

Liquefaction - Frequently asked questions

(updated 2 September 2022)

<http://www.nelson.govt.nz/environment/nelson-plan/natural-hazards/liquefaction/>

1. What is liquefaction?

Liquefaction refers to a process that can occur during earthquakes where ground shaking causes loose and saturated soil to lose strength and behave like a fluid.

2. In what situations could liquefaction occur?

The key elements that are needed for liquefaction to occur are:

- Sufficient ground shaking during an earthquake (a combination of duration and intensity of shaking)
- Loose, non-plastic soil (typically sands and silts, and in some cases gravel)
- Saturated soil (ie below the groundwater table)

Areas susceptible to liquefaction generally correspond with geologically young deposits (<10,000 years) located in relatively flat areas close to active or abandoned waterways, in coastal or estuarine areas, and/or areas of uncompacted or poorly compacted fill.

3. What are the effects of liquefaction?

The effects of liquefaction can vary from a few small sand boils where sand, silt, and water erupts upward under pressure to the ground surface, to more significant effects, including:

- Widespread sand boils causing differential settlements of the ground surface that damage paved surfaces and potentially cause heavy objects to sink into the ground.
- Differential settlements of the ground which may cause failure of shallow building foundations as they subside/ sink into the ground.
- Lifting of buried pipes (water and sewer), tanks, and manholes that aren't properly anchored underground.
- Subsidence of ground levels which can increase the potential for flooding, and damage underground services, paved surfaces and buildings.
- Lateral ground spreading as the ground moves downslope causing cracking of the ground surface. This may occur within about 100 metres of the shoreline and/or a water course.

4. Why does Council produce liquefaction hazard maps?

Councils are required by legislation to manage risks from natural hazards. Relevant legislation includes the Resource Management Act (RMA), Building Act, Local Government Act, and the Civil Defence and Emergency Management Act. Managing these risks requires assessment of the natural hazards, and identification of areas where they may occur.

Managing natural hazard risks ensures that development occurs in appropriate locations, and in ways that avoid or mitigate the risk. The first step in managing the risk posed by a natural hazard risk is assessing areas, or the entire region, to identify where the hazard may occur (which involves mapping).

The regional scale liquefaction mapping produced as part of the Nelson Regional Liquefaction Assessment 2021 was commissioned in response to updates to the Building Code in 2019 requiring local authorities to complete mapping of liquefaction hazard areas in their region by 29 November 2021. The Building Code updates were made to ensure that new buildings are built safe and strong enough to withstand liquefaction effects and came into

force because of the experience of the Canterbury earthquakes and subsequent recommendations made by the Royal Commission of Inquiry.

5. What information is used to map the liquefaction hazard areas?

The liquefaction mapping is based on technical assessments undertaken by engineering geologists and geotechnical engineers at Beca and follow the methodology set out in in the joint Earthquake Commission (EQC)/ Ministry of Business, Innovation and Employment (MBIE)/Ministry for the Environment (MfE) guidance. The Nelson Regional Liquefaction Assessment 2021 is a 'Level A' assessment, while the Tahunanui Level B Liquefaction Assessment is a more detailed 'Level B' assessment. You can view this guidance document at: building.govt.nz/assets/Uploads/building-code-compliance/b-stability/b1-structure/planning-engineering-liquefaction.pdf

The Nelson Regional Liquefaction Assessment (Level A) considered information on the subsurface soils available from regional and local geologic maps, along with ground surface elevations, aerial imagery, and regional seismicity, to identify areas that may contain susceptible saturated deposits.

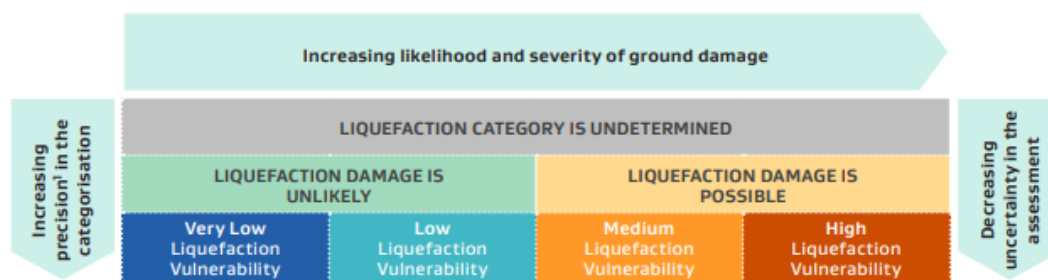
The Tahunanui Level B Liquefaction Assessment considered the information in the Level A assessment, but also involved quantitative liquefaction assessments to identify the range of liquefaction-induced damage predicted for a site during a specific earthquake event. Level B assessments are typically applied at a local scale and consider the specific subsurface soil types at the site as identified from geotechnical investigations, along with estimated earthquake shaking for a design event, and measured groundwater levels.

