Natural Hazards Research Australia

Modelling impacts of natural hazards on interconnected infrastructure networks:

Southeast Qld thunderstorms

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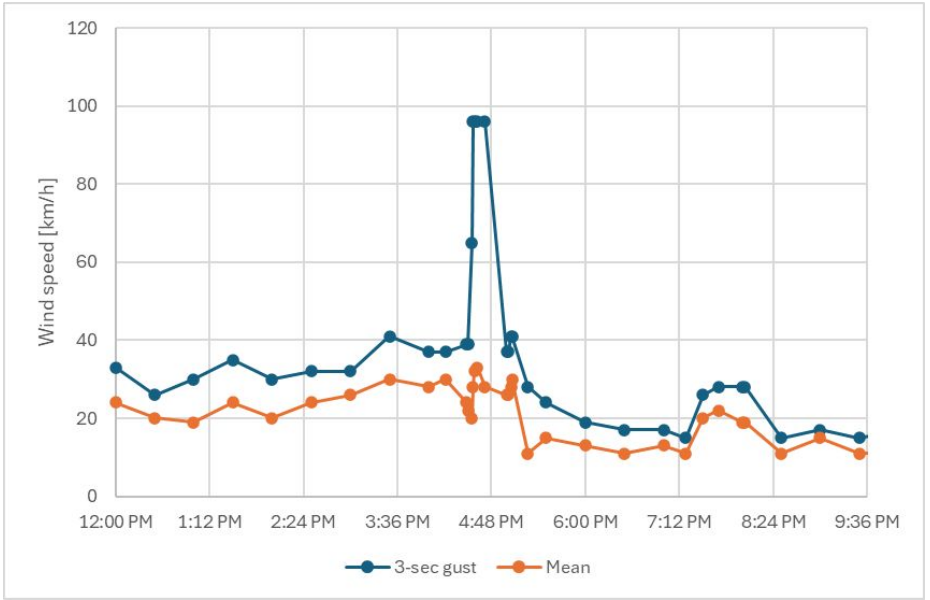
RISK FRONTIERS

