4 April 2011

A PRACTICAL URBAN PLANNING PERSPECTIVE OF THE QUEENSLAND FLOODS

Introduction:

Since the most recent drought which began in 2006/2007, there has been a common focus in Federal and State Government Policy on water security, allocation and efficiency of our water for the future. Whilst the focus has been on building resilience to the prolonged drought in Queensland, and it is only now as a result of the December 2010/January 2011 floods that the issue of flood management and mitigation has come to the forefront of governance and planning.

How times have changed since the days when our backyards were playgrounds for kids running through garden sprinklers or places for washing the family car. Recently our community's normal activities that often involve water usage have been restricted for the sole purpose of preserving our water for future times of need. Then suddenly a flood disaster hits and our local suburban streets are occupied by people canoeing through devastating flood waters. These changes in our natural environment affect our 'normal' day-to-day life and can happen so quickly that society learns to adapt and build resilience to these external forces of drought and flood.

Whether it is drought, fire or flood, 'natural disasters' can impact on all aspects of our way of life. To cope with current and future natural disasters our communities need to be adaptable and resilient and our policies need to be transparent and current. Our Government has an overarching responsibility to ensure the safety and security of our economy, our people and the environment. It is times like these when 75% of the State is under water that we question whether our current policies are adequate in dealing with such a disaster, or are we approaching a period where events like these will become more common and therefore unavoidable.

This paper aims to review the current practices and policies in light of the recent floods, identify perceived problems with current flood mitigation measures and suggest possible solutions from a practical planning perspective.

Setting the Scene:

Flooding is number one in the hierarchy of risks from natural hazards in Queensland, and has significant economic impacts on Queensland communities.[1]

Brisbane experienced major flooding in 1893 and 1974 as the Brisbane River broke its bank and inundated low lying areas, killing 14 people and flooding almost 6,000 homes in the latter event. This

[1] Queensland Government, Ministerial Media Statement. 2 November 2009. *State Government to Plan for Flood Resistant Communities.* Retrieved from http://www.cabinet.qld.gov.au/mms/StatementDisplaySingle.aspx?id=67220

flood followed months of rain which had filled rivers in the south-east, then when Cyclone Wanda dumped heavy rain over the region these rivers were pushed over the limit, leading to the worst floods of the century.[2]

In the aftermath of 1974, the Wivenhoe Dam was built as Brisbane's defence against another major flood. Although the dam was built to prevent future flooding like that of 1974, the possibility of a more severe flood in Brisbane has always been a serious risk.

In late December 2010 and January 2011 Queensland was hit by some of the most widespread and significant flooding in the State's history with Theodore and Condamine fully evacuated and over 22 towns and over 200,000 people severely affected. In total, forty-one local government areas were declared disaster areas with significant disruption to mining, agriculture and other industries.[3]

The flood was the most significant in Australia since at least the 1970s in terms of extent, impact and severity.[4] Four major rain events affected large parts of eastern Queensland and New South Wales making December the wettest on record for Queensland and Eastern Australia as a whole.

Attributing to this late November and December rainfall was the early, very wet July to October meaning many catchments were already wet before the flooding rain. The late rainfall of 2010 was during a very strong La Nina event in the Pacific Ocean similar to previously strong La Nina events in 1955 and 1974 which were also associated with widespread flooding.[5]

The Bureau of Meteorology (BOM) Monthly Weather Review – Queensland December 2010[6], summarised the December weather in Queensland as -

- *The wettest December on record*
- *One of the most significant floods in Queensland's history*
- *Record flooding across southern and central catchments*
- *Queensland's first cyclone of the season, Tasha, crossed the coast south of Cairns on Christmas morning*
- *Severe thunderstorms with large hail in the southeast*
- *There were 82 high daily rainfall and 321 high total monthly rainfall records*
- *There were 16 low daily and low mean maximum temperature records*
- *There were 6 high daily and mean minimum temperature records*

[2] Andersen, B. 10 January 2011. *1974 comes flooding back as Brisbane on alert.* Retrieved from http://www.abc.net.au/news/stories/2011/01/10/3109759.htm

[3] Bureau of Meteorology. 21 January 2011. *Monthly Weather Review, Queensland December 2010.* retrieved from http://www.bom.gov.au/climate/mwr/qld/mwr-qld-201012.pdf

[4] Bureau of Meteorology, National Climate Centre. 7 January 2011. *Special Climate Statement 24 - An extremely wet December leads to widespread flooding across eastern Australia.*

[5] Ibid.

[6] Bureau of Meteorology. 21 January 2011. Op cit.

A total of thirty-five people died in the event and (completely or partially) over 26,000 homes inundated.[7]

With the devastation of the recent Queensland flood and the resulting impacts of loss of life, closure of businesses and broken communities, it is time to reconsider our current practices and policies that were meant to protect our community from such an event.

Legislative Context

Firstly, to set the context it is relevant to establish the current legislative framework for flood management in Australia. At the state and local levels, flood management initiatives focus on activities which raise community awareness and levels of resilience. Measures to prevent flooding can include zoning, land use management, by-laws, education, information alerts and local flood prevention plans.[8] In addition, Governments currently use regional and urban planning, land use and development planning, building codes and a range of engineering standards for disaster risk management.

