Auckland Landslide Susceptibility Study

He Rangahau i te Mōrearea o te Horo Whenua ki Tāmaki Makaurau

May 2025

Why we undertook this study

Landslides are among New Zealand's deadliest natural hazards. Across the Auckland region they impact people, homes, infrastructure, roads and services. Auckland Council has completed a region wide study to map landslide susceptibility. The maps provide vital information to planners, infrastructure providers, owners, developers, and engineers so that they can understand and manage the risks from landslides.

What is a landslide?

A landslide is the movement of a mass of rock, debris or earth (soil) down a slope. Landslides typically occur:

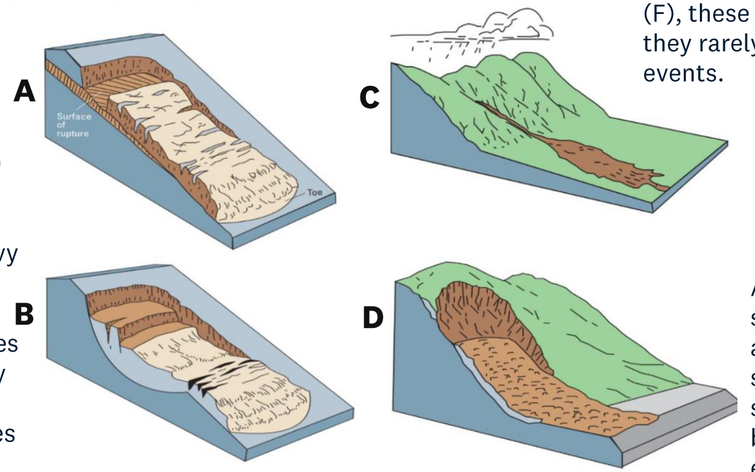
- On steep slopes (natural or modified)
- On slopes in weak materials

What can trigger a landslide?

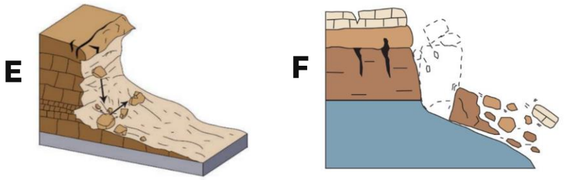
- Heavy or prolonged rainfall, which may become more severe and frequent due to climate change
- Earthworks (adding or removing material)
- Strong earthquake shaking
- Due to stream or sea erosion
- Due to failure of structures like retaining walls

Landslides in Auckland

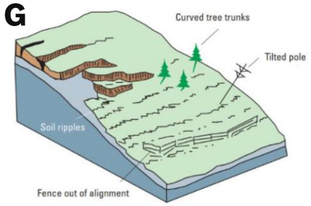
The most common landslides in Auckland are translational (A) and rotational (B), although in particularly heavy rainfall debris flows (C) and debris avalanches (D) can be a very significant danger. A-D types were considered for this study.



Although Auckland does experience rock fall (E) and rock toppling (F), these were not considered in this susceptibility study because they rarely affect homes, and because of limited records of past events.

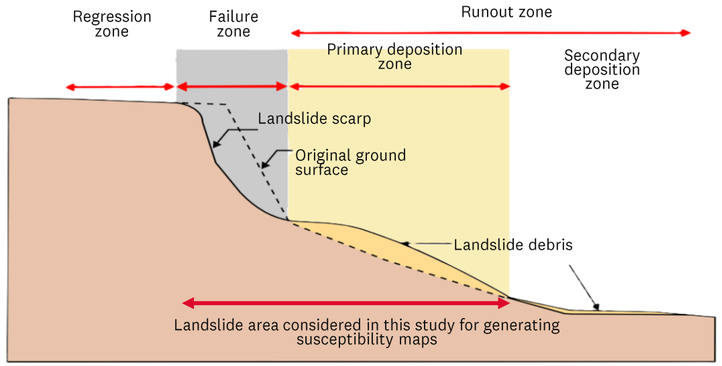


Auckland also has a lot of soil creep (G) but this was also excluded from the study because it is usually shallow and slow, so can be controlled with normal engineering.



