

Tsunami Vertical Evacuation Structures – Design Guide

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Tsunami Waves

Generated when a large volume of water is displaced

- Earthquake
- Landslide
- Volcano
- Meteor



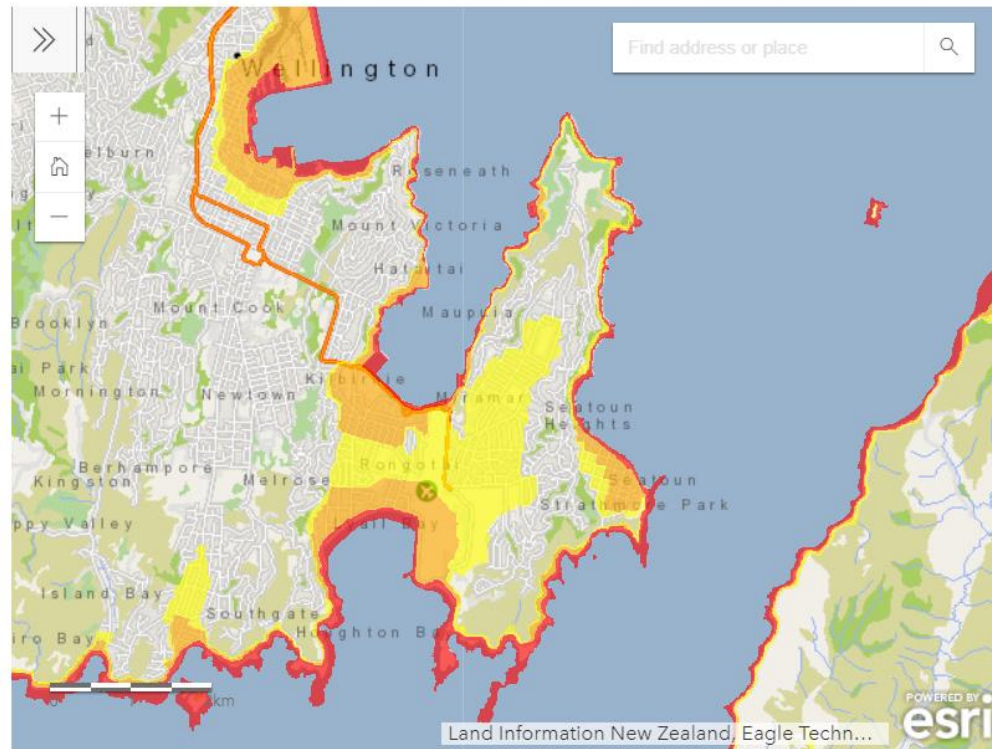
Tsunami Damage

Damage can be caused by

- Wave forces
- Debris impact
- Uplift on horizontal surfaces etc



Tsunami Risk to Urban Areas



From WREMO website



Risk Mitigation

Define evacuation zones:

- Self-evacuation in strongly-felt earthquakes (local)
- Official-evacuation in tsunami warnings (distant)

Land use planning:

- Restrict development in high-risk areas

Engineering:

- Construct buildings and other infrastructure in a tsunami-resilient way

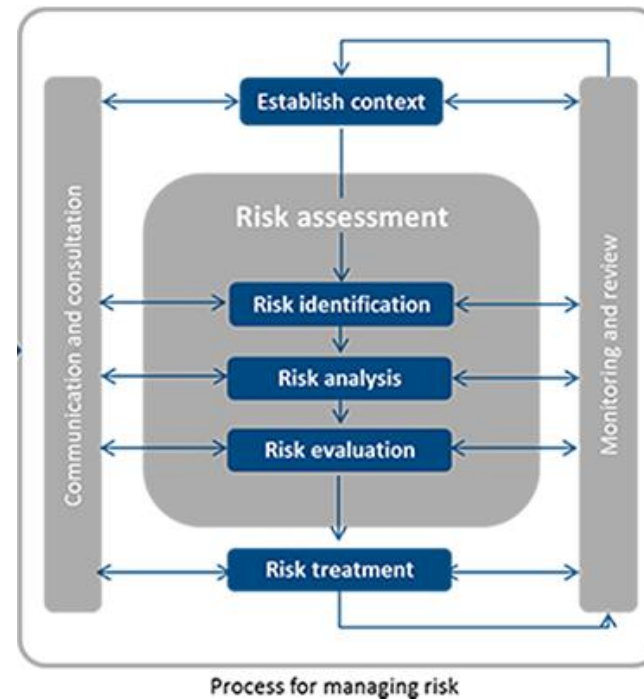
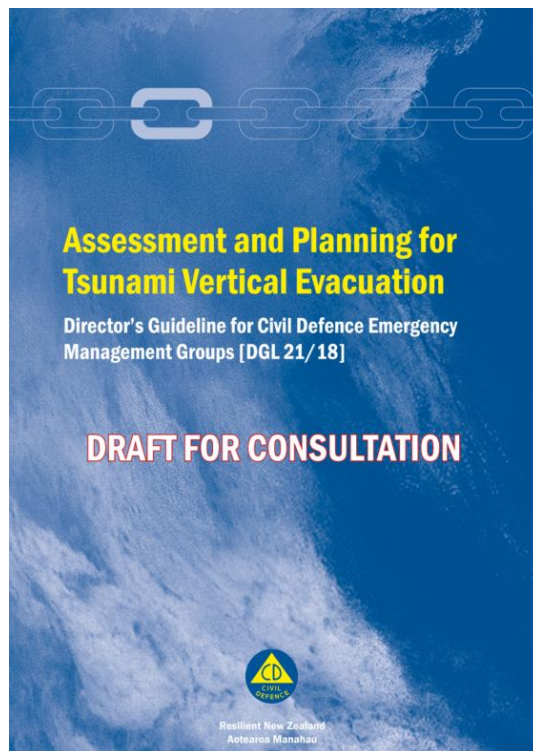
Mitigation – Vertical Evacuation