UTS

CYCLONE TESTING STATION
James Cook University Australia

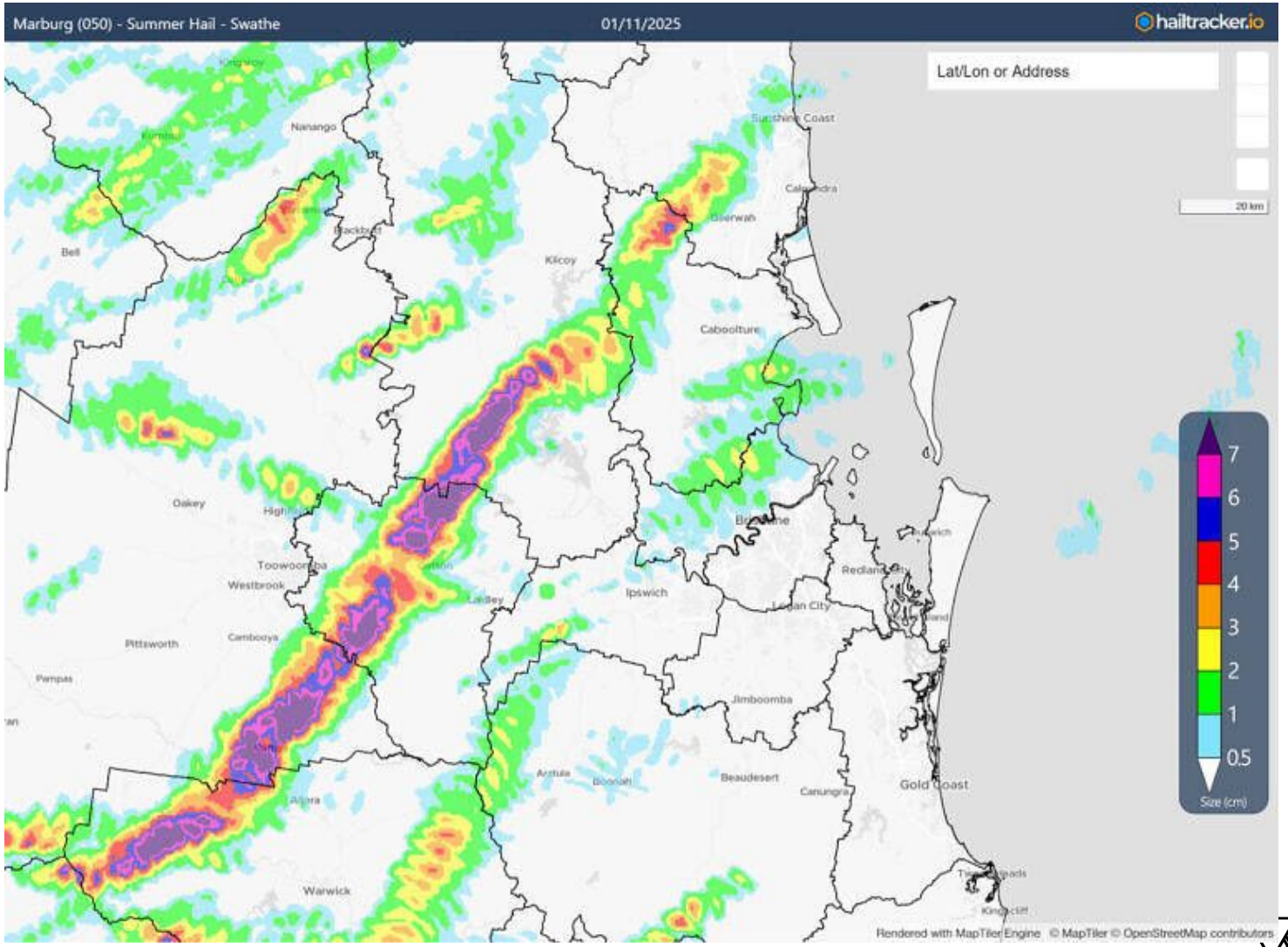
SE Qld severe storms – 26 October

SE Qld – 26 October 2025. Strong winds and hail led to 70,000 homes and businesses losing power. Some structural damage.



