



Natural hazards and the risks they pose to South-East Queensland

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in conjunction with the

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EXECUTIVE SUMMARY

Natural hazards and the risks they pose to South-East Queensland is the third in a series of multi-hazard case studies by the AGSO *Cities Project*. The Project undertakes research towards the mitigation of risks posed by a range of natural hazards to Australian urban communities. The ultimate objective is to improve the safety of communities, and consequently make them more sustainable and prosperous.

This report considers risks posed by tropical cyclone (including severe wind and storm tide), east coast lows, thunderstorm, landslide, earthquake, flood, heat wave and bushfire hazards. The vulnerability of South-East Queensland to the effects of natural hazards is increasing as a result of population and development growth. Risk modeling brings together natural hazard research and the vulnerability of the community (the people, buildings and infrastructure) in order to define threat in an objective and relative manner.

We have adopted a systematic approach to the description of the elements at risk in the community and their vulnerability, grouping the various elements into the five themes of setting, shelter, sustenance, security and society. We have developed an overall vulnerability profile of South-East Queensland by which to identify those CCDs and suburbs that provide a disproportionate contribution to community risk because of the number and nature of the elements at risk they contain.

Our analysis enables us to make estimates of the risk in South-East Queensland posed by a number of hazards. Estimates are based on the average recurrence interval (ARI) of a hazard. ARI is the average period in years between the occurrence of a hazard of a given size or larger. It must be appreciated that **an ARI gives no indication** of when a hazard will occur next.

- When compared to other hazards, flooding represents the greatest risk across the region. Flooding, given a 100 year ARI, affects at least 47 400 developed properties, of which, more than half have overfloor flooding. Damage (as a percent of insured loss) across the entire study area is about 1.1% per dwelling (including contents) during a 100 year ARI event. More than half the damage occurs within the Brisbane-Bremer catchment, about 27% occurs within the Pimpama-Coomera-Nerang-Tallabudgera-Currumbin catchment, about 13% in the Logan-Albert and 2% in the Caboolture-Burpengary catchment. This estimate, however, is based on an aggregate and it is unlikely that any one event will impact the entire region to the same extent.
- There is a moderate to high level of risk from storm tide inundation in the region. The number of properties affected by overfloor inundation increase dramatically from 7000 to 44 000 buildings as the ARIs increase from 50 to 10 000 years respectively. At the 100 year ARI level the equivalent of 2100 dwellings (including contents) could be destroyed, or about 0.37% of the value across the region. This estimate, however, is based on an aggregate and it is unlikely that any one event will impact the entire region to this extent.
- The risk posed by tropical cyclone (TC) severe wind is low to moderate across the region. There are, undoubtedly, localised areas in which the combination of building

age, construction and site conditions could produce high damage levels. The area at most risk is the coastal strip in which shielding from wind and storm tide is likely to be minimal. Percent damage losses across the entire range of ARIs from 100 to 5000 years show a steady increase in the number of affected dwellings with an increase in the recurrence interval. At the 100 year ARI level, the equivalent of 150 dwellings (including contents) could be destroyed, or about 0.024% of the value across the entire region.

- The overall level of earthquake risk in South-East Queensland is low, however, the risk is greater in the many areas that are built on unconsolidated sediments or on Tertiary geological units. There have been few reports of earthquakes causing significant damage in South-East Queensland, however, the historical record is short, and the consequences of a rare earthquake, such as the magnitude 6.3 that occurred offshore of Bundaberg in 1918 can be significant. South-East Queensland faces a moderately low risk to its residential buildings from earthquakes. The vulnerability of South-East Queensland residential buildings to earthquake is low as the majority (an estimated 95%) are of light timber frame construction performing well in earthquake.
- Landslide risk is a very localised phenomenon. Within the Gold Coast hinterland region, in particular in the Canungra-Beechmont, Numinbah, Tamborine, Springbrook Plateau, upper Tallegbudgera and Currumbin valley areas, risk posed from landsliding is significant. During a 100 year ARI event, a maximum of four fatalities and up to two dwellings could be destroyed on slopes $>25^\circ$. Individuals living in the Beachmont basalt geological unit are particularly at risk. On slopes $<25^\circ$ the number of fatalities is significantly less at about 0.3, with about 2.7 dwellings destroyed. Some sections of roads on slopes $<25^\circ$, are expected on average to be blocked or partially blocked every 1 to 2 km and have a section destroyed by landslide about once every 5 km. In other areas such as Caboolture, Pine Rivers, Brisbane, Ipswich, Redland, and Redcliffe, landslide risk is very low and it is unlikely that existing buildings would be destroyed or people killed.
- There is a significant overall risk from hail, lightning and wind from severe thunderstorms, though the impact from any one storm will be very localised. We have not, however, been able to quantify the level of that risk.
- There is a significant and widespread risk of fatalities from heatwaves, the level of which, however, can not be quantified at this stage.
- There is a low overall risk of bushfire damage in urban areas, however, the risk in rural areas and rural fringe areas is moderate to significant.

A comparison of hazards indicates that by far the greatest hazard risk posed to the South-East Queensland community is from flooding. The January 1974 floods remain the most severe example of urban flooding in Australia and affected the entire South-East Queensland region. The earlier floods of 1841 and 1893, though much larger in magnitude, resulted in significantly less damage because of a smaller population, fewer buildings and less infrastructure.

Storm tide poses slightly less risk to the region, the last major events to cause damage resulted from TC *Dinah* (1967) and TC *Dora* (1971). Earthquake and severe wind pose much less of a risk to the region, though their impact will still be significant, especially for the longer return periods.

It has been more than 25 years since the last significant hazard impacted the South-East Queensland region. During this period the potential for impact has increased significantly as a result of increased urban development, and awareness and perhaps preparedness for hazards has decreased with the passing of time. It is hoped that this report will provide a level of awareness appropriate to the true risk in the region.