INCORPORATING MĀTAURANGA MĀORI INTO FLOOD MODELLING

Project Group 29: Julia Ford & Iisa Salie   Department of Civil & Environmental Engineering (Group: Water)   Supervisor: Dr. Kilisimasi Latu

WAIROA, FLOODS & MODELS

Flooding models couple topographical parameters with rainfall forecasts to produce flood hazard estimations but disregard catchment-specific, qualitative information such as **mātauranga Māori perspectives** and **past community experiences.** Located within Hawke's Bay, Wairoa has a **unique river catchment** and has been hit hard by recent flooding events.

Climate change induced flooding is increasing in both frequency and severity, placing additional pressure on these flood models to protect communities. Existing māturanga Māori tools assess the health of waterways, but their application in flood forecasting is yet to be fully explored.

Having trouble getting much-needed Community Values and Perspectives to uplift your traditional flood model?

Come to Wairoa for a site visit and wānanga to unlock valuable local, indigenous and environmental knowledge to improve your models!

Site Visit and Wānanga include invaluable insights into:
1. **Significant past flooding events**
2. **Indigenous flood mitigation techniques**
3. **Culturally significant sites**
4. **Council-Community relations and flood resilience plans**

RESULTS IN WAIROA

1. Initial Flood Breach

- **Initial breach** of flood waters at this location.
- Planned infrastructure should protect susceptible locations along the river, especially near this area.

2. Hairpin Bend

- Suggested location for **floodway.**
- Heavily opposed by iwi due to possibly inundation of ancestral Māori land including various Marae and urupā.

3. Coastal Slash

- Significant **woody debris** from forestry activities in the upper catchment.
- Transported downstream in flooding events, causing blockages in narrow river sections.

4. River Mouth

- Poor management and inaccuracies in weather forecasting leads to delayed excavation warning.
- Bottle-necked **river mouth** outlet worsens flooding conditions.

5. Railway Bridge

- **Slash blockages** around bridge piers lead to damming of the river.
- **Scour** accelerates infrastructural degradation and thus these blockages.

6. Wairoa-Waiau Confluence

- **Tidal currents** exacerbate river levels; incoming waves oppose discharging flow downstream.
- Waiau tributary river requires monitoring to **protect vulnerable urupā and marae** on the erodible banks.

Surface Water Depths

- 0.1m
- 1.0m
- 2.0m
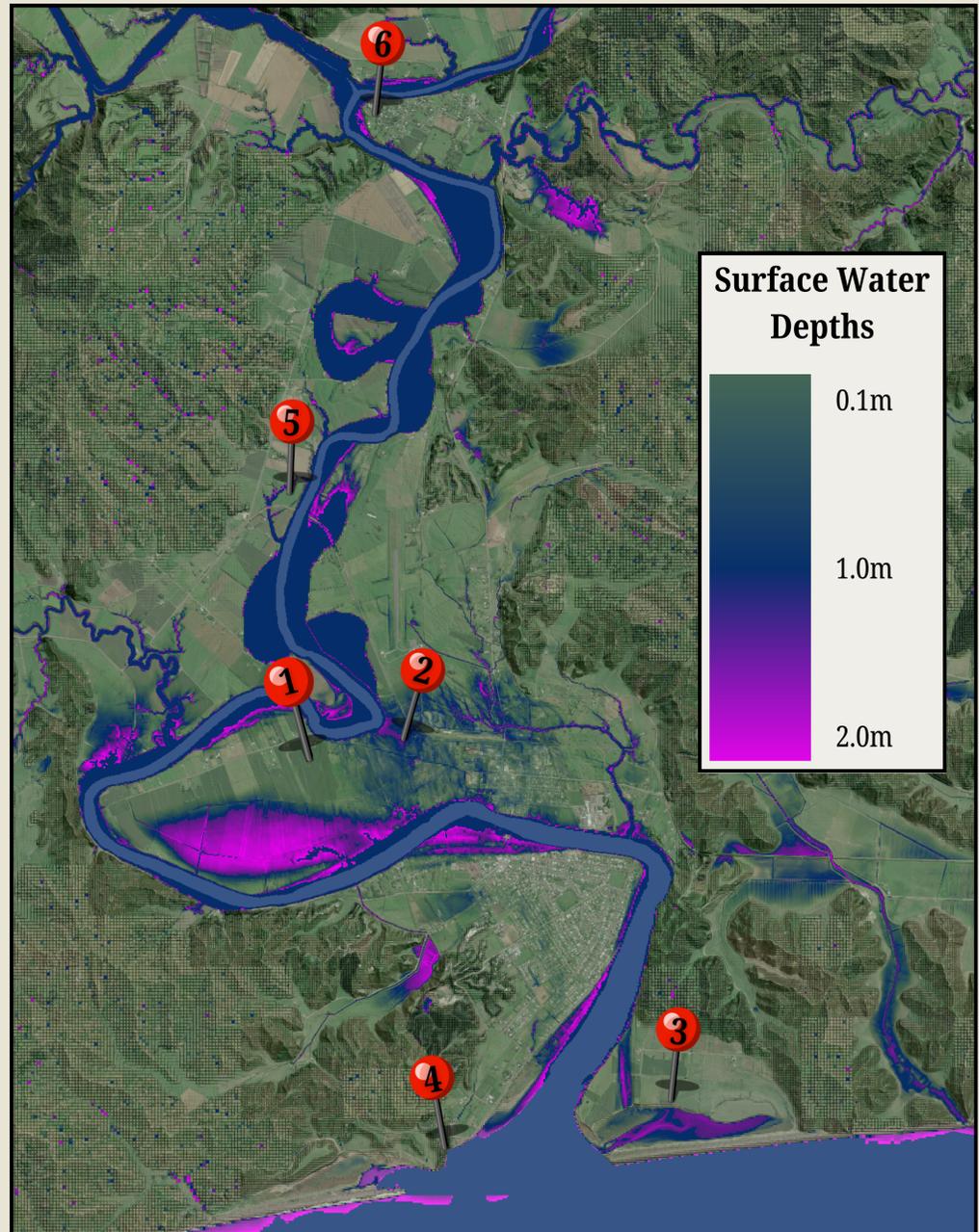
THE INITIAL FLOOD HAZARD MAP

This topographical flood model depicts regions of significant flood hazard within Wairoa but is unable to capture the vast range of variables in this complex catchment and is therefore quite rudimentary. Regions of high interest have been identified, but to truly identify the largest contributors to flooding damages more thorough investigation and consultation with the people of Wairoa is required.

WHAT SCENARIOS TO TEST NEXT?

1. **Locations of all culturally significant sites.**
2. **Soil stability along the riverbanks.**
3. **Slash concentrations near narrow river sections and bridges.**
4. **The impact of pre-RMA stop banks on available floodplains.**
5. **The impact of extended stop banking.**
6. **The efficacy and risks associated with the proposed flood channel.**
7. **Tidal impacts on the direction of flow within the river.**
8. **The impact of the river mouth location.**
9. **The impact of the river mouth opening size.**
10. **Sediment build-up and transportation.**

KEY TAKEAWAYS

Improved flood modelling should utilise the mātauranga of the region and catchment specific scenarios. Existing cultural monitoring data of rivers, cultural mapping, community consultation and site visits provide accurate assessments of flooding impacts in rural communities. Combined frameworks may also strengthen community-council collaboration and greatly improve flood resilience across Aotearoa.