

DSC Impacts & Implications Research Project

Develop national, region and territory population, built-asset and land cover coastal and fluvial/pluvial flood exposure profiles for present day and future climate conditions in New Zealand.

<https://www.deepsouthchallenge.co.nz/projects/national-flood-risks-climate-change>

National flood risks & climate change

Emergent exposure of flood inundation hazards under future climate change in New Zealand

Floods are some of New Zealand's most frequent, most damaging and most disruptive natural hazards. As our climate changes, flooding caused by both increased rainfall and rising sea levels – in coastal areas and on floodplains – is expected to increase.



Coastal Flood Hazard Mapping

New Zealand 1% AEP extreme sea-level flood hazard maps (ESL 1) for present-day MSL:

- Increments of + 0.1m SLR up to +3m.
- LIDAR DEM (31 Maps)
- Satellite DEM (1 Map)



Fluvial/Pluvial Flood Hazard Mapping

New Zealand flood hazard area map (FLHA)

The FLHA combines:

- Modelled or historic flood hazard maps.
- Flood prone soil maps.

FLHA maps used were publicly available.

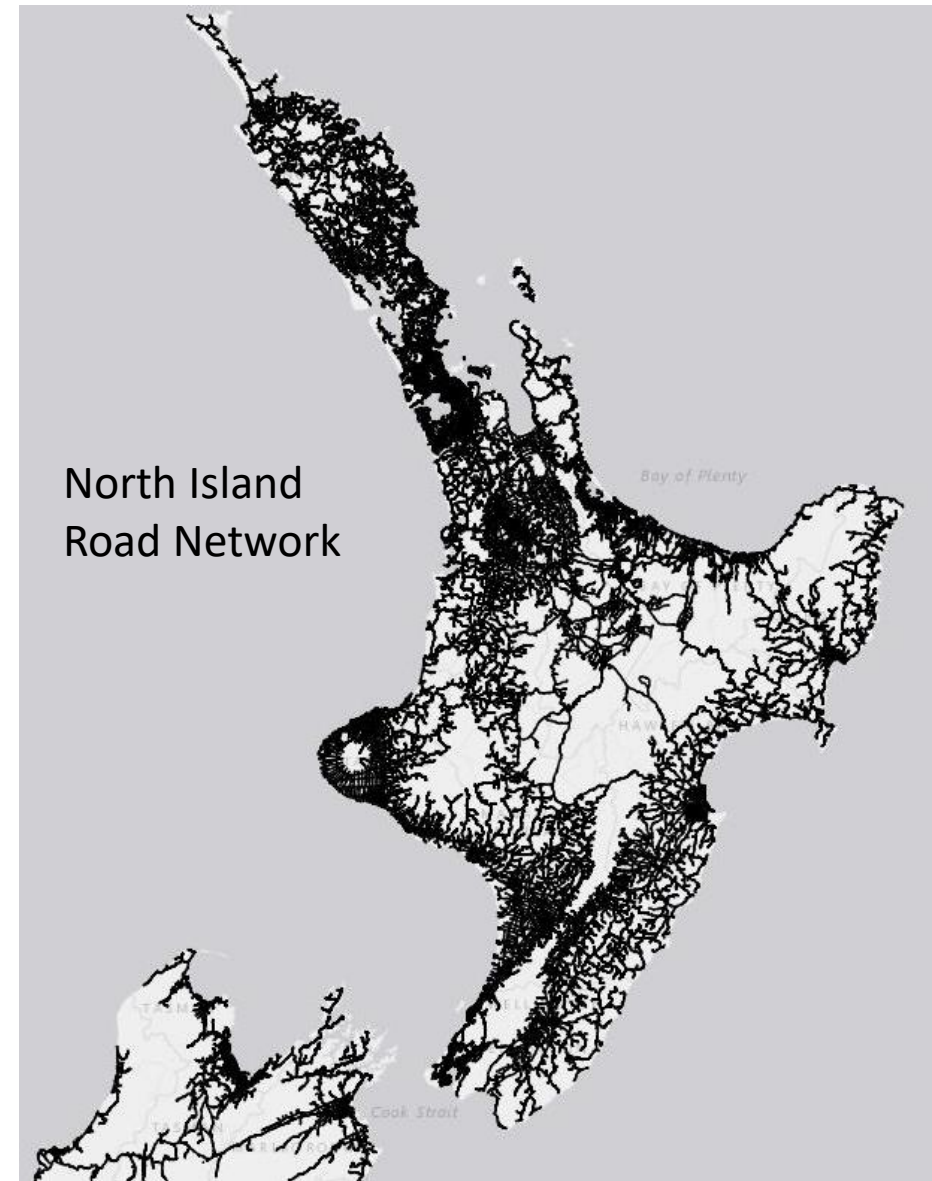
The FLHA maps represent a range of flood magnitudes and frequencies.