6. What do the liquefaction maps show?

The Nelson Regional Liquefaction Assessment identifies areas in the Nelson region where liquefaction damage is possible in the event of strong shaking from an earthquake. These correspond with areas identified as potentially containing loose and saturated deposits that are susceptible to liquefaction.

The Tahunanui Level B Liquefaction Assessment also identifies areas where liquefaction damage is possible in the event of strong shaking from an earthquake. It further refines parts of the 'liquefaction damage is possible' area to '*medium liquefaction vulnerability*' or '*high liquefaction vulnerability*' in the event of strong shaking from an earthquake. The refinement and subdivision of areas reflects more certainty in the anticipated range of liquefaction induced ground damage as a result of the quantitative liquefaction assessments completed under the Level B assessment.

The map is colour coded according to liquefaction vulnerability categories assigned in the MBIE guidance document (as shown in the table below). The yellow/gold colour indicates where liquefaction damage is possible. The green colour shows where liquefaction damage is unlikely. Land in the *liquefaction damage is possible* category (yellow/gold colour) can be assessed in greater detail to determine whether it can be further identified as *medium liquefaction vulnerability* (lighter orange colour), or *high liquefaction vulnerability* (dark orange colour).



Note:

- 1 In this context the 'precision' of the categorisation means how explicitly the level of liquefaction vulnerability is described. The precision is different to the accuracy (ie trueness) of the categorisation.

7. Why is my property included in the liquefaction susceptibility area when it has never been affected?

Despite Nelson not having (during our lifetimes) experienced an earthquake of the magnitude that would cause liquefaction damage like Christchurch did, Council is required to look at risk over a long time period to help inform decisions regarding future development and land uses. Your property is included in the liquefaction susceptibility area because, in the event of strong shaking from an earthquake, your property may be affected.

8. Will this information go on my property file and Land Information Memorandum (LIM)?

Yes. All property files have been updated with this natural hazard information and LIM notations have been included.

Under the Local Government Official Information and Meetings Act 1987 Council has an obligation to provide LIM notations regarding information it holds on natural hazards (including liquefaction) but is not yet contained within the local District Plan.

Even in circumstances where the liquefaction hazard is only identified on a small portion of a property (e.g. driveway or garden), Council is still required to note this on the LIM and property information file.

9. What does the LIM notation for liquefaction say?

For properties identified in the Nelson Regional Liquefaction Assessment 2021 as 'liquefaction damage is possible' that are not within the area assessed in the Tahunanui Level B Liquefaction Assessment, The LIM notation is as follows:

Liquefaction hazard

The Council holds a report (Nelson Regional Liquefaction Assessment, 23 November 2021) that identifies this property, or part of this property, as 'liquefaction damage is possible' meaning it is potentially susceptible to ground damage caused by liquefaction during earthquakes.

The data contained within the Nelson Regional Liquefaction Assessment report has been generated at a regional scale (1:25,000) using regional datasets. Site specific liquefaction assessments were not considered. The assessment is indicative of the potential for liquefaction to affect any individual site or property. To determine the specific liquefaction hazard affecting any individual site or property, a site-specific assessment may need to be undertaken.

Further refinements to the geographic extent of the identified area where 'liquefaction damage is possible' may occur in the future, for example as the Nelson Resource Management Plan (NRMP) is updated. As a result, the liquefaction information recorded on the LIM for this property may be updated in the future.

A copy of the Nelson Regional Liquefaction Assessment report, and previous reports on liquefaction hazard, can be accessed online at <http://www.nelson.govt.nz/environment/nelson-plan/natural-hazards/> or by contacting the Planning Administrator on 5460200.

For properties identified in the 2022 Tahunanui Level B Liquefaction Assessment as 'liquefaction damage is possible', 'medium liquefaction vulnerability' or 'high liquefaction vulnerability', the LIM notation is as follows:

Liquefaction hazard

The Council holds a report (Tahunanui Level B Liquefaction Assessment, 2022) that identifies this property, or part of this property, as 'liquefaction damage is possible' meaning it is potentially susceptible to ground damage caused by liquefaction during earthquakes.

The data contained within the Tahunanui Level B Liquefaction Assessment report has been generated at a scale of 1:15,000. Property specific liquefaction assessments were not considered. The assessment is indicative of the potential for liquefaction to affect any individual site or property. To determine the specific liquefaction hazard affecting any individual site or property, a site or property specific assessment may need to be undertaken.

