



bushfire&natural
HAZARDSCRC

SCENARIO PROJECT

Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements

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An Australian Government Initiative



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

WHY DISASTER SCENARIOS?

Risk = f(Hazard, Exposure, Vulnerability)

Scenarios visualise the combination of these risk attributes

Enable *what-if* questions to be explored?

Enable a fuller understanding of how risks may impact your business.

HOW CAN THEY BE USED?

- Enhance planning:
 - Basing planning assumptions upon realistic consequences of a disaster.
 - Moving beyond planning based upon administrative boundaries.
 - Improving our understanding of the indirect consequences of a disaster -- economic losses, fatalities and recovery priorities.
- Assist to identify gaps in our understanding
- Enhance resource allocation modelling
- Provide realistic tools for engaging with communities

ULTIMATE BENEFITS IF UTILISED

- Improved understanding of risks
- Establishment of mitigation priorities
- Better planning to manage consequences and resource allocation
- Overcome cross boundary issues
- Enhanced engagement with community and political leaders

WHAT IF?

- one of Australia's major cities were hit by an **earthquake** similar to the Newcastle event?
- six catchments in northern NSW **flood** contemporaneously?
- the Great **Flood** of 1954 occurred today? What would be the economic cost now that there are six times the number of exposed dwellings?
- a **tropical cyclone** hits Brisbane? What could we expect?
- we experience twenty **bushfires** in a week? It has happened in the past. What would it look like? Are we prepared?



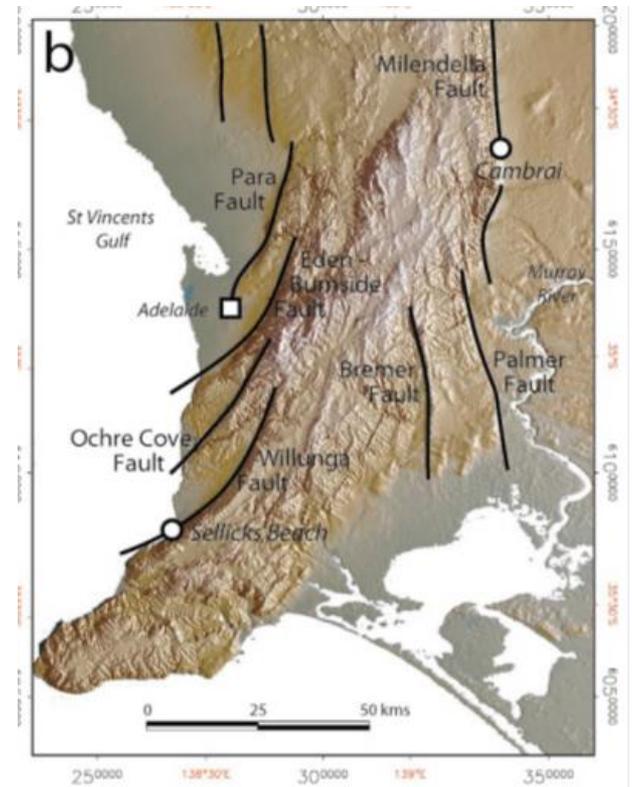
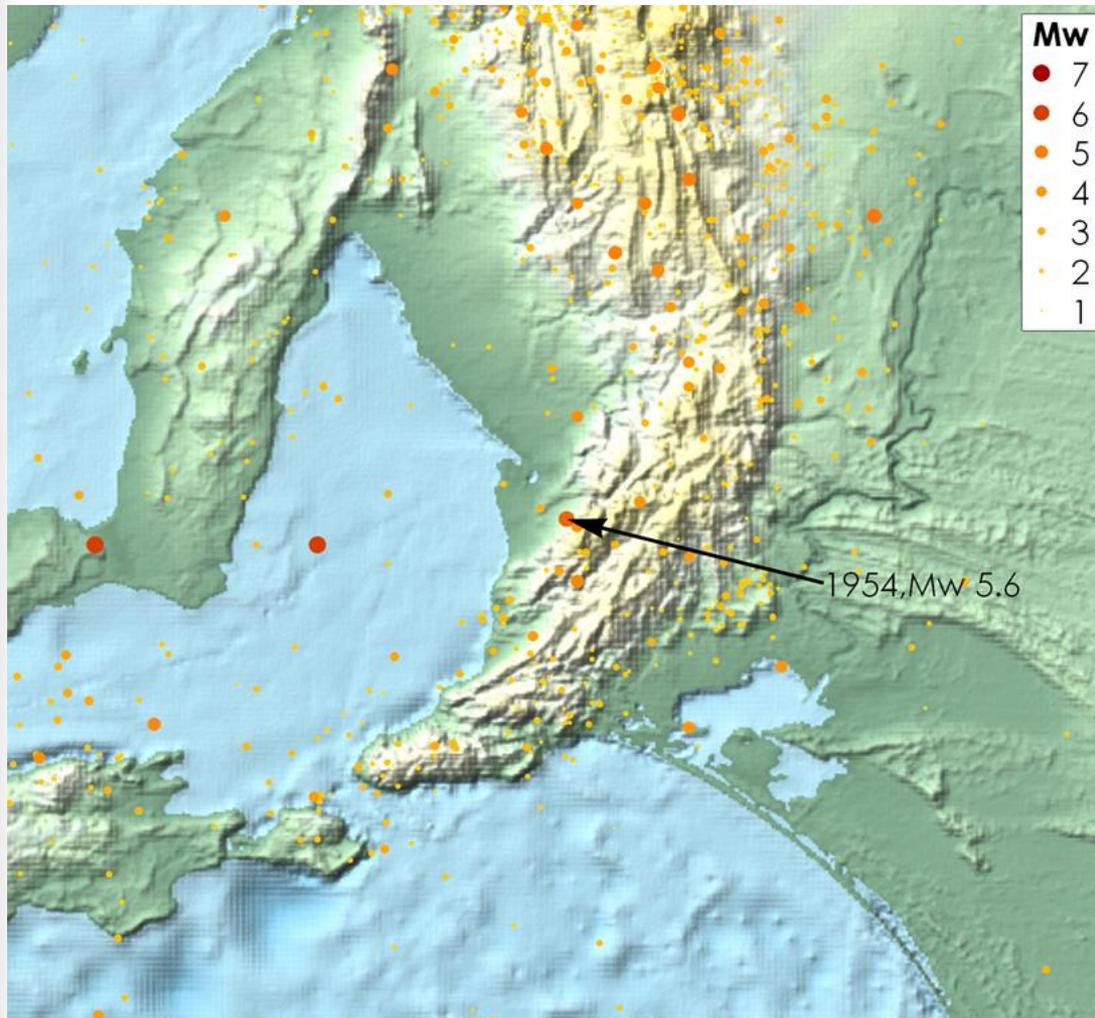
PROJECT AIMS

