



# Framework for evacuation routes

In a natural disaster, people may be evacuated if the area faces an imminent threat, is unsafe or unliveable. A range of transport modes may be used on emergency evacuation routes, with people travelling on foot, or in vehicles, vessels or aircraft. The routes may cross public or private land and evacuees may have private, public or shared transport options.

This research report sets out a framework for identifying, planning, designing and assessing emergency evacuation routes for use in a natural disaster.

The researchers aimed to:

- identify and examine international and New Zealand experience, and best practice in planning and assessing evacuate routes
- establish the ideal characteristics of evacuation routes in New Zealand conditions for particular hazards
- construct a framework and method for evaluating evacuation routes
- test and validate the framework and method using two case studies.

The framework is intended for all organisations with an interest or role in evacuation planning, including Waka Kotahi NZ Transport Agency, Civil Defence Emergency Management (CDEM) groups and iwi.

## Literature review and stakeholder engagement

The researchers reviewed the literature on evacuation routes and evacuation planning, focusing on current and emerging practices in New Zealand and internationally. These included official guidance, published literature and existing evacuation plans.

The review identifies factors for route planning, including the characteristics of the communities, the route and the receiving areas.

The researchers did a stocktake of existing evacuation route plans prepared by New Zealand CDEM groups and explored methods for modelling routes. They also considered the role of community, iwi, hapū and marae in emergency response and evacuations.

After engaging with key stakeholders, including Waka Kotahi and CDEM groups across New Zealand, the researchers found that framework users need to:

- understand the communities being evacuated and their transport requirements
- know current practices and past experiences when identifying, assessing and publicising evacuation routes
- consider 'receiving' areas and communities, and the role of supporting facilities in evacuations.

## The framework

From the literature review and stakeholder engagement results, the researchers then developed an Evacuation Routes Framework. The final framework presented in the report was tested and refined through the two case studies.

The framework is divided into three components:

- evacuation factors to consider when developing evacuation scenarios, including:
  - hazard characteristics (likelihood, area, warning time)
  - affected population (support needed to access and travel evacuation routes)
  - safe areas, facilities needed and likely destinations.

- evacuation scenario(s) – how the evacuation might play out
  - shelter-in-place (if safe)
  - pre-event evacuation (with sufficient warning time)
  - during, or immediately before or after the event (little or no warning time)
  - post-event, when people will likely attempt to return home.
- evacuation route identification and assessment – the factors to consider when identifying and assessing potential routes, which include:
  - reviewing existing evacuation plans
  - assessing transport resources and operational requirements (by mode)
  - assessing risks and vulnerabilities
  - assessing or modelling route demand and capacity
  - identifying other priorities for the route
  - identifying facilities and supplies en route, and at receiving communities.

The research report describes each of these points in detail, with examples and supporting datasets. The framework is also dynamic. After practitioners have reviewed and assessed potential routes, they may need to re-evaluate the factors and scenarios.

It can be applied pre-event (to identify and evaluate potential route options) or during an event (to help identify and re-evaluate evacuation routes in real time).

Applying the framework includes the following steps:

- preparing the necessary inputs, including maps
- engaging with relevant stakeholders
- identifying and assessing evacuation routes
- identifying and addressing gaps in evacuation routes
- reviewing, as required.

However, many evacuation planning organisations have limited time and funding. They may need extra funding and support for this work, and to ensure that efforts are focused on the highest risk hazards and potential mass evacuation scenarios.

## Case studies

The two case study areas used to test the Evacuation Routes Framework across a range of hazards were in Wellington (earthquake scenario) and Nelson/Tasman (tsunami, flood and rural fire scenarios).

## Implementing the research

Researchers' recommendations for implementing the research:

- Investigate how the framework and other findings can be integrated into National Emergency Management Agency guidelines.
- Share key findings widely in the transport industry and emergency management sector, including examples and learnings from applying the framework.
- Do another case study applying the framework to a volcanic hazard event.
- Support better data sharing across organisations (for improved consistency and availability).

## Recommendations for further research

Potential areas for future research include:

- examining the vulnerabilities and dynamics of exposed communities
- examining the roles of local champions and education programmes in hazard awareness and evacuation
- expanding current research in mass evacuations from large urban centres to other hazard scenarios and population centres
- scoping the value of collaborative, co-creative research into modelling methods for evacuation routes with emergency management groups, communities, and research organisations.



RR 681 – Framework for evacuation routes, Waka Kotahi NZ Transport Agency research report.  
Available at [www.nzta.govt.nz/resources/research/reports/681](http://www.nzta.govt.nz/resources/research/reports/681)