

National Liquefaction Model – Info for government

Liquefaction is a major earthquake hazard in New Zealand, occurring when strong shaking causes soil to lose strength and behave like a liquid, damaging land and buildings. To better estimate potential losses from future earthquakes, the Natural Hazards Commission (NHC) Toka Tū Ake commissioned New Zealand's first National Liquefaction Model (NLM).

Purpose

The NLM improves our understanding of liquefaction risk at a national scale. It integrates geotechnical, geomorphological, and groundwater data to estimate liquefaction susceptibility and potential land damage under various earthquake scenarios.

The model was developed by Tonkin + Taylor, with input from central and local government agencies, industry stakeholders and international experts to ensure it is both technically robust and relevant for real-world use.

As with any model, the NLM does not change the underlying liquefaction hazard. Rather, the NLM provides a more consistent, nationally comparable way to assess liquefaction susceptibility.

The model supports more consistent, evidence-based decision-making on natural hazard risk across government.



Liquefaction damage in Christchurch, 2011

Use cases and limitations

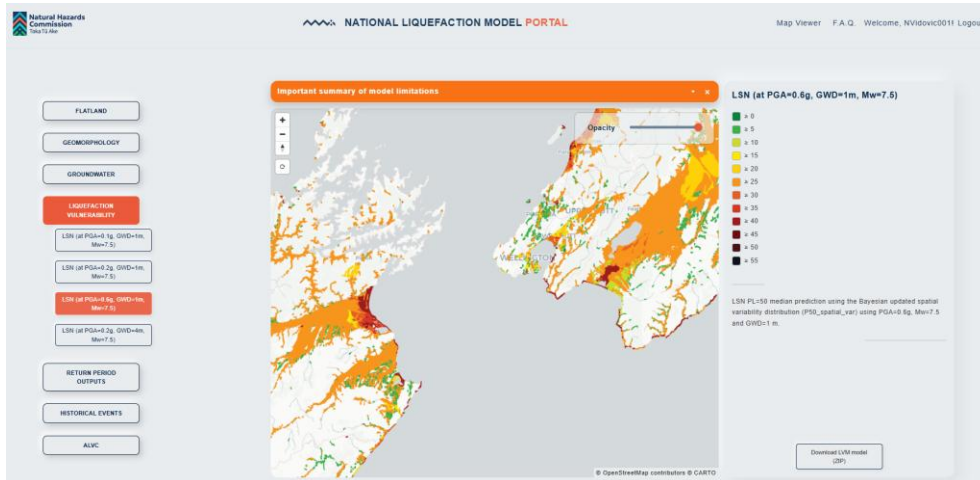
Central and local government agencies can use the NLM outputs to:

- Compare liquefaction susceptibility across regions using a consistent national approach
- Assess the effectiveness of policy and guidance under future earthquake and sea-level rise scenarios
- Combine with loss modelling to evaluate how proposed updates to building regulatory documents may influence future potential losses
- Support Civil Defence Emergency Management planning and response exercises
- Identify gaps in existing liquefaction mapping and support the development, validation and review of local liquefaction maps (noting that, where there are differences, council-developed maps remain the more authoritative source for local conditions)

An important limitation is that the current model does not include lateral spreading, which can be a significant contributor to liquefaction-related damage in some settings. The model also has higher uncertainty in areas with limited data.

The NLM is designed for regional analysis (100 m grid resolution), not for property-level decisions such as building consents. For Land Information Memoranda (LIMs), councils should apply their own judgement and follow Department of Internal Affairs (DIA) guidance on natural hazard information^{1 2}. The NLM outputs should be interpreted alongside other information like local data, guidance and site-specific investigations, and with appropriate explanation of its regional scale and limitations.

Using the Model outside of its intended purposes may lead to confusion or misinterpretation.



Screenshot of the NLM Portal Map Viewer

Alignment with existing guidance

The NLM's automated mapping uses thresholds consistent with MBIE and Ministry for the Environment planning and engineering guidance for potentially liquefaction-prone land³, including the 'Liquefaction Damage is Possible' category (defined as >15% probability of minor to moderate land damage in a 1-in-500-year event). While aligned with national guidance, NLM outputs are not a substitute for locally developed maps or regulatory tools. Local information and assessments remain the primary basis for site-specific decisions.

Accessing the NLM

The NLM is available through a web portal for technical users. While publicly accessible, the Portal is designed for users with appropriate technical expertise. It includes disclaimers to guide appropriate use, which users should read and understand before using the Model. Users can view interactive maps, download technical data, and access the full technical reports.

Access the National Liquefaction Model portal

¹ Department of Internal Affairs (DIA). *Guidance for natural hazard information in Land Information Memoranda (LIMs)* (September 2025). [https://www.dia.govt.nz/diawebsite.nsf/Files/Local-Government-2025/\\$file/Guidance-for-Natural-Hazard-Information-in-LIMs-September-2025.pdf](https://www.dia.govt.nz/diawebsite.nsf/Files/Local-Government-2025/$file/Guidance-for-Natural-Hazard-Information-in-LIMs-September-2025.pdf)

² Department of Internal Affairs (DIA). *Scenario-based guidance for including natural hazard information in LIMs* (September 2025). [https://www.dia.govt.nz/diawebsite.nsf/Files/Local-Government-2025/\\$file/Scenario-based-guidance-for-including-Natural-Hazard-Information-in-LIMs-September-2025.pdf](https://www.dia.govt.nz/diawebsite.nsf/Files/Local-Government-2025/$file/Scenario-based-guidance-for-including-Natural-Hazard-Information-in-LIMs-September-2025.pdf)

³ Ministry for the Environment & Ministry of Business, Innovation and Employment (MBIE). *Planning and engineering guidance for potentially liquefaction-prone land*. <https://environment.govt.nz/publications/planning-and-engineering-guidance-for-potentially-liquefaction-prone-land-resource-management-act-and-building-act-aspects/>

For more information

The NLM is a modular model that will be updated over time as new data, improved methods and user feedback become available. Ongoing engagement with central and local government agencies will help guide future updates and support national resilience and policy development.

For more detailed information on the model's design, inputs and limitations, users should refer to the technical documentation available through the NLM portal. To provide feedback or request information, contact us at research@naturalhazards.govt.nz.