

To build or not build: that is the Townsville question

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Many would remember the computer game *SimCity*, an opportunity to build fictitious cities, with the aim of being re-elected as mayor and generating enough tax revenue to maintain vital community infrastructure. Despite, the advanced level requiring some consideration of fires, alien attack and other hazards, for the average player it was all about city growth. In real life, however, hazards occur, and we need to plan for them whilst balancing numerous competing priorities. 'How' is often a hotly debated topic.

Planning for floods

Media criticism has been levelled at the development of flood prone areas in Townsville with some of the flooded areas described as 'newly built', implying that they were approved in the modern era when there should have been a good understanding of the flood problem. Land use planning is an essential component of disaster risk management and hence is vital in managing existing, residual and future flood risks.



Australian Defence Force members assist with the clean-up of a newly developed Townsville Estate

Many areas of Australia have adopted land use planning policies for residential buildings based on the 1% Annual Exceedance Probability (AEP) flood with an additional level of freeboard applied (safety factor). There is no national standard to define flood planning levels and such policies must be suitable for individual communities¹.

A community survey undertaken by Townsville City Council in 2015 identified the risk appetite of residents for different classes of development. Flooding of residential and commercial

¹ National guidance regarding the floodplain management process including key considerations for managing flood risk can be found at knowledge.aidr.org.au/media/3521/adr-handbook-7.pdf

buildings in the 1% AEP event (1 in 100-year Average Recurrence Interval (ARI)) was viewed as unacceptable but flooding in the 0.2% AEP event (1 in 500 yr ARI) was acceptable to most.

For many years in Townsville land use planning was based on the 2% AEP event (1 in 50 yr ARI)². Other Queensland communities, for example Bundaberg, have also used this level in the past³. In recent times Townsville City Council adopted the 1% AEP event as the defined flood level with four classes of flood hazard to establish development controls as shown in Appendix 1. Given that the flooding experienced in the 2019 event was significantly greater than the 1% AEP event it is not surprising that many newly developed suburbs were affected.

Whilst development in High hazard areas is avoided, development in areas of Medium hazard within the extent of the 1% AEP flood⁴ appears allowable, but with buildings needing to have floor levels above the 1% AEP flood level⁵ to limit flood damage. Such an approach is not necessarily uncommon but should require an assessment of access and egress safety and require the continued policing of regulations to prevent development below approved floor levels. Previous Risk Frontiers flood investigations have observed development of ground floor spaces for habitation, and in some instances renting of these spaces to vulnerable or low-income tenants (e.g. Lismore).

In communities that may become isolated in frequent events but inundated in rarer events or for which isolation duration is intolerable, consideration should be given to the feasibility of community evacuation in events rarer than the 1% AEP flood. This should avoid the creation of low flood islands where evacuation access is lost early in a flood only for residents to later experience inundation. Adequate warning time for residents to evacuate is of course essential.

Existing land-use planning policies in Australia are largely probability based, reliant on set thresholds and do not fully account for the level of flood risk that would require wider consideration of possible flood consequences above a defined flood level. After the 2011 Queensland floods, the Queensland Chief Scientist stated⁶:

² The 2009 Townsville Natural Disaster Risk Assessment Study says that the 1% AEP standard was only recently introduced.

³ Since changed to the 2013 flood level which is equivalent to the 1% AEP event and largest flood on record.

⁴ eplanning.townsville.qld.gov.au.

⁵ Essential infrastructure at a minimum is required to be developed above the 0.5% AEP level. Higher requirements are set for hospitals, emergency service facilities and major electricity infrastructure which are restricted to areas above the 0.2% AEP event.

⁶ www.chiefscientist.qld.gov.au/publications/understanding-floods/

Currently nearly everywhere in Australia the 1% AEP event, or '1 in 100 year flood', with an appropriate additional height (or freeboard) for buildings is designated as having an 'acceptable' risk for planning purposes, regardless of the potential consequences of the flood.

Other countries such as the United Kingdom and the Netherlands⁷ have adopted higher standards. For other hazards in Australia more stringent regulations have been adopted: for example, building standards for earthquakes are based on a 1 in 475-year ARI event. Floodplain Management Australia (the peak body for floodplain management practitioners in Australia) has long supported the need to adopt a risk-based approach. Some South East Queensland councils have adopted such an approach, including the application of building controls above the 1% AEP flood. The national flood manual states⁸:

Considering the full range of flood risk in zonings can encourage development in locations where it is compatible with flood function and flood hazard, and where emergency response arrangements are sustainable.

