MBIE Endeavour 5-year Research Programme: Reducing flood inundation hazard and risk

October 2020 – September 2025

Overall aim: A more Flood-Resilient Aotearoa New Zealand

Produce an updateable nationally-consistent flood inundation hazard and risk assessment for current conditions and future scenarios under climate change.

Create a forum between science, iwi, policy-makers and stake-holders to ensure desired outcomes

Why?

National screening tool:

- Identify where the flood hazard/risk are high – especially in rural areas where there may not currently be information.
- Identify where the flood hazard/risk may increase under climate change.
- Work with local and central government, iwi, stake-holders to determine how to use this information to increase resilience

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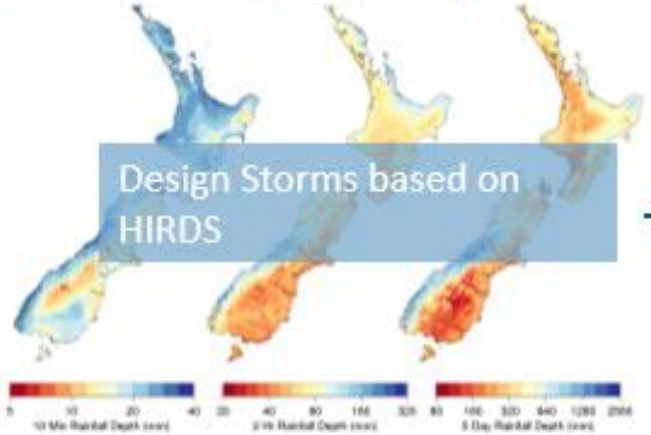
Mātauranga Māori theme – Wairewa Rūnanga Case Studies
RA1: Flood Mapping
CS1.1-2 Geofabric inputs for modelling
CS1.3-5 Historic flood data
CS1.5-9 Design storms
CS1.10-12 Flood model design
CS1.13-21 Regional and national flood mapping
RA2: Flood Risk to the built environment
CS2.1 Dynamic flood risk tool
CS2.2-3 Flood exposure and vulnerability assessments
CS2.4 National flood risk assessment
CS2.5 Uncertainty in built-environment risk
CS2.6 Future flood risk
CS2.7 Socio-economic costs and benefits of flood risk reduction
RA3: Social vulnerability to cascading events
CS3.1-2 Case study identification and establishment
CS3.3 Systems map of cascading impacts
CS3.4 Exposing cascades and the existence of thresholds
CS3.5 Useable and useful knowledge tools and practice that advance risk and vulnerability assessments
RA4: Reducing flood risk and adapting to change
CS4.1 Establishment of the boundary organisation
CS4.2 Science-practice roadshows
CS4.3 Testing the usability and usefulness of information/ project outputs
CS4.4 Designing and testing 'What if' scenarios
CS4.5 Identifying market signals and predicting responses
CS4.6 Developing guidance for local government
CS4.7 Maximising the project's national long-lasting impacts
Uncertainty theme – Quantifying and communicating uncertainty

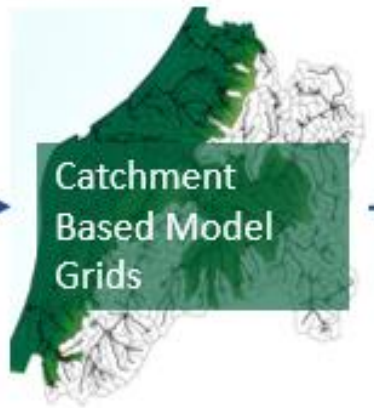
RA1 – National Flood Mapping:

Create a semi-automated system and methodology for nationally consistent flood maps for a range of design storm events, including climate change impacts, validated against a database of historical floods.

