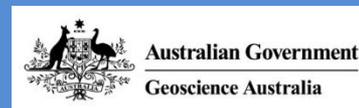




# Community Strategy Development for Reducing Earthquake Risk in Western Australia



bushfire&natural  
**HAZARDS**CRC



# Background

York is the oldest inland town in Western Australia and is located 97km east of Perth.

York's building stock is predominantly of vulnerable older unreinforced masonry (URM) buildings with many heritage listing.

York is located in an area of "Moderate" seismicity by world standards (high by Australian standards).

Heritage buildings and architecture is important to the social, cultural and economic fabric of York.



# Aims

Aims of the project are to:

- Explore strategies for the progressive retrofit of the building stock with economic measures of cost effectiveness (likely entailing less than full retrofit).
- Assess a range of heritage-sensitive seismic retrofit strategies.
- Cost-benefit analysis of seismic retrofit.
- Develop a range of scenarios for EM planning purposes of the current town and future state.
- Inform State and local government policy to advance mitigation of the high earthquake risk of some WA communities.
- Draw directly on the BNHCRC URM research and economic modelling.
- Utilise the intangible value research of a second UWA led BNHCRC project.

# Scenario Impact Modelling

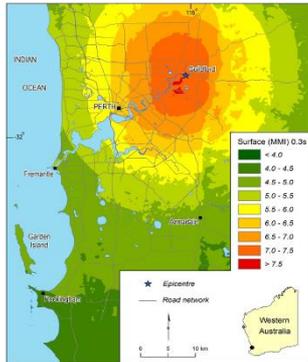
Earthquake scenarios

Local shaking Severity

Building Damage

Casualties USAR

Socio-econ. Disruption

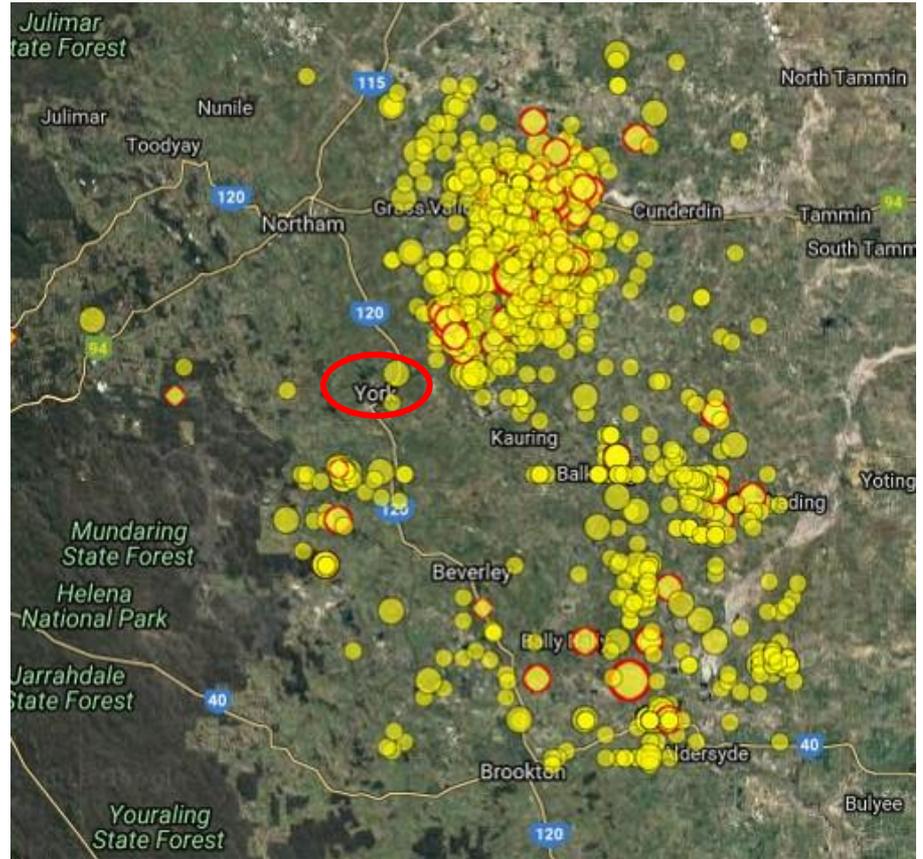


# Historical Earthquake Distribution

In the last 50 years SW WA has experienced one of the highest levels of seismicity in Australia.