Flood Exposure Mapping of Elements at Risk – National Coverage

Study scope limited to open geospatial data:

- **Population:** 2013 Census Night Usually Resident Population (Stats NZ)
- **Buildings:** 2016 NZ Building Inventory (RiskScape).
- **Infrastructure:** Roads (NZTA), Railways and Airports (LINZ), Electricity (Transpower), Three-waters (Local Government).
- **Land Cover:** Landcare Landcover Database v4.1.



Example National and Regional Coastal Flood Exposure Plot - Roads

ESL1 Road Exposure Summary

National

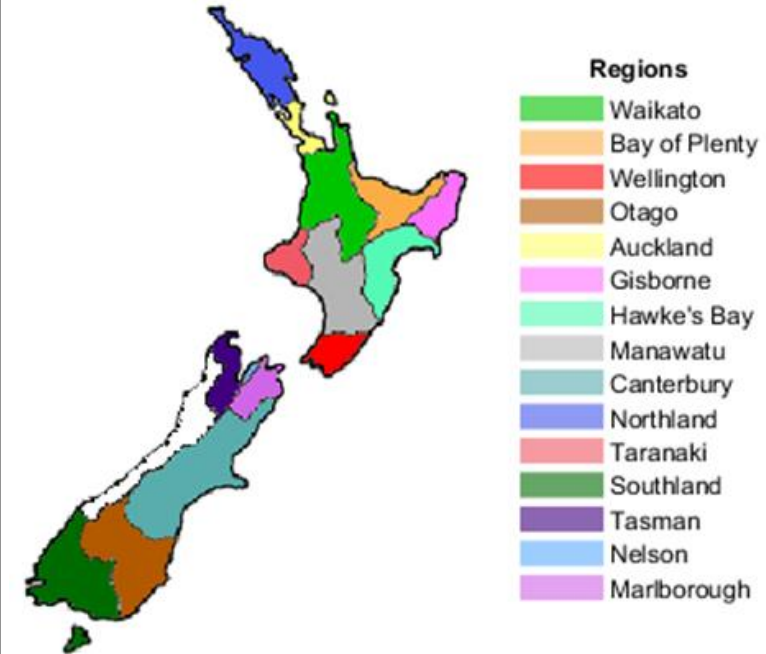
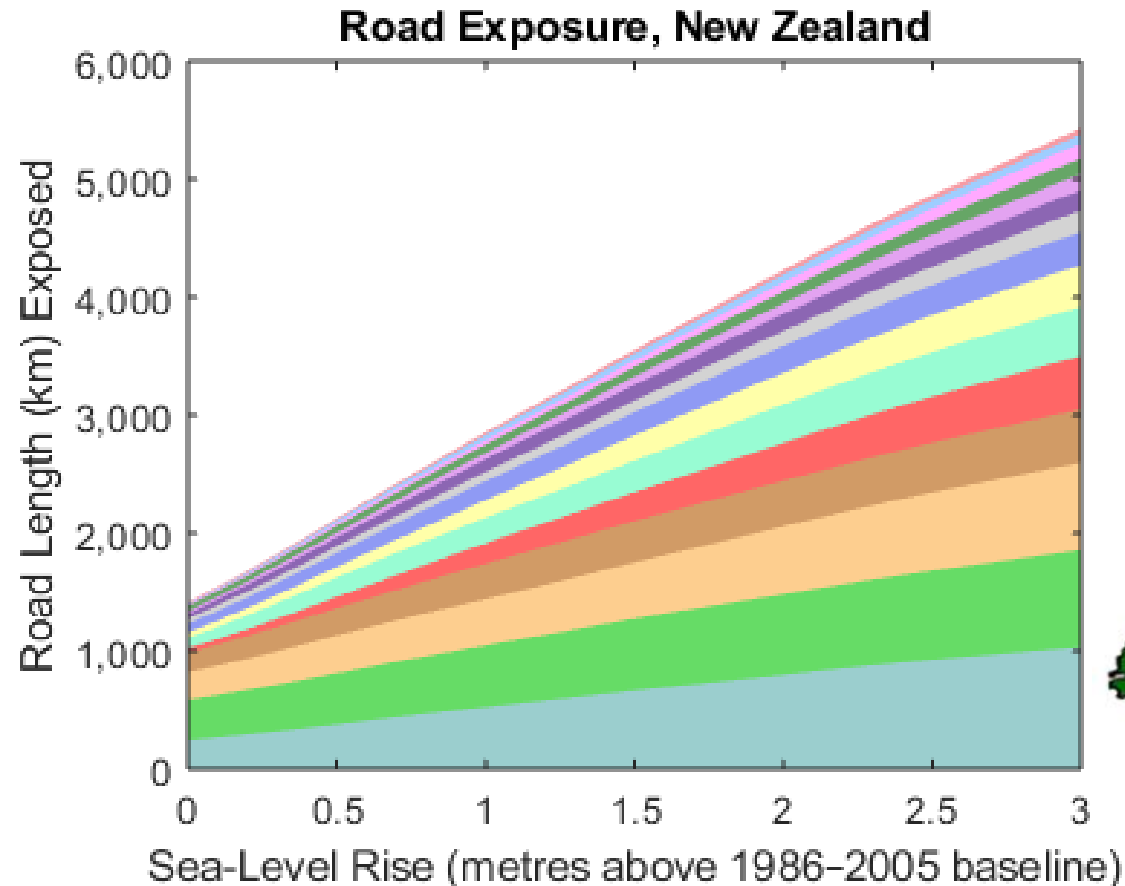
Road and railway exposure increases by 133 km for every + 0.1m SLR on average.