- To deliver a suite of scenario simulations that allow the question of “what if?” to be answered.
- Hazards:
 - Earthquake
 - Tropical Cyclone
 - Bushfire
 - Flood
 - Tsunami? (heatwave?, thunderstorm?)
- Impacts:
 - Building damage (residential, emergency, commercial)
 - Infrastructure damage
 - Resultant death/injury and population displacement

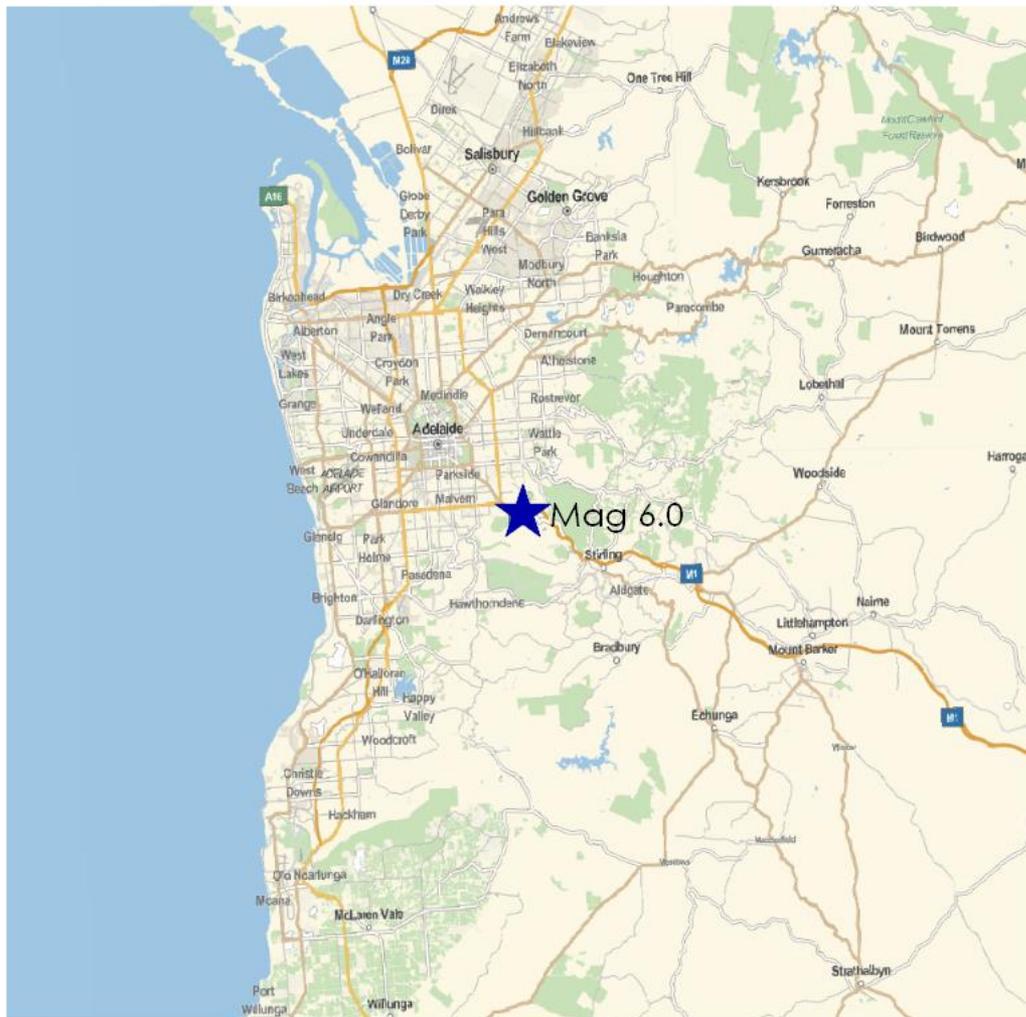
PROGRESS

- Review of TC and earthquake literature (vulnerability)
- Initial development of analysis/impact assessment framework