Vast majority have occurred in the Yilgarn.

- 1941 Meeberrie magnitude 6.3
- 1968 Meckering magnitude 6.5
- 1970 Calingiri magnitude 6.0
- 1979 Cadoux magnitude 6.2
- 2010 Kalgoorlie-Boulder magnitude 5.0



# 1968 Meckering Earthquake

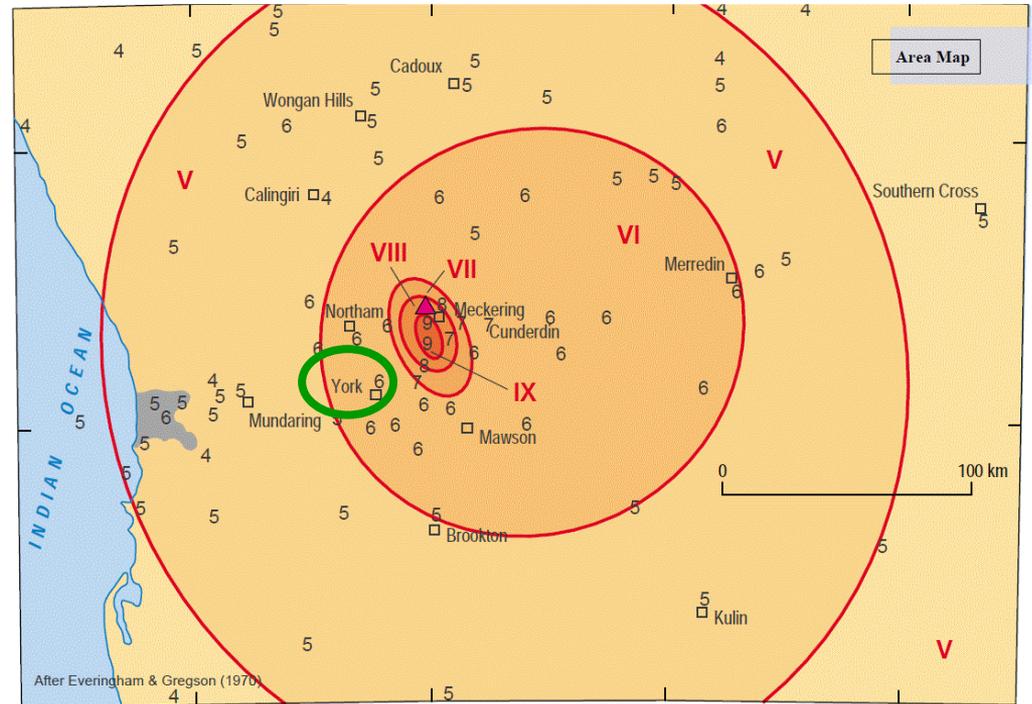
The magnitude 6.5 Meckering earthquake occurred on 14 October 1968.

York is 40km SW of Meckering and suffered damage.

3 people injured when the balcony of the Imperial Hotel collapsed.

245 claims for damage.

York Town Hall suffered some structural damage.