Regions

Road exposure in both Waikato and Canterbury exceeds 500 km at 1 m SLR.

Territories

Around 300 km of roads are exposed in Hauraki District and Christchurch City at 1 m SLR.



Building on Previous Research - Upcoming Funding Proposals

2020 MBIE Endeavour Fund (submission in March 2020)

National Flood Inundation Hazard and Risk Assessment

Overall proposal aim:

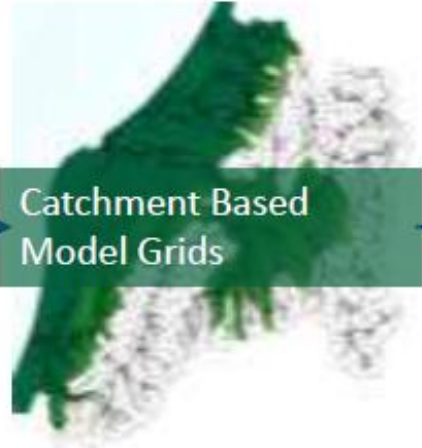
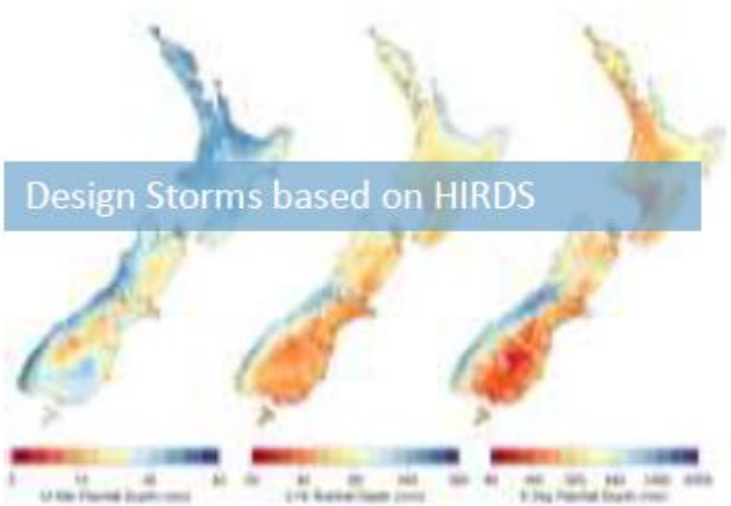
Nationally consistent flood inundation hazard and risk assessment for current conditions and future scenarios under climate change.

Key Deliverables

- A model framework and tools for delivering consistent national flood inundation hazard and risk assessments.
- National fluvial and pluvial flood inundation maps under present-day and future climate conditions.
- National guidelines for delivering flood inundation hazard and risk assessments.

National Flood Inundation Hazard and Risk Assessment - Flood Model Workflow

National Databases:
DEM
Roughness
River Network (DN3)
Infrastructure
(Stopbanks, bridges)



Building on Previous Research - Upcoming Funding Proposals

2019 -2024 Deep South Challenge (submitted in November 2019)

National Assessment of Critical Infrastructure Network Service Disruption from Future Coastal Flooding

Overall proposal aim:

New Zealand's first national scale assessment of the frequency and magnitude of direct and indirect infrastructure network service disruption from future coastal flooding.

Key Deliverables:

- New Zealand wide coastal flooding inundation maps for future higher sea-levels.
- Network component failures from future coastal flooding and direct and indirect service disruption across multiple networks.
- Geographic locations and populations affected by direct and indirect network service disruption.