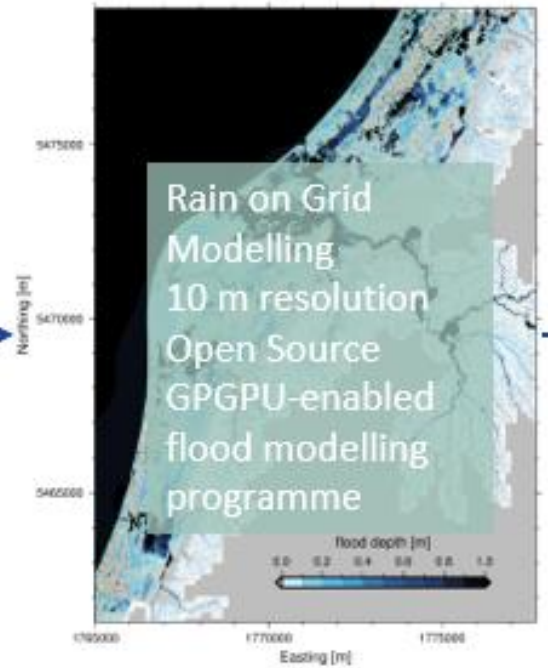
National Databases:
DEM
Roughness
River Network (DN3)
Infrastructure (Stopbanks, bridges)



Design Storms based on HIRDS



Catchment Based Model Grids



Rain on Grid Modelling
10 m resolution
Open Source
GPGPU-enabled
flood modelling
programme

Stitch together into national grid

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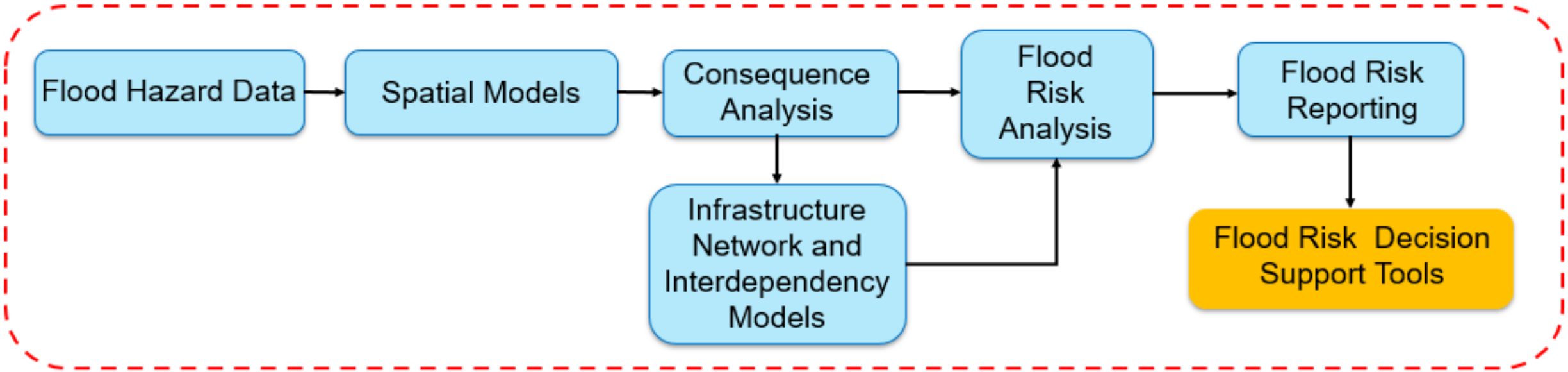
RA2 – Flood Risk to the Built-Environment



Develop a flexible modelling tool to assess built-environment flood risk in Aotearoa New Zealand.

- *Buildings*
- *Critical Lifelines Infrastructure*
- *Agriculture*
- *Future risk & uncertainty*

Deep South Challenge: National Assessment of Critical Infrastructure Network Service Disruption from Future Coastal Flooding

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

Achieved by developing:

1. New Zealand wide coastal flooding inundation maps for future higher sea-levels;
2. A model framework, data and tools that quantify network component failures from future coastal flooding and direct and indirect service disruption across multiple networks; and
3. New Zealand wide maps and datasets of geographic locations and populations affected by direct and indirect network service disruption caused by future coastal flooding.