# York Imperial Hotel

1968 earthquake damage



Today



# St Patrick's Church

## Internal retrofitting

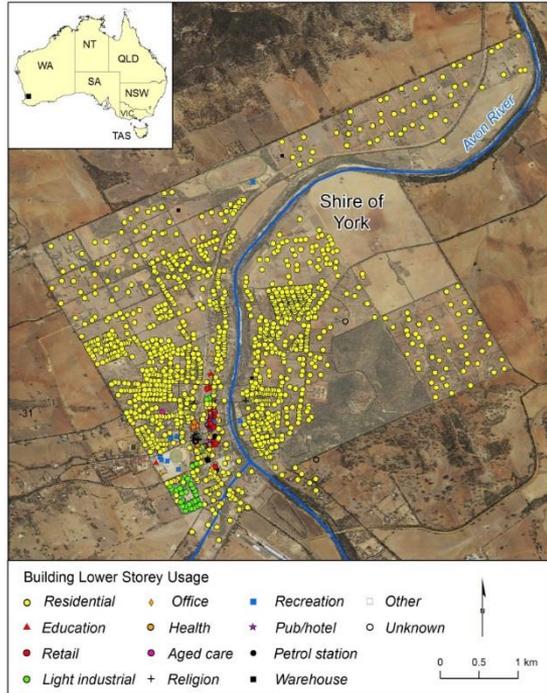


# Buildings

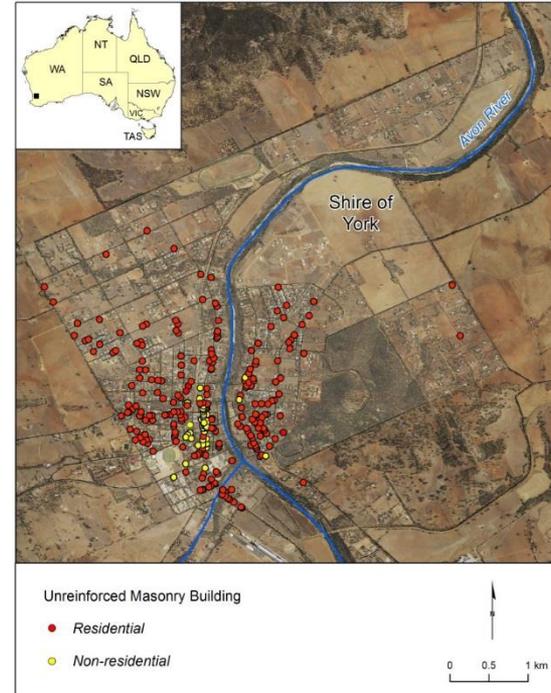
1,417 buildings surveyed in total

267 identified as old URM: 222 residential and 45 non-residential

## Buildings surveyed



## Old URM



# Mitigation Workshop – 9 August 2018

- Retrofit implementation strategy and scenario selection workshop held 9 August 2018.
- Stakeholders involved were:
  - Shire of York,
  - Office of State Heritage WA,
  - Engineering Heritage WA,
  - Insurance Australia Group
  - University of Adelaide
  - University of Western Australia
  - Geoscience Australia
  - DFES.

# Mitigation Workshop – 9 August 2018

- Heritage engineers explained the utility of products in heritage building strengthening. Highlighted that retrofit for earthquake also results in improved structural behaviour for settlement therefore overall improvement in the building.
- York Shire has an “Avon Terrace” grants program to fund 50% of the cost of repainting the main street façades along Avon Terrace. It is presently a modest \$20,000 pa.
- York Shire expressed an interest in identifying the buildings that should have the highest priority based on risk. These could be targeted first for retrofit.
- Office of State Heritage has a range of grants and incentives to encourage the conservation of the State’s cultural heritage. This initiative comes at an opportune time as the Office of State Heritage is developing a forward strategy to address resilience to natural hazards.
- Geoscience Australia could assess which WA communities are most likely to have older URM buildings exposed to higher earthquake hazard. This could lead to a state level targeting of communities.

# Mitigation Strategies

- Alignment of the Heritage Grants Program funding and the Shire of York “Avon Terrace Revitalisation” program (50% cost sharing) to maximise the uptake of seismic strengthening of heritage buildings.
- Opportunities for incentive program being conducted where insurance premiums may be reduced.
- Education by the Heritage Council to address concerns by York building owners that any initiative by owners to retrofit will trigger constraints from the Heritage office that will impact costs.
- Prepare “how to guide” for owners of heritage buildings to implement maintenance and mitigation strategies.