- Year 1 scenarios:
 - Adelaide earthquake (complete)
 - South-east Queensland tropical cyclone (progressing)
- Moving forward
 - What scenarios are of interest for year 2?
 - Are we simulating the impacts of most use?

SCENARIO SELECTION: ADELAIDE EQ



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Para fault

ARI

Mw

Largest earthquakes,
ARI > 10,000

up to 7.0-7.5

ARI ≈ 1000

6

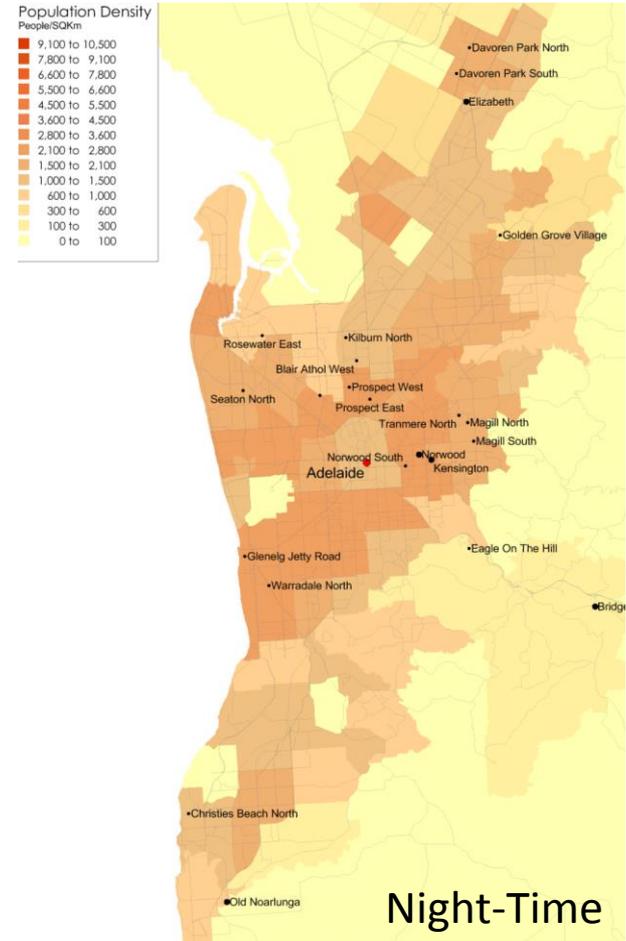
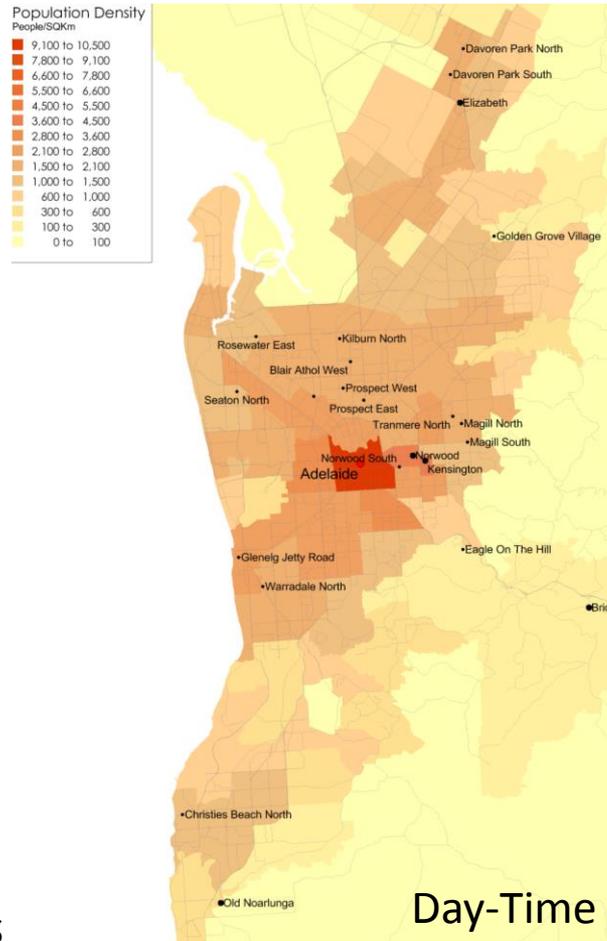
Building code,
ARI ≈ 500

