A M_W 6.0 ADELAIDE EARTHQUAKE SCENARIO

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WHAT-IF A MAGNITUDE 6.0 EARTHQUAKE HAPPENED NEAR ADELAIDE SA? IN THIS PROJECT WE HAVE DEVELOPED SUCH SCENARIO BY USING RISK FRONTIERS EARTHQUAKE LOSS MODEL QUAKEAUS TO CALCULATE LOSSES TO PROPERTY, INFRASTRUCTURE AND CASUALTIES.

HISTORICAL EXPERIENCE

- On 1 March 1954 Adelaide experienced a M 5.4 earthquake. For 35 years this was the most destructive earthquake to have hit Australia until the Newcastle event 35 years later in 1989.
- Even though the Newcastle and Adelaide events had similar magnitudes, the Adelaide event occurred further from densely built areas than Newcastle event, whose epicenter was directly underneath the city's CBD.

Earthquake damage in Adelaide 1954 (source: Government of South Australia. Department of State Development).

BNHCRC PROJECT

- Year one scenario for this project includes an earthquake of magnitude 6.0 occurring on the Para fault, underneath Adelaide's CBD.
- This scenario consists of a variety of maps and technical information describing the extent and location of damage if such an event were to occur.

METHODOLOGY

In order to develop a scenario it is necessary to use a suite of models describing the processes that occur during a disaster:

- **Hazard**: in the case of earthquake, it describes how seismic waves cause ground motion in the locations near its epicentre.
- **Vulnerability**: describes how buildings behave when affected by ground motion.
- **Exposure**: where buildings are located, how many people are likely to be there at the time of the event.

What is special about this exercise?

- Earthquake loss models tend to use a single-parameter, such as peak ground acceleration (PGA) to determine damage. PGA corresponds to the impulsive force exerted by an event on given building; however, damage is also a function of how fast or slow the force applied to a building oscillates. For example, a slowly swinging force of 1sec period will affect a 10 storey building more than a small sturdy house. This exercise takes this into consideration by using a multi-parameter vulnerability model, which corresponds to the full response spectrum of the ground motion – this is the only loss model of its kind.

EXPOSURE MODELLING

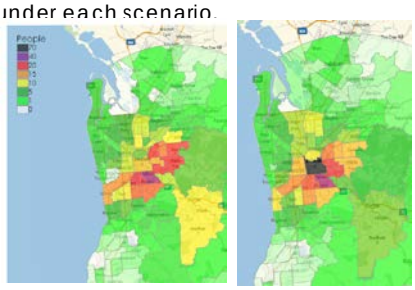
- Another important feature of this model is the high resolution modelling of exposure. Locations were modelled using the Geocoded National Address File (GNAF). For building types we used the National Exposure Information System (NEXIS) provided by Geosciences Australia. This exercise also requires information on soil types, location of essential facilities and population from a number of sources (ABS, Roadnet, in-house).

RESULTS – THE EVENT

Below we show the situation map of the event we are modelling.

DAMAGE – PEOPLE AND BUILDINGS

An earthquake can occur at any time of the day. This is relevant to modelling of casualties. For this modelling exercise we have modelled an event that occurred at night- and another at daytime, and produced the maps below with the distribution of casualties under each scenario.



(night-time) **(day-time)**

We have also modelled losses to buildings, essential facilities (hospitals, schools) and infrastructure. To get a copy of the full report email **valentina.koschatzky@mq.edu.au**