Further refinements to the geographic extent of the identified area where 'liquefaction damage is possible' may occur in the future, for example as the Nelson Resource Management Plan (NRMP) is updated. As a result, the liquefaction information recorded on the LIM for this property may be updated in the future.

A copy of the Tahunanui Level B Liquefaction Assessment report, and previous reports on liquefaction hazard, can be accessed online at <https://www.nelson.govt.nz/environment/nelson-plan/natural-hazards/> or by contacting the Planning Administrator on 5460200.

- 10. My property in Tāhunanui was developed using appropriate foundation treatment to mitigate the risk of liquefaction. Why do I still have a LIM notation on my property file?**
Since 2013, a number of new developments in Tāhunanui have incorporated appropriate foundation treatments into the building design to mitigate the risk of damage from liquefaction. While this may have mitigated the risk of liquefaction damage to the building, other parts of the property could remain at risk e.g. driveways and gardens. On this basis, it is appropriate that a LIM notation remains on the property file to ensure that liquefaction is considered when assessing any future development proposals on the site and to inform potential buyers.
- 11. Why has my property in Eastern Tahunanui now been identified as susceptible to liquefaction when previous assessments found that it wasn't?**

Our understanding of liquefaction in Nelson continues to evolve as new areas are assessed and we undertake more detailed studies in areas we are already aware of.

Methodologies for assessing liquefaction also change over time. The recent region-wide assessment of liquefaction, and the more detailed Tahunanui Level B Liquefaction Assessment, used the methodology outlined in national guidance issued by the Ministry of Business, Innovation and Employment (MBIE) in 2017 for planning and building on liquefaction-prone land. This is a different methodology to the one used for previous assessments of Tahunanui undertaken in 2013 and 2014.

The geologic setting of Tahunanui and geotechnical testing indicates that much Tahunanui is underlain by geologically young, loose, and saturated sands and silts meaning that the susceptibility of these deposits to liquefaction cannot be discounted.

12. Can I get the LIM notation removed?

Under section 44A (2) (i) and (ii) of the Local Government Official Information Management Act (LGOIMA) councils are legally obliged to include this information on LIMS if it is not apparent from the District Plan (in Nelson's case, the NRMP). However, once this information is included in an operative District Plan, the LIM notation may be removed.

13. Will being in the liquefaction area limit the ability to build a new house or extend an existing one on my property?

Anyone looking to carry out building or development on their land need to ensure that they gain the appropriate building and/or resource consent.

There are currently no rules in the NRMP regarding development in an area at risk from liquefaction hazard specifically. However liquefaction can be considered in some resource consent processes where natural hazards need to be considered more broadly.

In the future, areas of Nelson that may be susceptible to liquefaction are expected to be included into the NRMP, or into a new resource management plan.

If you require a building consent, the Council's assessment would consider liquefaction. It would consider the proposed location and type of foundations, the purpose of the building, and the risk to people, property, infrastructure and the environment from liquefaction. Please visit the Council's building consent webpage for more information regarding new buildings in areas of liquefaction:

nelson.govt.nz/new-buildings-and-liquefaction-effects

14. Can my property still be subdivided if it's in the liquefaction susceptibility area?

Subdivision requires resource consent. The rules for subdivision are contained in the Nelson Resource Management Plan. Natural hazards are taken into account when considering an application to subdivide land within areas susceptible to natural hazards, including liquefaction.

15. What if I want to sell my property?

Any potential buyer can access the relevant land and property information files in relation to natural hazards. To find out more about requesting property files and fees involved (there is no fee if you are the property owner) please visit: nelson.govt.nz/requesting-property-files

Prospective buyers can also purchase a LIM from the Council. To find out more about obtaining a LIM and the fees involved, please visit: nelson.govt.nz/land-information-memorandum-lim-reports

16. Will this information affect my property value or insurance?

Council cannot advise property owners about any effect this information may have on your property values or insurance. We recommend property owners seek professional advice from a property valuation or insurance expert about any concerns you may have regarding these matters.

17. Will I be covered by the Earthquake Commission (EQC) if my property is affected by an earthquake?

EQC cover provides natural disaster insurance for residential homes and some areas of residential land after earthquakes, landslips, volcanoes, tsunami and hydrothermal activity. It also provides cover for storm flood damaged land.

For more information, please refer to EQC's website: eqc.govt.nz/what-we-do/what-youre-covered-for

18. Where do I find information about what to do during an earthquake?

Civil defence information and advice on getting prepared can be found on the [Nelson Tasman Civil Defence Emergency Management](https://nelson.govt.nz/tasman-civil-defence-emergency-management) website.