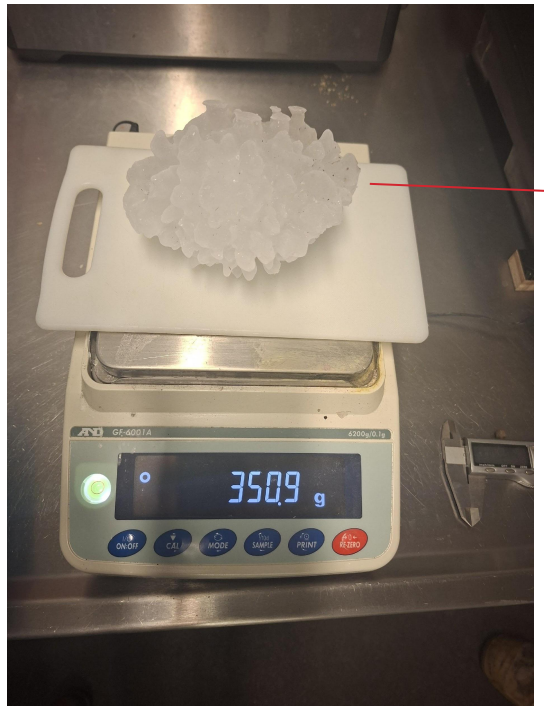
SE Qld severe storms – 1 November

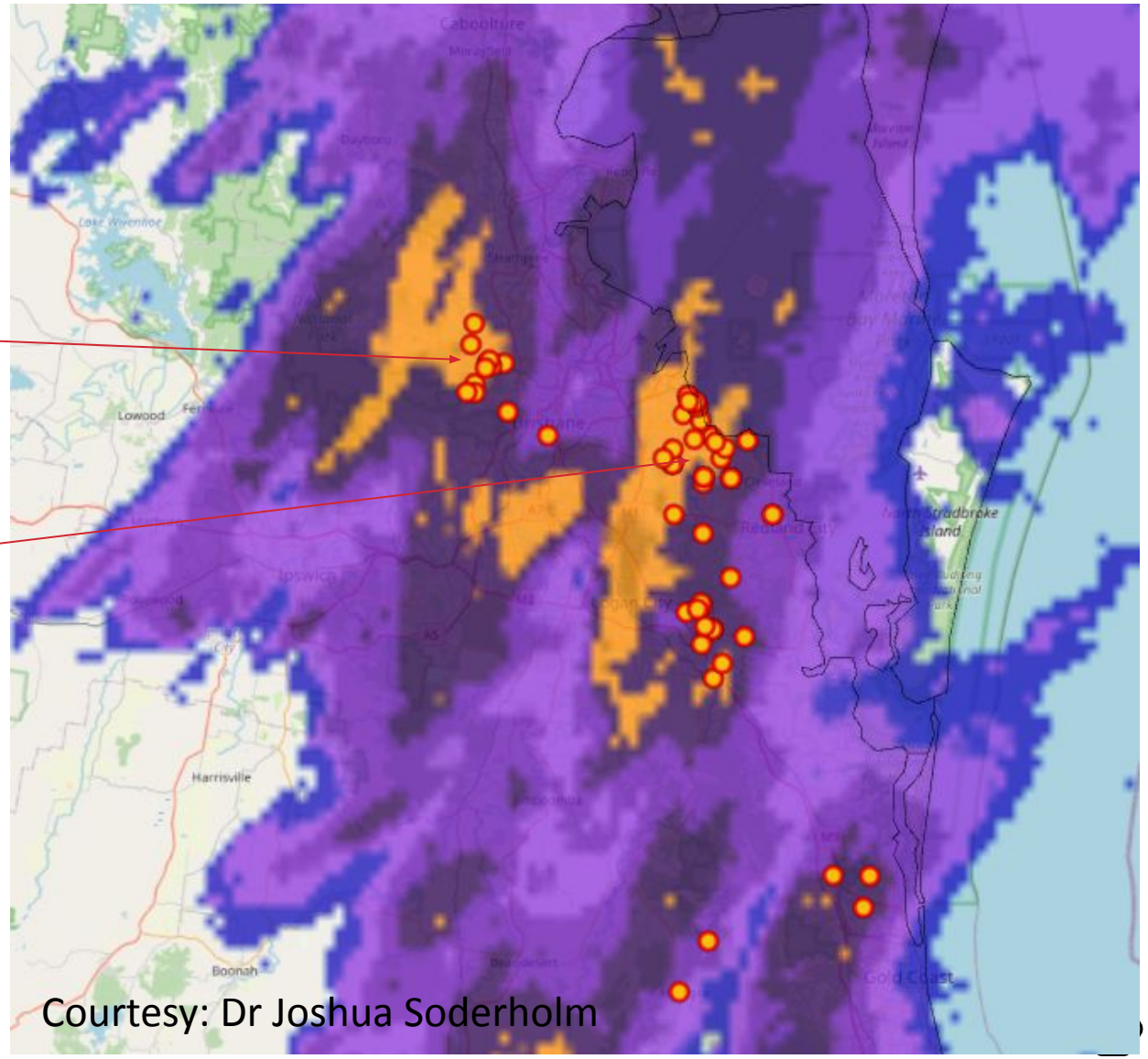
Source: ABC News



SE Qld – 1 November 2025. 7-9 cm led to power outages, building damage and injury.

SE Qld severe storms – 24 November





Courtesy: Dr Joshua Soderholm

SE Qld – 24 November 2025. Strong winds and hail exceeding 13 cm led to more than 150,000 homes and businesses losing power.