5.5

Smaller earthquakes also occur in a distributed manner throughout the region, not only on the identified active faults

POPULATION DISTRIBUTION

Where is everyone?



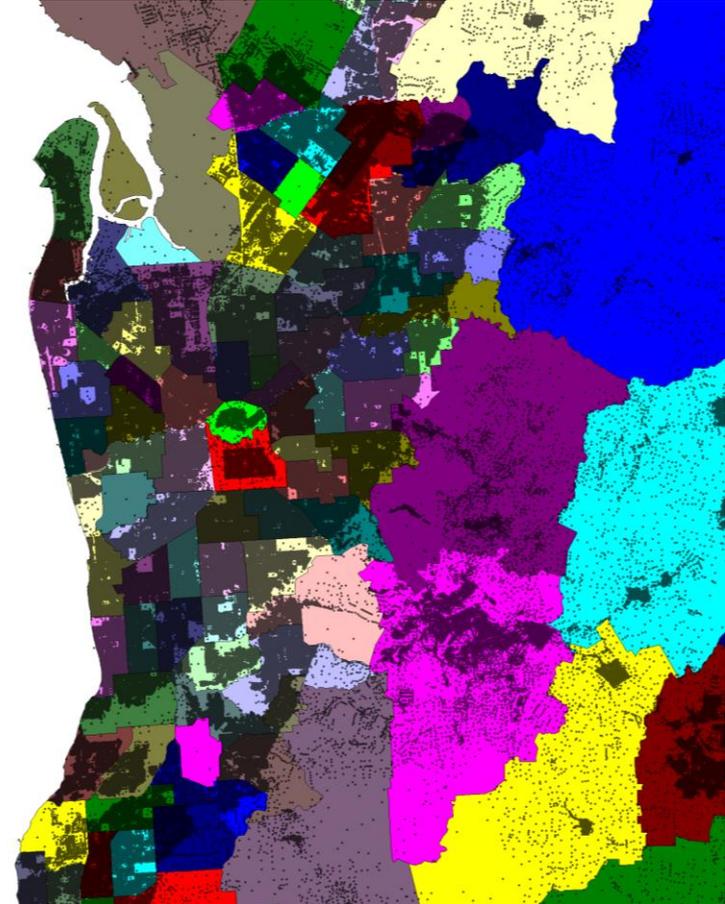
Sources:

- 2011 Census
- Department of Higher Education

BUILDINGS' INVENTORY

In what kind of building are people in?