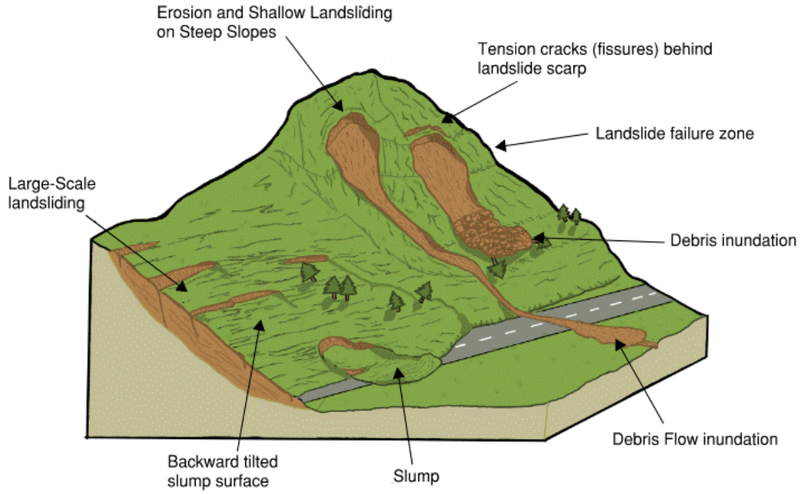
Components of landslides

The debris from failed slopes move down slope and deposit the failed materials. They run out further when mixed with water and air. The failure can also regress further (uphill) into land that would have otherwise not failed because the supporting land is gone. The areas of runout and regression are not shown on the landslide susceptibility maps, but all contribute to the risk.



Features of landslides

Common features of shallow landslides (top right) and large scale landslides (bottom left) include:

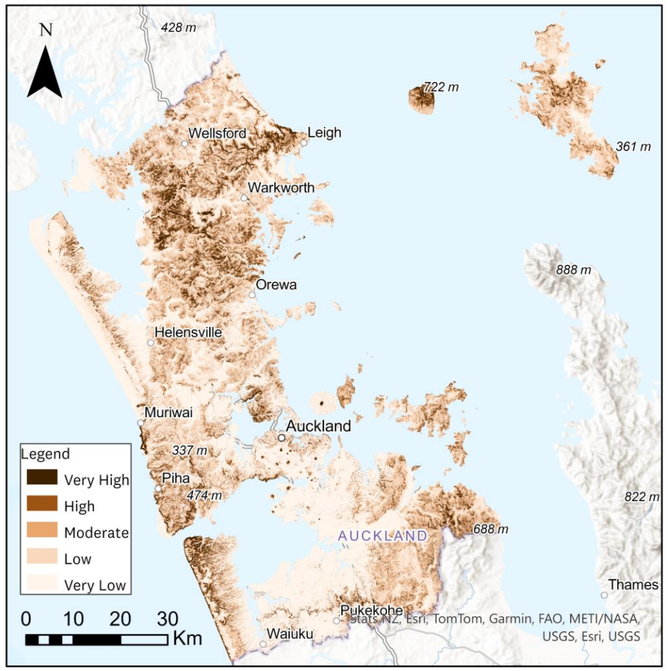


Outcomes from the study

The landslide susceptibility maps show which slopes are more likely to be vulnerable to failure. Landslide susceptibility has been assessed using high resolution topography data, land use, waterways, geomorphological and geological maps, and an extensive database of past landslides across the region. Two types of rainfall-induced landslides have been assessed and are presented on separate maps. This is because the two types require different approaches to manage them, and in some cases are controlled by different factors.