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Outputs

1. National extreme sea-level and sea-level rise flood hazard maps

   (1 October 2020 - 30 June 2021)

2. Network component asset inventories

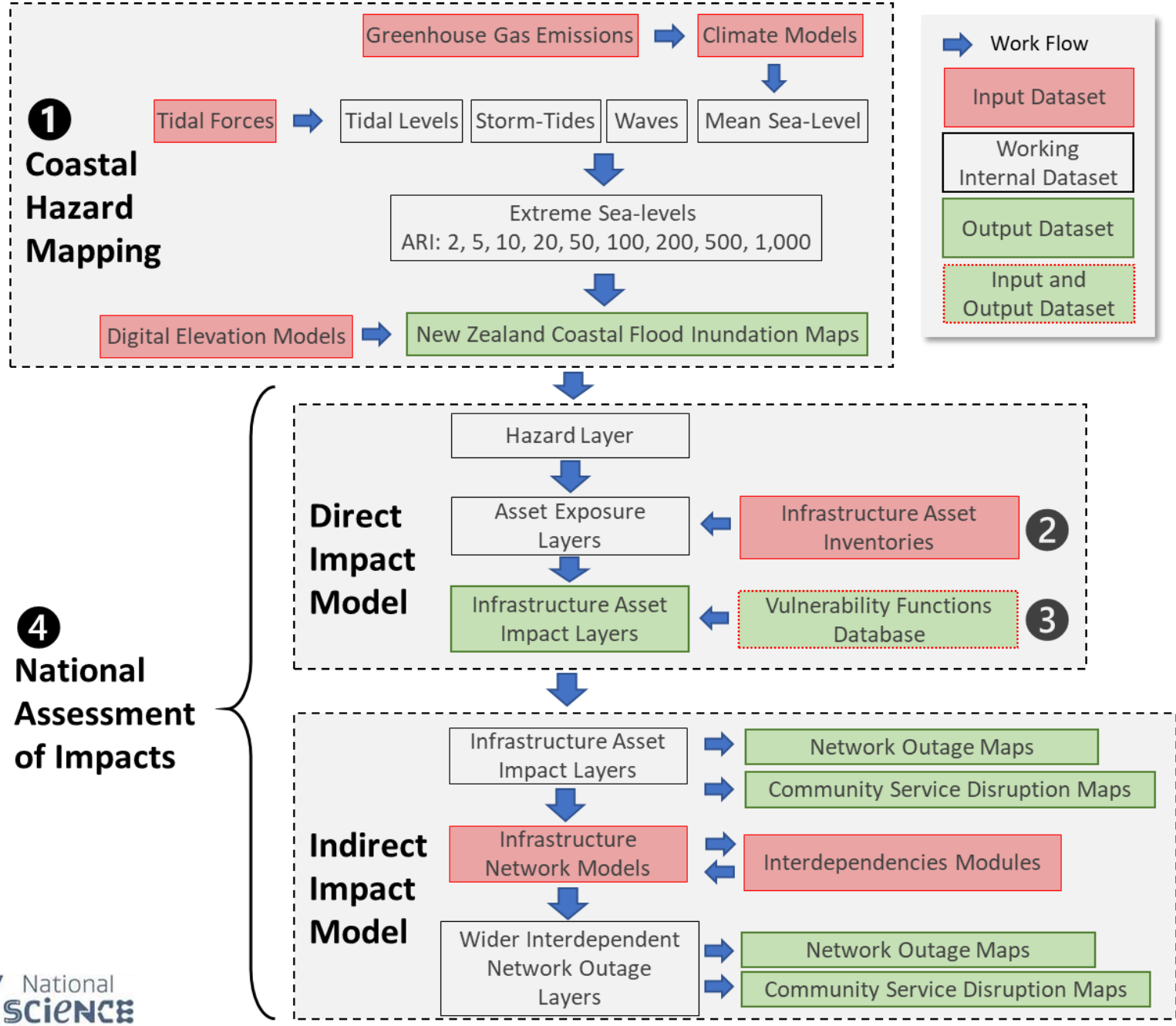
   (1 December 2020 - 1 March 2022)

3. Network component vulnerability function database

   (1 January 2021 - 1 March 2022)

4. Network impact model; network outage maps; community disruption maps

   (1 January 2021 - 1 March 2023)



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Key Contacts

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