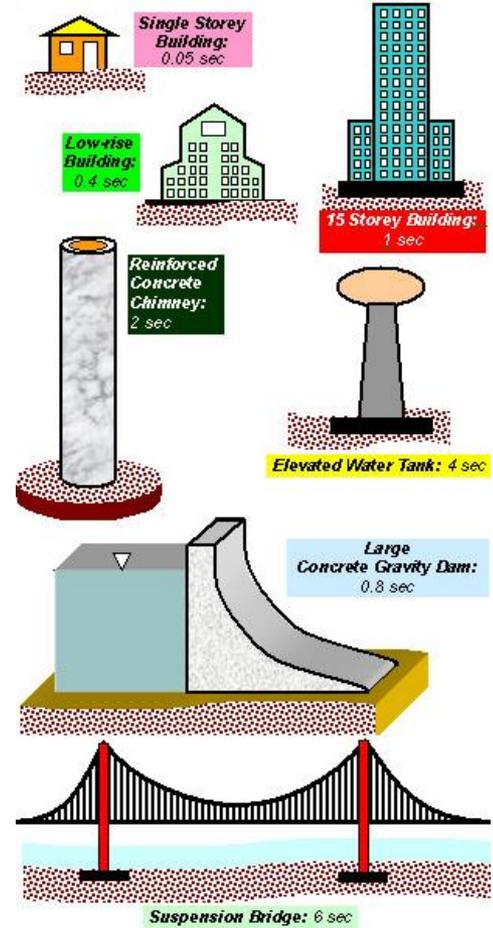
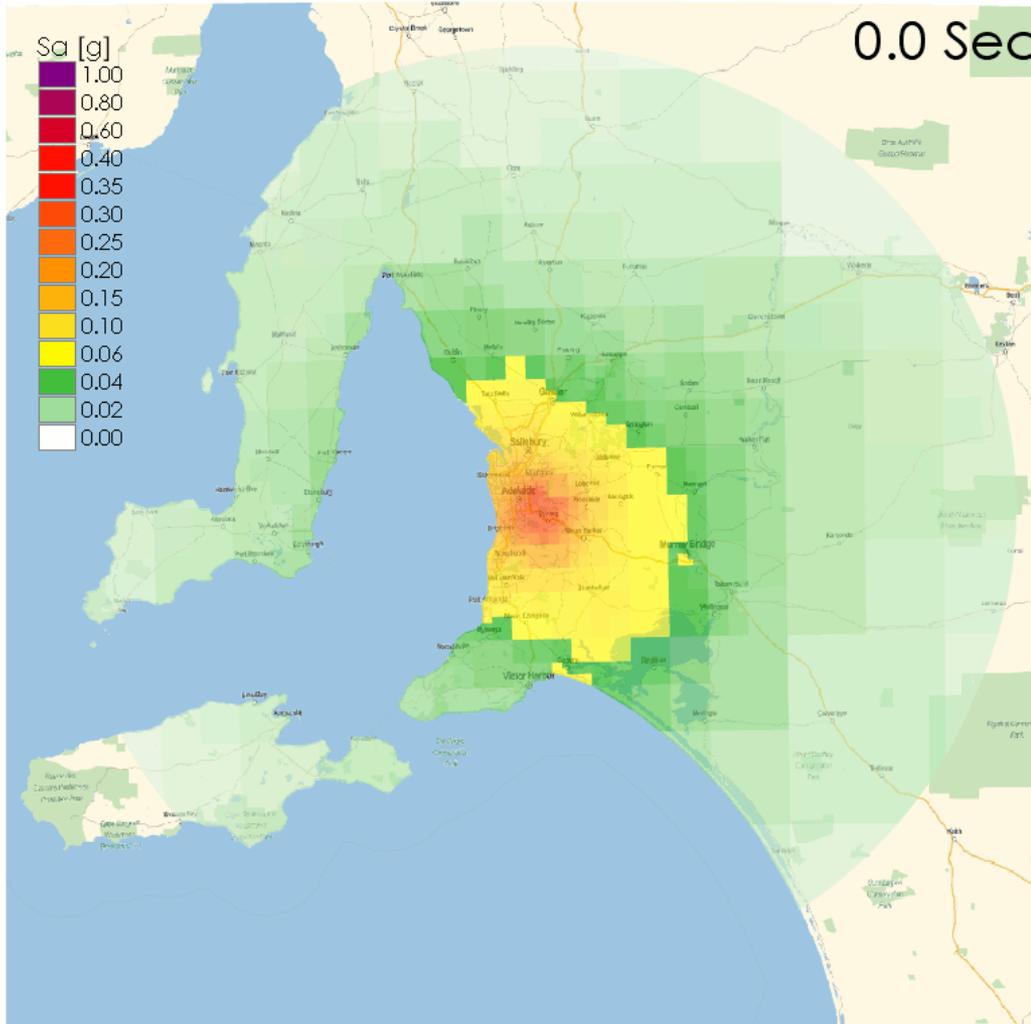
Different building construction types behave differently to seismic shaking