The project

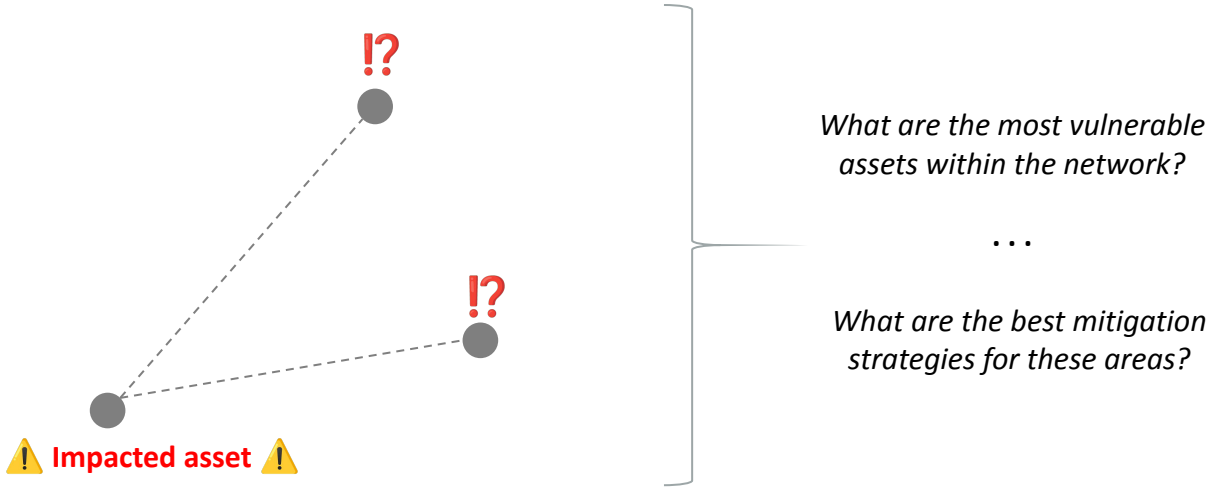
- The Aim of this research project is to:

1. Understand the extent of direct physical impacts of natural hazards on (public) infrastructure assets

2. Develop estimation methods to model the cascading impacts of natural hazards on interconnected infrastructure

3. Provide a framework to better understand the value of infrastructure resilience investments.

(Shutterstock, 2023)



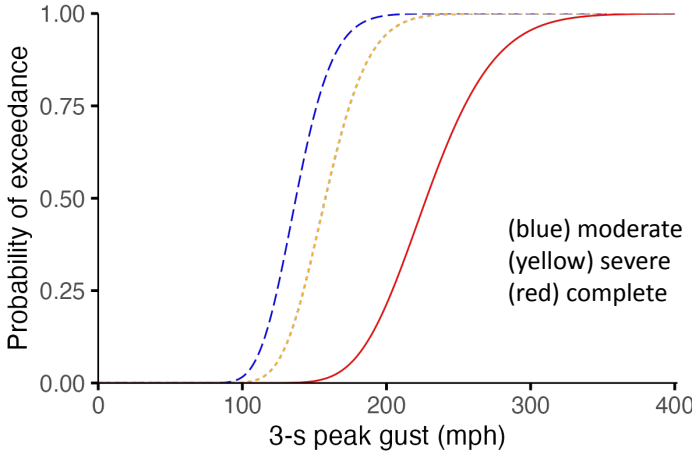
The project

- We have 3 streams of research
  1. Network mapping
  2. Damage estimation
  3. Utilisation case studies