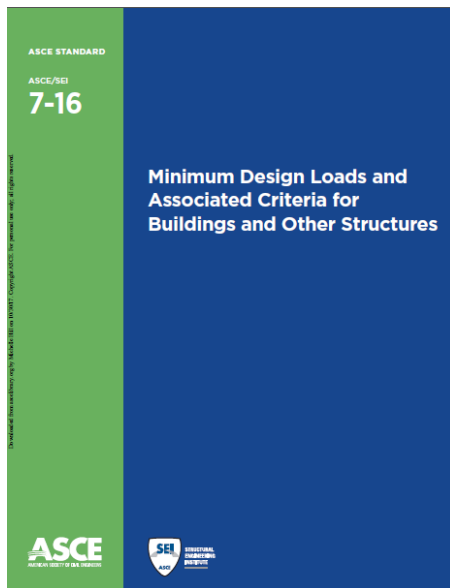
Mitigation – Vertical Evacuation



Planning for Vertical Evacuation



Design of Vertical Evacuation Structures



Includes

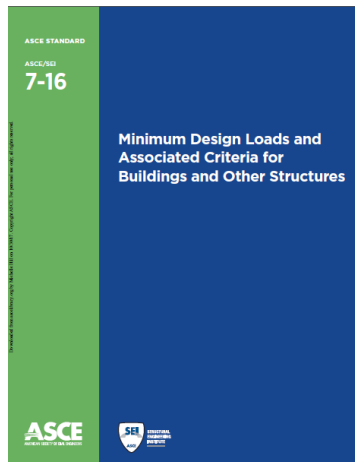
- How to model the **height/wave velocity** of tsunami at a particular site
- What tsunami **forces** are expected
- Structural performance **objectives**

'Sticking' Points

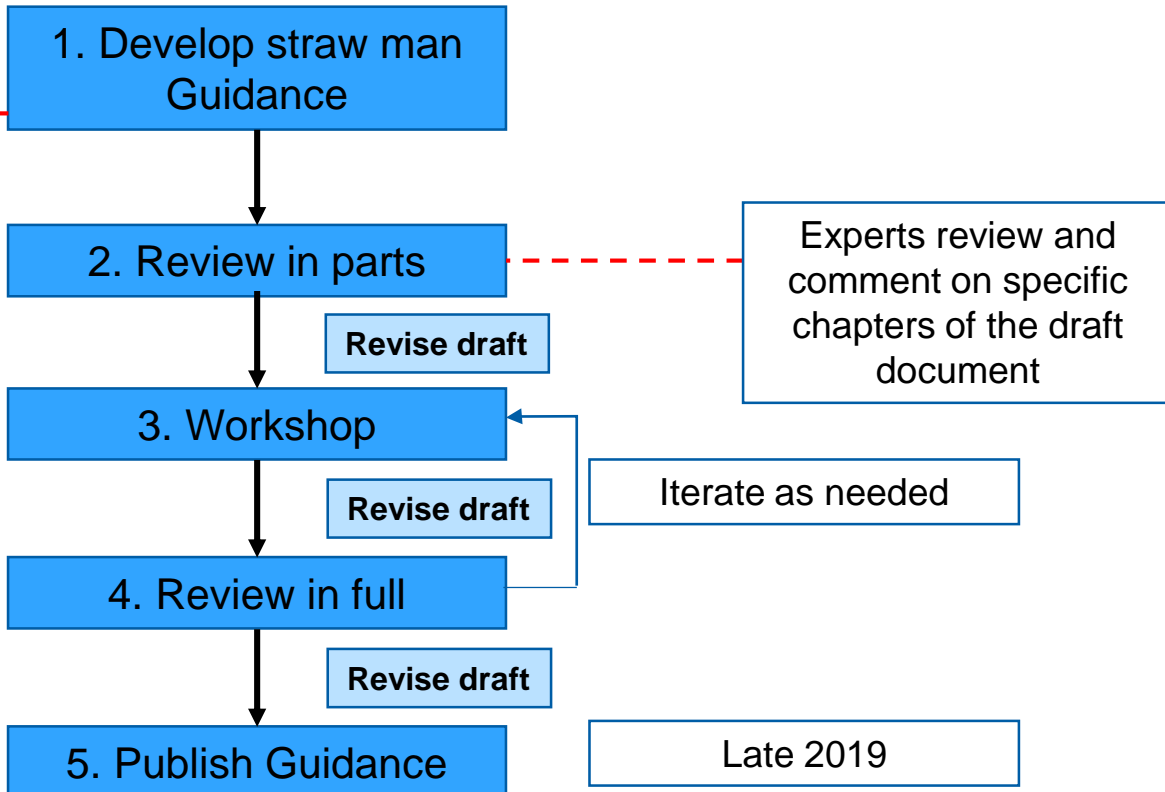
Tsunami modelling – Simplified approaches?

Structural design – Tension with seismic design philosophy

Design of Vertical Evacuation Structures



Largely based on ASCE 7-16 Chapter 6





Thank you