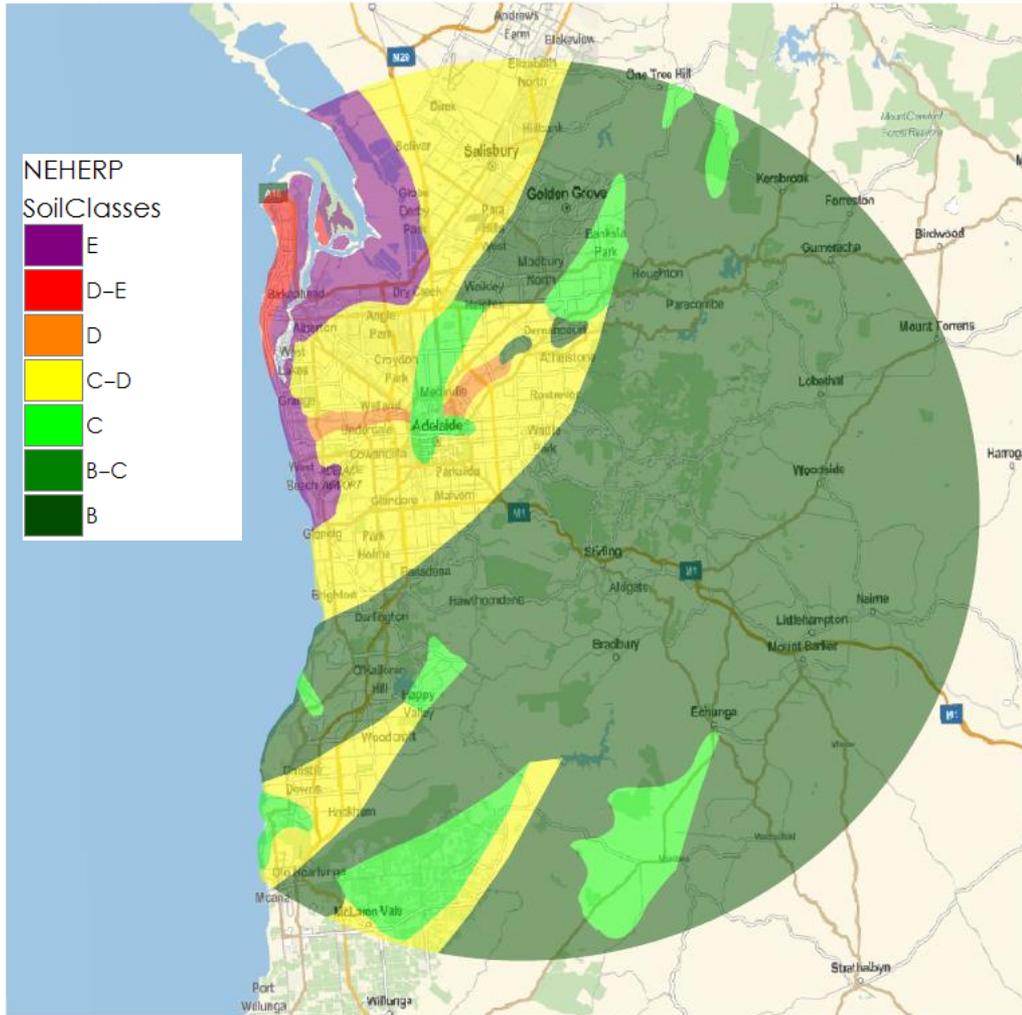
Sources:

- G-NAF (Geocoded National Address File) **Lat-Long**
- NEXIS (National Exposure Information System) **SA2**

RESULTS: GROUND SHAKING



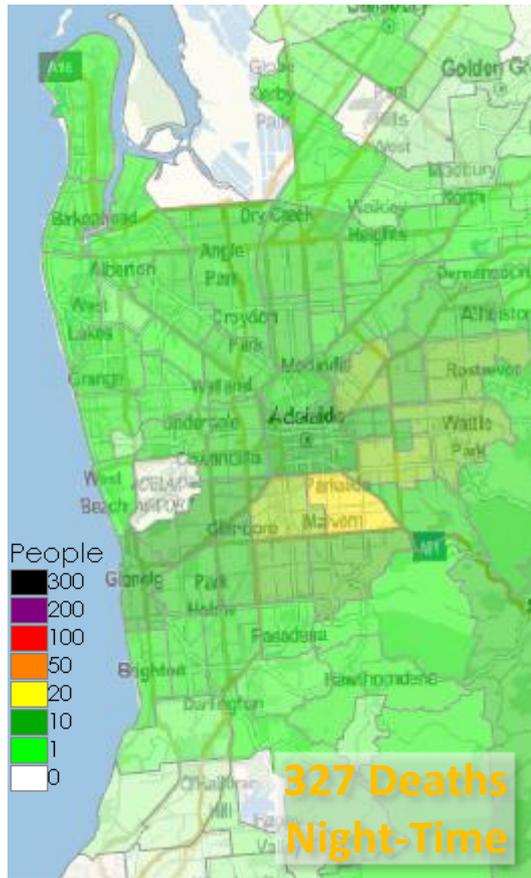
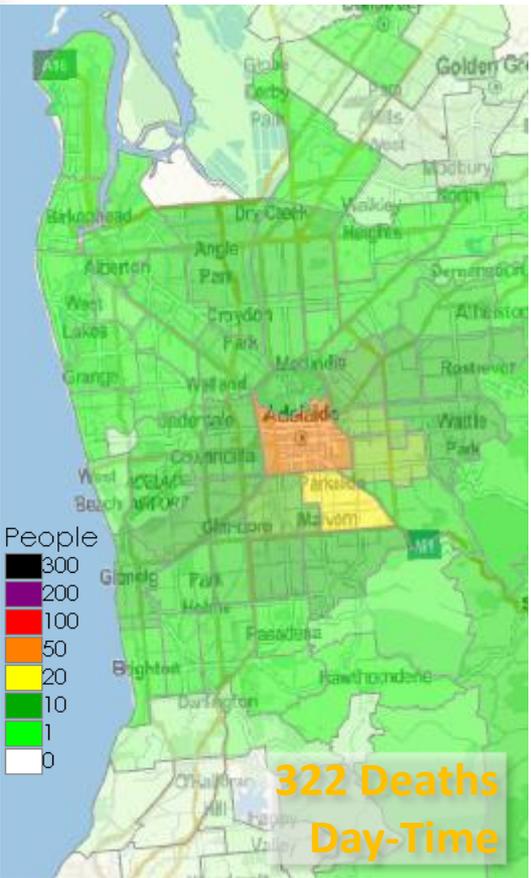
RESULTS: LIQUEFACTION



