Australian GEOGRAPHIC (/)

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The Newcastle Workers Club was hit hard in the 1989 earthquake. (Credit: City of Newcastle)

On this day: Newcastle earthquake strikes

BY EMILY VERDOUW | DECEMBER 28, 2011

In 1989, Australia's most destructive earthquake hit Newcastle with devastating consequences.

ON 28 DECEMBER, 1989, the streets of Newcastle, from all accounts, were devastated. People were seen clearing from their offices and spilling onto the streets as buildings began to crumble around them, as one of the most disastrous earthquakes (/article-index.htm?tags=earthquakes) in Australian history struck.

Thirteen lives were lost on this day between Christmas and New Year's Eve, and many of the city's historical buildings were decimated - along with 35,000 homes, resulting in 1000 displaced people and a $4 billion damage bill.

Building standards were questioned, as 12 of the 13 lives lost were a direct result of crumbling structures.

A popular place for locals, the Newcastle Workers Club suffered the worst of it, with the death

of nine people.

Beaumont Street in the CBD contained many homes and businesses that were destroyed, claiming three lives.

In total 50,000 buildings were damaged and 300 had to be demolished.

This destruction and distress resulted in one of Australia's worst natural disasters (/article-index.htm?tags=natural+disasters), despite the earthquake registering magnitude 5.6 on the Richter scale. Many people questioned how a supposedly moderate earthquake cause so much damage?

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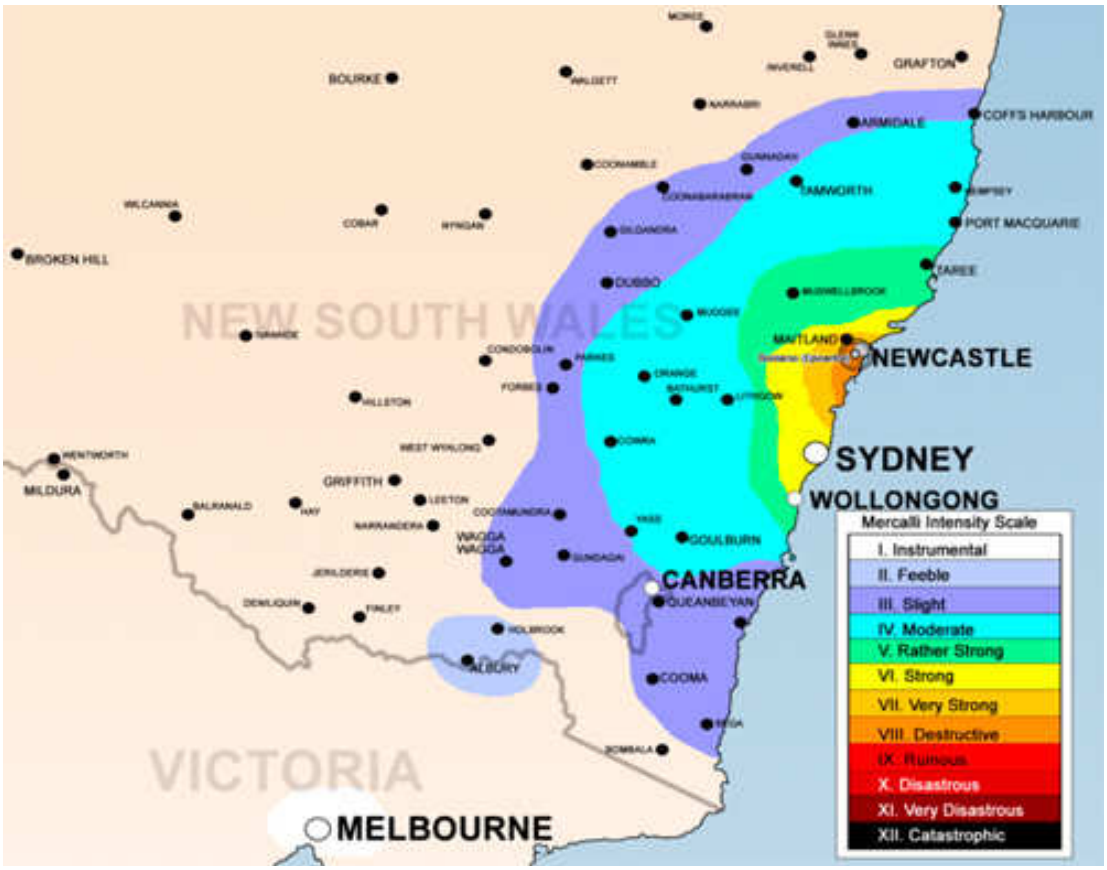

A map of the 1989 Newcastle earthquake by levels of damage severity. (Credit: Geoscience Australia/Wikimedia)

Newcastle earthquake damage could have been reduced

"One of the challenges we've had in Australia is being able to define earthquake hazards nationally," says Mark Edwards, structural engineer from Geoscience Australia.

This is because Australia hasn't endured devastating earthquakes of the frequency of our Pacific neighbours Japan (/journal/how-the-japan-tsunami-travelled.htm) and New Zealand (/article-index.htm?tags=new+zealand).

Mark says there were a variety of factors that contributed to the excessive damage Newcastle.

"The magnitude of an earthquake indicates how much energy is released and the damage is a result of how close you are to that energy release. In the Newcastle earthquake, the epicentre was fairly close to the major city centre," he says.

The earthquake struck about 15km south-west of Newcastle's CBD at an estimated (an relatively shallow) depth of 11km.

The quake was amplified, Mark says, by soft sediments deposited from the Hunter River into which intensified ground motion, making shaking (or 'seismic loading') experienced by the buildings worse.

The buildings' vulnerability to the earthquake (/journal/earthquake-proof-buildings-is-australia-ready.htm) was due to their construction and deterioration with age. Some buildings were made with low-quality unreinforced masonry "which means, basically, there was no reinforcement bars and little masonry strength to support tension built up by shaking," says Mark.

For some buildings, proximity to the coast made this vulnerability worse due to corrosion of brick ties between brick courses.

Generally speaking, the devastation from the Newcastle earthquake could have been reduced had builders and engineers known more. But as they say, that's the beauty of hindsight.

"What happened in Newcastle drove home the need to understand that earthquake hazards better and to design buildings to resist it. This led to a nationally implied standard for earthquake loads by Standards Australia which basically requires earthquakes to be considered in the design process," says Mark.

Similar damage in Newcastle could be seen again

Although a national standard has been developed and refined over time, Mark says the legacy

of older buildings means similar damage could be seen again in other Australian cities.

"I was looking at the building stock in central Sydney (non-CBD) and there are a very large proportion of older masonry buildings dating back to Victorian times. [This means], a Newcastle-type earthquake could cause similar damage but on a greater scale due to the larger urban area of Sydney," he says.

In Australia's largest city, the risk is large for insurers, says Mark.

"We have been advised that a major earthquake under Sydney is one of the top 20 risks to the global reinsurance industry in the world due to the large exposure of insured vulnerable buildings."