

National Liquefaction Model – Info for finance sector

Liquefaction is a major hazard in New Zealand. It was a main driver of the losses from the Canterbury earthquakes. 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 can be used as an input to loss modelling and scenario analysis at a regional or portfolio scale.

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



Liquefaction damage in Christchurch, 2011

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.

Improving the consistency of national liquefaction risk information also supports risk financing and reinsurance planning across the system.

Use cases and limitations

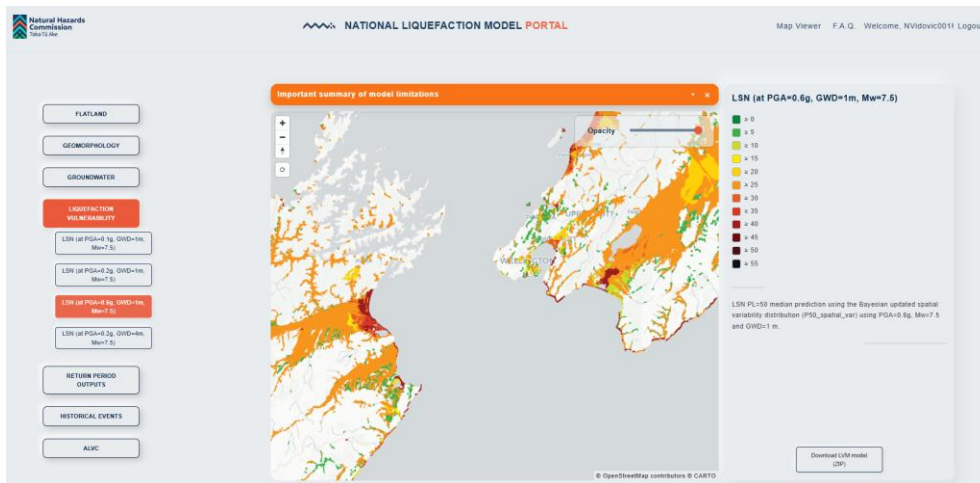
People working in the insurance, reinsurance, or financial sector may find the NLM useful for:

- Exposure modelling across portfolios
- Reinsurance planning and portfolio-level strategy
- Scenario testing for historical and future earthquake events
- Supporting resilience and risk mitigation activities

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 not suitable for individual property risk assessment, underwriting, or site-specific pricing decisions. It does not include lateral spreading and has higher uncertainty in areas with limited data. Outputs should be interpreted alongside other relevant data, models and professional judgement.

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 land¹, 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](#)

For more information

The NLM is a modular model that will be updated over time as new data, improved methods, and stakeholder feedback become available. Ongoing engagement with users across sectors, including the insurance sector, will help guide future updates and ensure the model remains relevant and fit for purpose.

For more detailed information on the model's design, inputs and limitations, refer to the technical documentation available through the NLM portal.

¹ 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/>

To provide feedback or request information, contact us at research@naturalhazards.govt.nz