Features Affected by Liquefaction

- Buildings
- Roads
- Rail
- Bridges
- Airports
- Pipelines

RESULTS: CASUALTIES



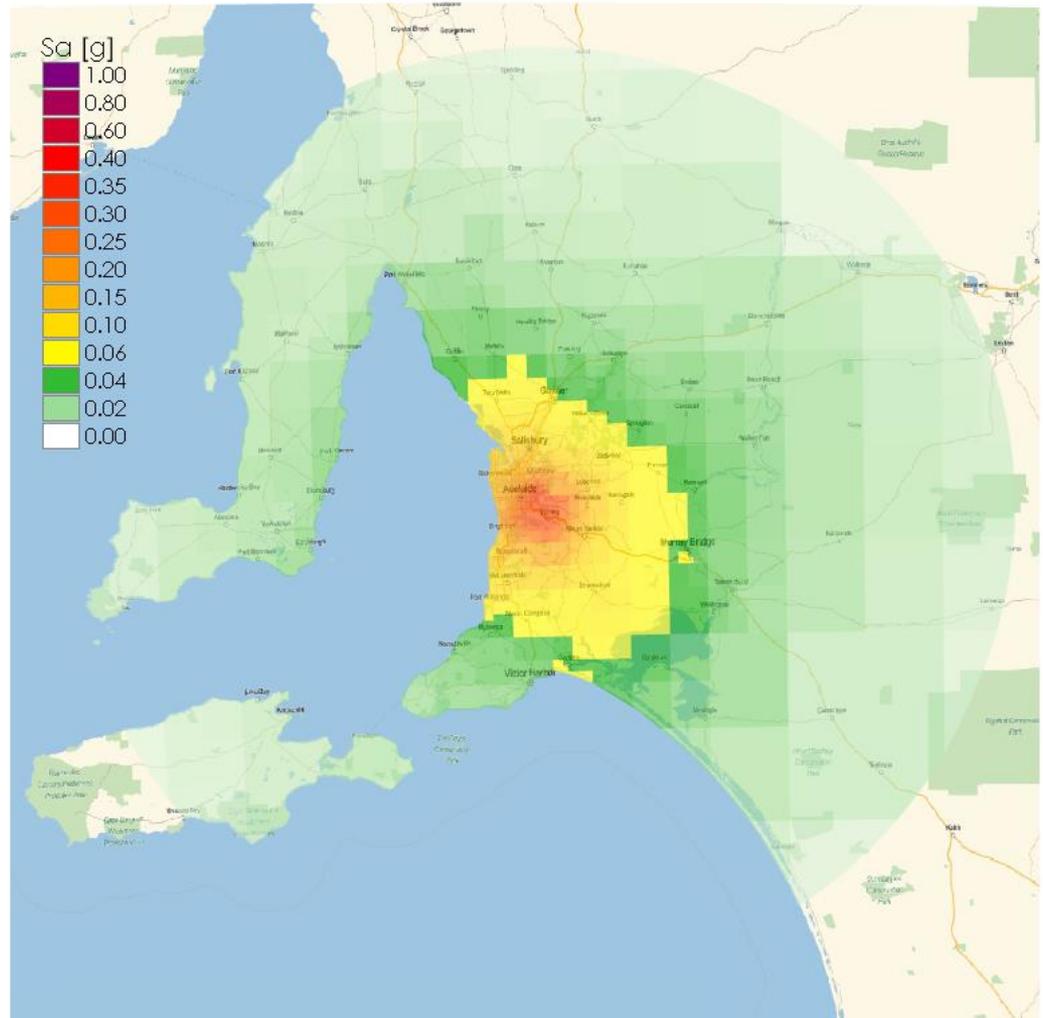
Severity	Day	Night
1	4988	5324
2	1532	1650
3	170	167
4	322	327

