of our assessment is a map overlay identifying areas where ‘Liquefaction Damage is Possible’ and where ‘Liquefaction Damage is Unlikely’ in accordance with the MBIE/ MfE (2017) guidance” which is consistent with the “primary focus” of the MBIE guidance for a “Level A” assessment.

The BECA review of Previous Liquefaction Hazard Assessments is also considered consistent with the MBIE guidance for a “Level A” assessment. The BECA report however extends somewhat beyond the “Level A” guidance in presenting, and interpreting, the revisions in reporting prepared by others. Similarly, the Methodology Tree (Figure 5-4) evaluates three levels of the likelihood of liquefaction damage and one level of vulnerability which extends somewhat beyond the MBIE “Level A” guidance.

Similarly, the dual designation of “Unlikely Liquefaction Damage”/ “Very Low Liquefaction Vulnerability” in the Map Appendix A extends somewhat beyond the MBIE “Level A” guidance.

Other comments arising from our review of the BECA report, are listed below:

Report Name: The current BECA report name is overly vague and does not reflect the limited scope of work described. It is recommended the report name be revised to Nelson Regional “Level A” Liquefaction Assessment or similar.

Liquefaction Records: The BECA report notes “The Nelson region has experienced at least five large earthquakes in the last 170 years ...No records of liquefaction associated with these events have been identified. It appropriately points out “These events have not been centred in the Nelson area and historical records suggests that the shaking intensities during these events may not have been high enough to trigger liquefaction (Modified Mercalli Scale; MMI).”

Assumptions and Limitations: Appropriate (including your comment requesting “a bit more explanation”).

Local Perspective Comment on Regional Scale Mapping

My perspective/ comment, as a local geologist familiar with Nelson geology, is that the Liquefaction Assessment maps are appropriately consistent with recent revised geologic maps of Nelson-Richmond urban area mapping (Johnston M. R., Ghisetti, F. C. & Wopereis, P. 2021; 2021a). In particular that includes the eastern margin of the Tahunanui area where interfingering of the Stoke fan/ Rabbit Island gravels with the potentially liquefiable Tahunanui sand deposits, complicated by the recently mapped Tahunanui fault, presents a lower, but not insignificant, risk of liquefaction.

The BECA report identifies apparent inconsistencies in liquefaction potential of Tahunanui area sediments with reference to reporting we have not reviewed for this peer review, nor been requested to review (Tonkin & Taylor 2013, 2014; Johnston, 2017).

With the exception of the apparent inconsistencies in liquefaction potential of the Tahunanui area sediments (noted above) - which could warrant further consideration - there do not appear to be any areas of the mapping that I consider need further consideration/appear to be geological anomalies in the mapping from a liquefaction vulnerability.

MBIE Guidance Report Limitation and Recommendation

The MBIE document, which forms the basis of this peer review, notes “This document is preliminary and the contents should be treated as draft guidelines...a further review will be undertaken (MBIE, 2017). It also notes “It is recommended that territorial authorities maintain a record of all liquefaction assessments they receive. Ideally this would be in a geospatial information system that records the extent, level of detail and categorisation results for each assessment.”

We are not aware of any further review having been undertaken by MBIE. We support the recommendation that territorial/ Unitary authorities maintain all liquefaction assessment they receive geospatially and with well defined metadata descriptions.

Conclusions and Recommendation

1. The Liquefaction Assessment maps are appropriately consistent with recent revised geologic maps of Nelson-Richmond urban area mapping which includes the eastern margin of the Tahunanui area.
2. With the exception of the apparent inconsistencies in liquefaction potential of the Tahunanui area sediments with reference to reporting we have not reviewed, nor been requested to review for this peer review - which could warrant further consideration - there do not appear to be any areas of the mapping that are considered to warrant further consideration from a liquefaction vulnerability.
3. We support the MBIE recommendation that territorial/ Unitary authorities maintain all liquefaction assessment they receive geospatially and with well-defined metadata descriptions.

Limitations

This report has been undertaken as per the agreed brief and has been prepared for the benefit of Nelson City Council. It is a peer review of the criteria of a Level A assessment carried out by others. No fieldwork has been undertaken.

No liability is accepted by Geo-Logic Ltd or by any principal, or director, or any servant or agent of this firm, in respect of its use by any other person. Any other person who relies upon any matter contained in this report without consultation with and agreement by Geo-Logic Ltd as to its applicability to that persons intentions, does so entirely at their own risk. This disclaimer shall apply notwithstanding that the report be made available to any person in connection with any application for permission or approval, or pursuant to any requirement of law.

References

Beca, 2021: Nelson Regional Liquefaction Assessment, prepared for Nelson City Council (Draft for client comment) dated 21 October 2021 (3160254-306125624-19)

Geo-Logic Ltd, 2013: Liquefaction Hazard Review, Drill Hole Data Compilation, Nelson prepared for Nelson City Council dated January 2013 (reference 5022.06)

Johnston, M. R. 2013. Revised Preliminary Assessment of the Liquefaction Hazard in Tasman and Nelson. Report prepared for the Tasman District and Nelson City Councils dated 16 February 2013.

Johnston M. R., Ghisetti, F. C. & Wopereis, P. 2021: Revised Geological Map of the Nelson-Richmond Urban Area. Accessed 15/02/2021 (<https://nelson-richmond-geolmap.github.io/RGMap/>).

Johnston M. R., Ghisetti, F. C. & Wopereis, P. 2021a: Updated November 2021 - Revised Geological Map of the Nelson-Richmond Urban Area. Accessed 20/12/2021 (<https://nelson-richmond-geolmap.github.io/RGMap/>).

MBIE, 2017: Planning and engineering guidance for potentially liquefaction-prone land, Resource Management Act and Building Act aspects. Ministry of Business, Innovation & Employment Rev 0.1 September 2017.

Yours faithfully
GEO-LOGIC LIMITED



Paul Denton
Engineering Geologist