# Mitigation Strategies

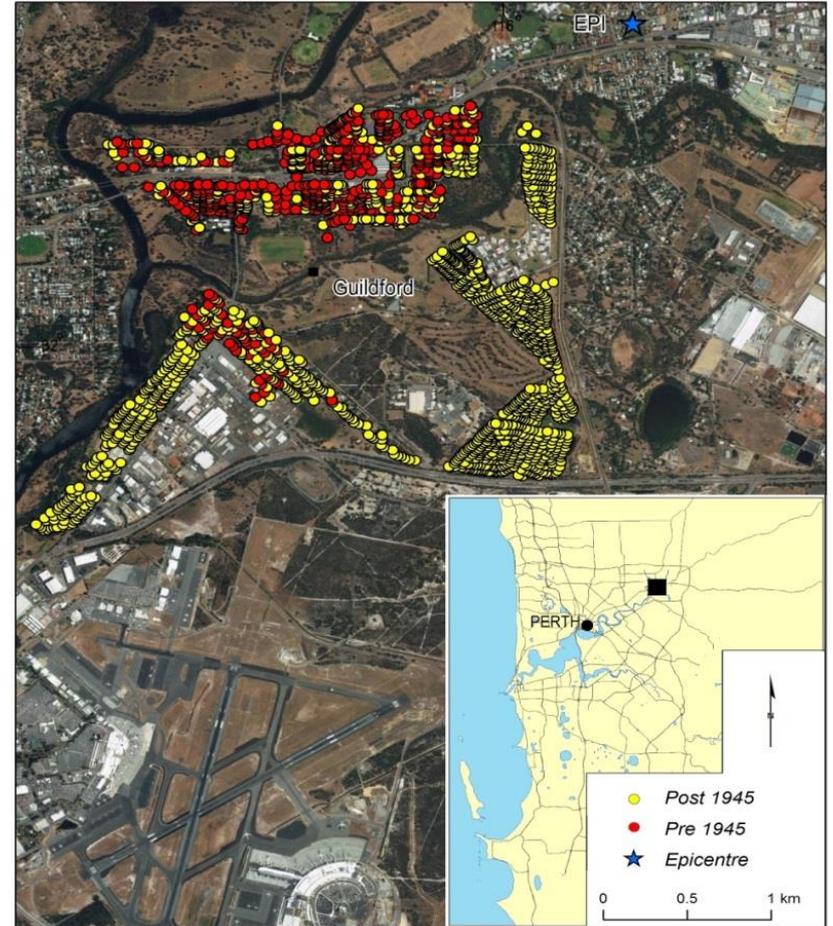
- Assist in developing plans and guide thinking on response and mitigation.
- Used to identify and verify current and future capability needs for agencies involved in managing earthquakes.
- Development of a detailed earthquake concept plan for response and recovery for York and other areas of high seismic hazard in WA.

# Guildford

Guildford is one of three towns established during the founding of the Swan River Colony in 1829, along with Perth and Fremantle

The area retains a high concentration of historical buildings

22,265 buildings are pre-1945 unreinforced masonry.



# Conclusion

- The objective of this research is to develop strategies to mitigate damage, injury and business disruption associated with earthquakes in the most vulnerable buildings of Australia's towns and cities.
- Look for opportunities to collaborate in implementing mitigation strategies.
- An engaged community essential for supporting and implementing mitigation strategies.
- An incentive program trialled on York for several years could lead to a national program.
- Scenarios support the development of emergency management plans.



## **Steve Gray**

Intelligence and Hazard Planning  
Department of Fire and Emergency  
Services

**Phone:** +61 8 9395 9438

**Web:** [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)

**Email:** [Stephen.Gray@dfes.wa.gov.au](mailto:Stephen.Gray@dfes.wa.gov.au)



## **Paul Martin**

Chief Executive Officer  
Shire of York

**Phone:** +61 8 96 41 22 33

**Web:** [www.york.wa.gov.au](http://www.york.wa.gov.au)

**Email:** [ceo@york.wa.gov.au](mailto:ceo@york.wa.gov.au)