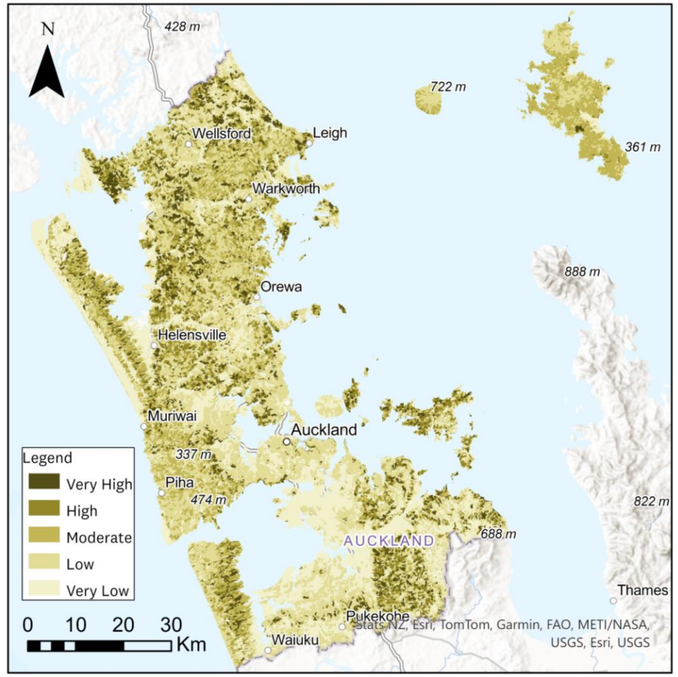
Shallow landslides

These are relatively shallow and fast-moving. They occur on steep slopes or gullies, where the slope fails, and debris runs down the slope. These are often controlled by land use, soil type and surface water runoff.



Large scale landslides

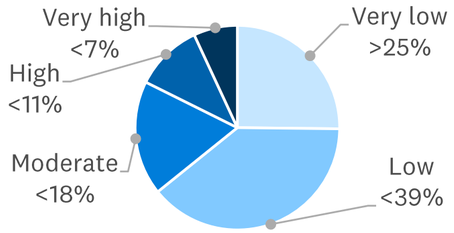
These affect deeper layers of soil and rock, and can affect large parts of hillsides. They are often controlled by weaknesses in the underlying rock, and by deep groundwater.



The maps identify the susceptibility of slopes to landslides on a scale of:

- Very low
- Low
- Moderate
- High
- Very high

This chart shows approximately how much of Auckland's area is affected by each susceptibility class, either in shallow or large scale landslides. It has not yet been decided which classes will have land use planning controls assigned to them, or what those controls will be. Further consultation will take place through strengthening the unitary plan process.



Maps for past landslides in the region have also been prepared as a landslide inventory. These allow us to separately identify areas known to have instability from those that are mapped as potentially susceptible.

How the maps may be used

How Auckland Council will use them

This study and results will be used to strengthen the Auckland Unitary Plan. The landslide susceptibility maps offer essential information to guide land use planning, urban growth strategies. They will help to steer development away from potentially high-risk areas, and guide where more detailed assessments are needed to manage the risk.

The maps will be shown on LIMs to inform future owners of the potential for landslides in the area and will be used in decision-making for council when identifying areas for development or for building infrastructure.

How homeowners can use them

These maps provide a starting point for landowners to engage specialists to assess the risk to their specific sites at a more detailed level, if they highlight a potential issue. However, they shouldn't be taken as showing a confirmed problem without more detailed assessment because they rely on data like geological maps which are not always accurate at a site-specific level.

Who else might use them

Emergency managers, infrastructure owners, insurers and central government agencies will all be able to use these maps to assess regional risk, and to identify if further assessment is appropriate for specific sites.

Four key limitations of the maps

1. Maps were prepared using data available at a regional scale and can't be used to make final decisions at a property level.

2. These maps do not capture the impacts downhill from runout of debris or land uphill due to regression of failed slopes. It is anticipated that this may be added in future versions of the maps.

3. Because they are based on historical landslides, they cannot easily take into account future changes such as land use or climate change.

4. We don't have a reliable long-term record of landslides across Auckland and advanced forecasting tools, so we cannot predict when landslides might occur.

For more information, visit **https://www.knowledgeauckland.org.nz** and to access the maps visit (search Geology and Geotechnical) https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html