- **Severity 1:** Injuries requiring basic medical aid that could be administered by paramedics.
- **Severity 2:** Injuries requiring a greater medical care and medical technology or surgery, but not expected to be life threatening.
- **Severity 3:** Injuries that pose an immediate life threatening condition if not treated expeditiously.
- **Severity 4:** killed or mortally injured.

RESULTS: AFFECTED FACILITIES

FEATURES EXPERIENCING PGA
>0.05

	M 6.0
Health	Addresses 598934
	Hospitals 979
	Ambulance Stations 265
Safety	Police Stations 262
	Fire Stations 360
	SES Facilities 54
Education	Pre-School 1642
	Kindergarten
	Schools
	TAFE
Power	Universities
	Sub Stations 313



SIMILAR PAST EVENTS



Parapets

the scene of the greatest damage to any building in Newcastle. 9 deaths occurred there and many others were injured.



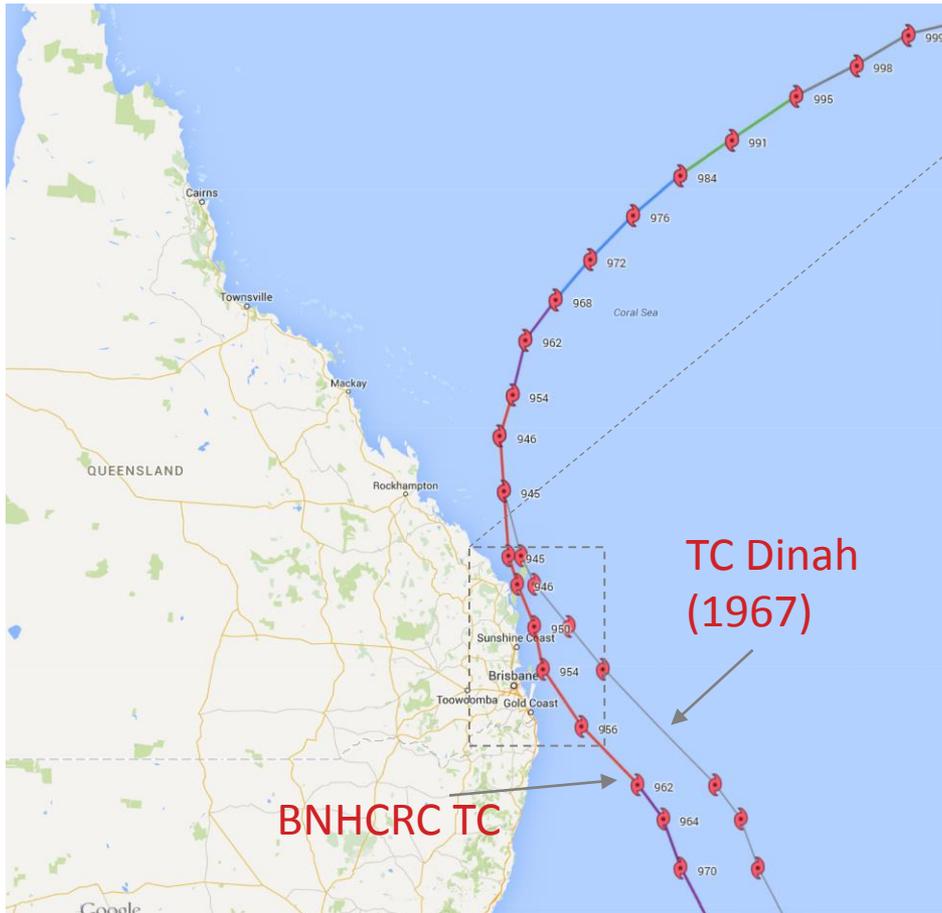
Localised liquefaction of soft soil near rivers



Local and foreign events

- Casualties
- Building damage
- Services disruption (Hospitals, Schools...)
- Utilities disruption (Power, Sewage, Fresh Water...)
- Transport disruption (Airports, Roads, Rail...)

SCENARIO SELECTION: SE QLD CYCLONE



QUESTIONS



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