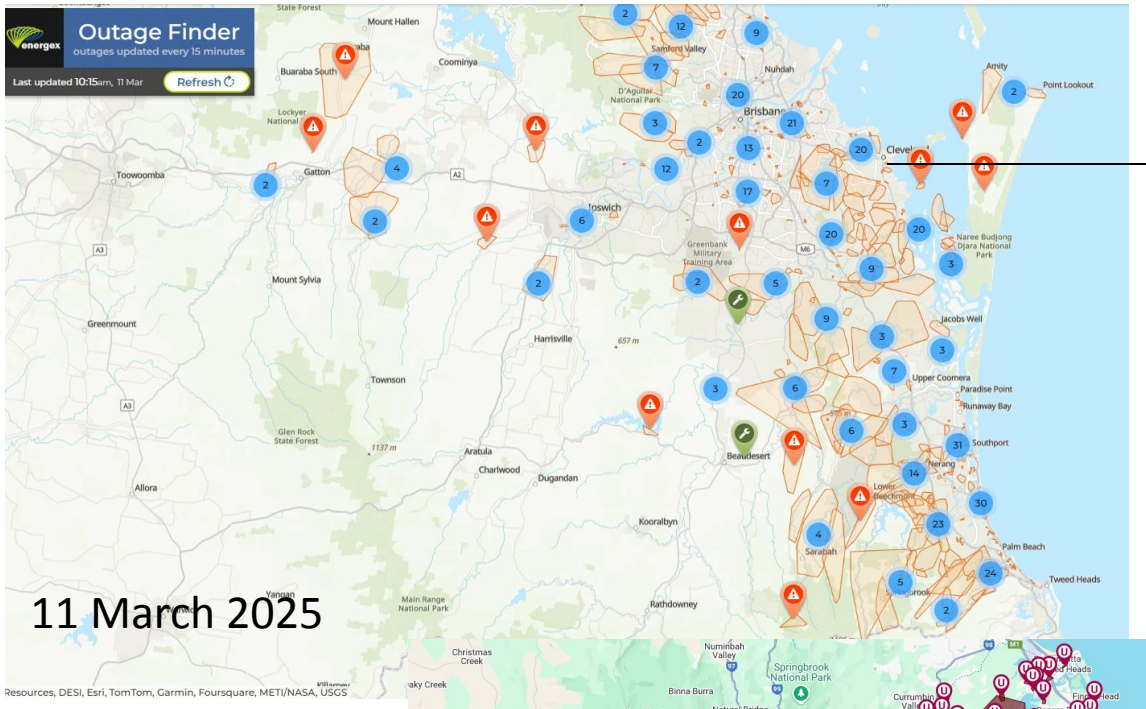
Where do we use event information?

- Hazards & networks
  - Flood, wind/storm, fire
  - Power (transmission & distribution), potable water, roads
- Study region (our sandbox)
  - Develop models/frameworks using SE Queensland networks and data
  - Frameworks (and where possible, models) will be region agnostic

Learning from events



Fragility curve for electrical substations (Watson & Etemadi, 2020)



