

# REALISTIC DISASTER SCENARIOS: SEVERE TROPICAL CYCLONE SEQLD



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**WHAT IF A CATEGORY 4 TROPICAL CYCLONE IMPACTED SOUTH EAST QUEENSLAND? WHAT WOULD THE IMPACTS BE? COULD OUR EMERGENCY SERVICES COPE? STRONG CYCLONES HAVE COME CLOSE TO THE DENSELY POPULATED SOUTH EAST OF QUEENSLAND, BUT IMPACTS HAVE BEEN LIMITED. THIS WILL NOT ALWAYS BE THE CASE. THIS PROJECT EXPLORES THE IMPACTS OF A SEVERE TROPICAL CYCLONE ON THE REGION AND ASKS, CAN THESE IMPACTS BE FORECAST?**

## PROJECT SUMMARY

- ▶ A variant on Severe Tropical Cyclone (TC) Dinah, which caused damage to parts of SE Qld in January 1967, has been simulated to estimate its potential (wind) impacts on today's society.
- ▶ Maximum wind speeds of 250 km/h were simulated within the storm (similar to Dinah), with a maximum gust of 200 km/h estimated on land. More than 300,000 people would experience category 2 winds (>125 km/h) with more than 50,000 experiencing category 3 (>165 km/h) gusts.
- ▶ Approximately 16,000 residential buildings were estimated to sustain significant levels of damage, with more than 5,000 damaged beyond repair.
- ▶ As a result of this damage more than 60,000 people would need short-term accommodation, with 10,000 - 20,000 needing medium- to long-term lodging during the rebuild period.

## TROPICAL CYCLONE DINAH (1967)

Severe TC Dinah impacted the Queensland coastline in January 1967. Although it remained well offshore, its category 4 winds and storm tide caused damage to trees, crops, buildings and infrastructure from Rockhampton to Grafton. Historians believe Dinah generated SE Qld's largest waves for the last century.

## SCENARIO: SEVERE TC SEQLD

A variation on the historic track of TC Dinah has been simulated for this scenario. The variation has the storm move 20-50 km closer to shore, bringing significantly stronger wind gusts to areas between Hervey Bay and the Sunshine Coast (Fig. 1). The storm's intensity reached category 4 north east of Hervey Bay and maintains while tracking south, but offshore, along the coastline. While this track does not bring the strongest winds on-land, it still generates gusts nearing design level.

## MOVING FORWARD

### Scenario modelling

The current model only considers wind damage. The compounding impacts of rainfall and storm tide inundation will be added over the next two years. Additionally, the range of impacts assessed will be expanded to include lifeline infrastructure (e.g. power, transport) and (if possible) fatalities.

### Damage forecasting

Scenario models have the ability to forecast damage and impacts in real time. To do this though, models must be run as a probabilistic ensemble and all uncertainties must be carefully considered (e.g. Fig. 2). Use of this model as a damage forecasting tool will be explored over the coming years.

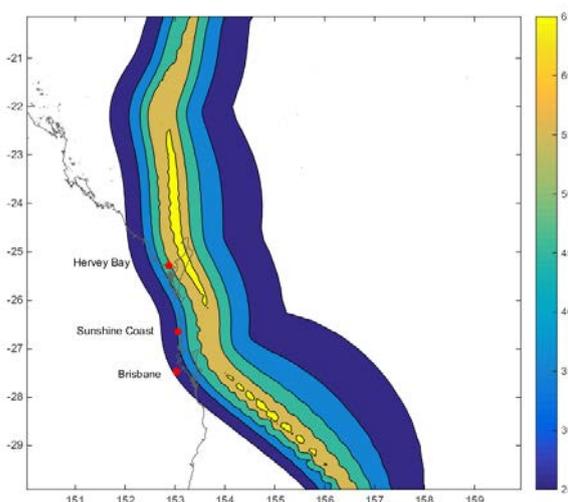


Figure 1. Maximum wind gusts generated by TC SEQLD

### Model

- ▶ Wind fields are generated using an analytical 3D model of TC winds and their interaction with the surface (land or sea).
- ▶ Damage to buildings is estimated with vulnerability curves that relate maximum wind gusts to expected damage (including uncertainty).
- ▶ Fragility models are used to group damaged buildings into damage states and estimate population displacement.
- ▶ Exposure information is sourced from Geoscience Australia's NEXUS database.

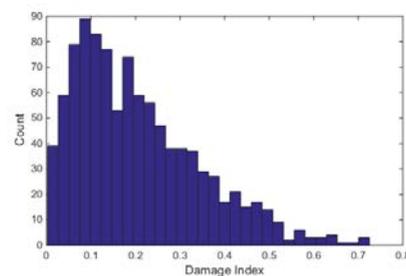


Figure 2. Example of uncertainty in damage index for residential buildings across 1000 realizations at one location.

## THE PROJECT

This scenario is part of the wider, *Using realistic disaster scenarios to understand natural hazard impacts and emergency management requirement* project. This work is a collaboration between researchers at Risk Frontiers (Macquarie University) and The University of Queensland, with end-users from emergency services agencies around the country.