As Townsville recovers and continues to grow as a major Australian regional city it will need to balance multiple competing interests. There is an opportunity cost involved in prohibiting development that must be balanced against the level of flood risk. In NSW, for example, this balance has long been referred to as involving a 'merits-based' approach that requires the balancing of social, economic, ecological and flooding factors.

Policy makers should also consider whether existing policies are consistent with the risk appetite of local communities, which is not often well defined. The Queensland Floods Commission of Inquiry⁹ stated:

Whether the 1% AEP flood constitutes an acceptable level of risk for development, and in particular residential development, is a vexed issue. The consequences of flooding are likely to be at their most disastrous for residents and homeowners. Floodplain Management in Australia recognises this: according to it, the community must play a role in determining what level of flood risk it is prepared to live with.

The 1% AEP flood level is not necessarily fixed and should also be expected to evolve over time. The introduction of the new Australian Rainfall and Runoff guidelines and collection of new flood and rainfall data may alter understanding of flood risk. Climate change impacts must also be considered as flood frequency may change in the future.

⁷ Other cities globally have very little building controls as was apparent after Hurricane Harvey in Houston - www.washingtonpost.com/graphics/2017/investigations/harvey-urban-planning/?noredirect=on&utm_term=.5a3d5e8c66ac

⁸ knowledge.aidr.org.au/media/3521/adr-handbook-7.pdf

⁹ www.floodcommission.qld.gov.au/publications/final-report/

There is a need to inform residents of the full extent of the risk

Though it is obviously possible to identify flood levels beyond the 1% AEP event, flood mapping available online through the Townsville City Council (“Townsville Maps Flooding”) does not provide information for this. This is not uncommon in Australia, which has inconsistent practices concerning the disclosure of flood risk information across local authorities. Often risk disclosure is limited to areas subject to planning overlays defined typically by the 1% AEP flood. Without risk disclosure, residents living in areas susceptible to rarer events may be unaware of their risk. This may result in residents opting out of flood insurance believing their property is flood free.

Eburn and Handmer (2012)¹⁰ suggest that the reluctance, at least anecdotally, to disclose risk information is driven by legal liability. It is subsequently argued that the risk of disclosing reasonably accurate hazard information in a planned manner is less than deliberately withholding information.

This issue requires further consideration and action. The Victorian Government for example has committed to ensuring the full disclosure of flood risks to individuals beyond the 1% AEP event through the Victorian Flood Management Strategy¹¹ and some local councils in other areas already disclose the risks associated with extreme flood events.

Of course, consideration must be given as to the most effective manner of communicating such information so that it is easily understood. It is well known that the ‘1 in 100-year flood’ is a widely misunderstood concept amongst community members. Further risk communication efforts are necessary in this regard.

Risk Frontiers regularly undertakes post event research to inform future policy and to improve the estimation of damages. Risk Frontiers visited Townsville this week with the support of the Bushfire and Natural Hazards Cooperative Research Centre. A further Briefing Note is under preparation to outline our key findings. Please contact Andrew Gissing for further detail (andrew.gissing@riskfrontiers.com)

¹⁰ Eburn, M and Handmer, J., ‘Legal Issues and Information on Natural Hazards’ (2012) 17 Local Government Law Journal, 19-26

¹¹ www.water.vic.gov.au/managing-floodplains/new-victorian-floodplain-management-strategy

Appendix 1

Flood Hazard Area	Description	What does the hazard code mean for development?
High hazard area	High hazard area represents the 1% Annual exceedence probability (AEP) event. This is the Defined Flood Event and the Defined Flood Level for Townsville City. Flooding may involve fast flowing and/or deeper flood floodwaters.	New development within these areas should be avoided. Any new development would be subject to the highest development assessment requirements.
Medium hazard area	Medium hazard area represents the 1% AEP event. This is the Defined Flood Event and the Defined Flood Level for Townsville City. Flooding exists but less likely to be deep and/or fast-moving water.	New residential development is subject to building requirements such as minimum floor heights for habitable areas.
Low hazard area	Areas of the floodplain outside the 1% AEP flood extent are still susceptible to flooding in rarer, more extreme flood events. The low flood hazard area represents inundation by the probable maximum flood outside the combined extent of the high and medium flood hazard areas.	No flood hazard overlay code requirements apply to dwellings. New development with a role in community resilience may be built in these areas subject to higher standards.
Medium hazard – further investigation areas.	Areas outside the extent of the flood modelling studies. Limited information is available about flood depths, levels or velocities in these areas.	High intensity development is likely to require further detailed flooding investigation