11 March 2025

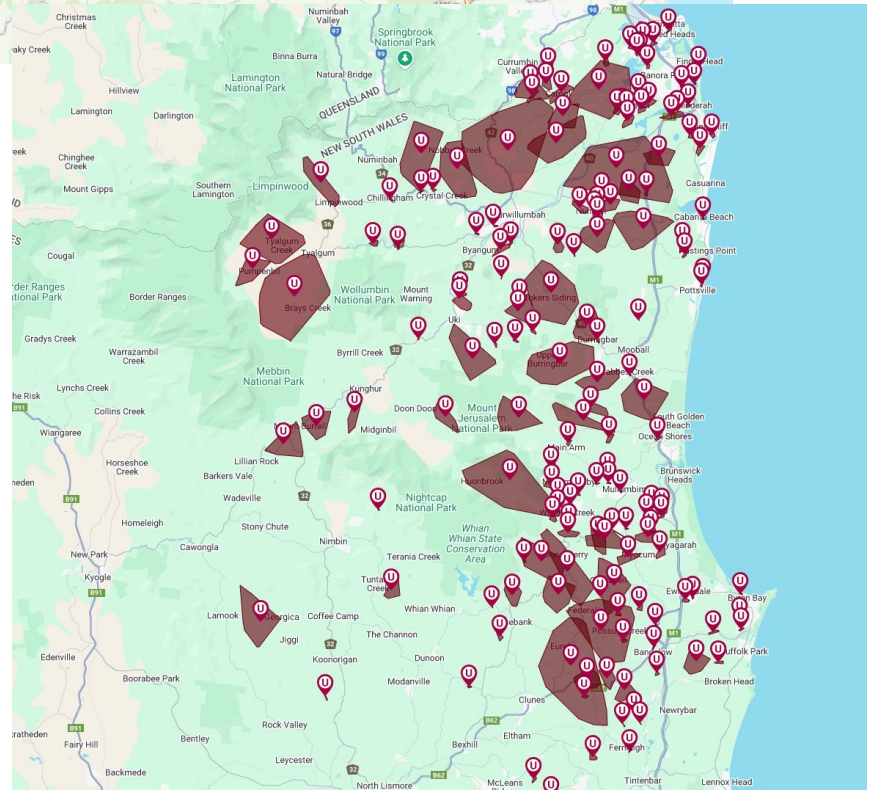
MANLY WEST

Type of Work
- Unplanned

Description
- Water booster is offline ***due to power outage***, customers may experience low pressure or no water.

Estimated restoration time
- 08/03/2025, 07:00 pm

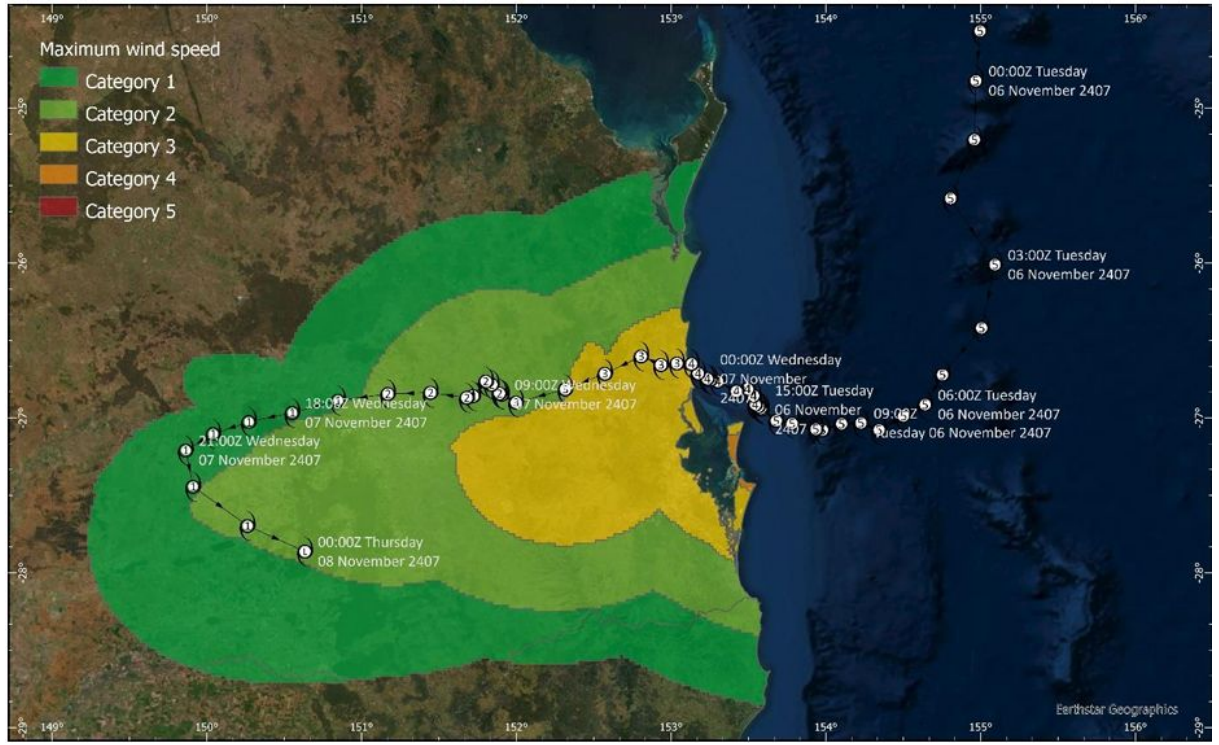
Impacted properties
- 200



March 2025, Tropical Cyclone Alfred

>300,000 people without power due to downed **distribution** lines through Qld and NSW for an event well below design levels

Utilisation case studies



Several Wind Hazard Assessment (SEQ) – Scenario 3

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