At a national level, the Natural Disaster Mitigation Program (NDMP) identifies and addresses natural disaster risk priorities for Australia. It deals with natural disasters such as bushfires, floods and tropical cyclones that regularly occur across the nation.[9]

Currently the State and Territory Governments co-ordinate disaster management and Commonwealth Government responds to their request for assistance through the Disaster Response Plan and Emergency Management Australia who provide operational and financial assistance. State and Territory Governments are responsible for establishing emergency management and disaster management entities through legislation that are linked to Fire, Police and State Emergency Services (SES).[10]

At a State level in Queensland, the Government legislation to manage flood events relevantly includes the South East Queensland Regional Plan 2009-2031, Draft SEQ Climate Change Management Plan (Department of Local Government and Planning), the State Planning Policy 1/03, Sustainable Planning Act 2009, Disaster Management Act 2003, various local government planning schemes and by-laws. Central to the State Government policies is the *State Planning Policy 1/03*: *Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03)* that was implemented under Schedule

[7] Chilcott, T., Fraser, K., and Templeton, A.15 January 2011. *Queensland spirit shining through, with thousands of volunteers turning out to help flood victims.* Courier Mail. Retrieved from http://www.couriermail.com.au/news/floodbound-residents-of-brisbanes-western-suburbs-await-supplies/story-e6freon6-1225987482889

[8] Apan, A., Keogh, D.U., King, D., Thomas, M., Mushtaq, S. and Baddiley, P. 2010. Page 9.*The 2008 Floods in Queensland: A Case Study of Vulnerability, Resilience and Adaptive Capacity*. Report for the National Climate Change Adaptation Research Facility, Gold Coast, Australia.

[9] Ibid.

[10] Ibid.

4 of the now superseded *Integrated Planning Act 1997* (IPA) and took effect on 1 September 2003.[11] These key planning instruments form the basis of our flood management policy with their key role to build resilience to natural hazards such as flood, and implement measures to ensure the protection of people and property from flooding impacts.

State Planning Policy 1/03 (SPP 1/03) *"sets out the State's interest in ensuring that the natural hazards of flood, bushfire, and landslide are adequately considered when making decisions about development."* (Section 1.1 – Purpose). The SPP has effect in the assessment of development applications, the making of planning schemes or their amendments and when land is designated for community infrastructure. This Policy addresses **only development issues** associated with minimising the potential adverse impacts of flood, bushfire and landslide.

The SEQ Regional Plan addresses the issue of 'overland flow and flood management' with the *principle* to *"Provide necessary flood immunity for infrastructure and buildings, and resilience to potential climate change flooding, while seeking to maintain the natural flow regime."* The SEQ Regional Plan relies on the SPP 1/03 as a reference document for planning scheme to address the management of flood hazard areas. The SEQ Regional Plan sets the key principles for flood management at a regional level to be implemented through the eleven local government planning instruments.

At a local level, Governments are responsible for the implementation of SPP 1/03 and the SEQ Regional Plan in the making and amending of planning schemes. Some local governments provided detailed flood mapping in the form of overlay maps that map out the Defined Flood Event (DFE) line for areas as well as the provision of planning codes (sometimes referred to in terms of 'constraints codes', 'overlay codes' or 'secondary codes') that address development and building requirements for flood protection and mitigation. Other local governments (often the smaller or regional government areas) lack any defined flood mapping information or planning code requirements. This can often result in poor development outcomes with little consideration for potential flood impacts.

It is important that flood management occurs not only at a State level, but filters through to local government level to ensure our population is protected and prepared for large flood events.

Perceived problems with current flood management

From a practical planning perspective, there are a number of perceived problems with current flood management in Queensland that could be resolved or improved.

From a policy perspective, SPP 1/03 only deals with **development issues** associated with mitigating flood. Existing developments that previously were outside a flood affected area are not captured under this policy for maintaining flood mitigation and responding to changes in defined flood event levels. SPP1/03 is now eight years old and should be amended regularly to ensure the policy reflects

[11] Ibid.

changes to the State's flood characteristics and implements current standards and outcomes for flood mitigation.

There is a gap in current flood management policies for ensuring State Planning Policies (SPP's), local planning instruments and by-laws reflect the current changes to flood regimes and climate change impacts that can alter existing defined flood levels. This was evident in the recent QLD floods that existing dwellings previously thought to be outside the identified flood prone areas in Brisbane, were significantly inundated by flood waters unexpectedly. This had tremendous impacts on people's livelihood, local infrastructure, businesses and the social welfare of the community. This raised questions around the accuracy of local government flood mapping and possible ramifications for new developments that are misguided in the level of flood risk exposed to the site.

New development proposals particularly in South East Queensland are increasingly encroaching into flood plain areas and are forced to provide hydraulic solutions for flood immunity. A contributing factor has been land shortages due to a rapidly increasing population and growing demand for more affordable housing. In the building and development industry, some of the stormwater management solutions rely on traditional methods for flood management whilst others in more recent times are becoming more innovative in their development solutions to maintain flood immunity (this is discussed further on in this paper). It is important that planning instruments discourage new developments that apply 'bandaid' solutions for flood mitigation and support new innovative design solutions to achieve flood immunity of residential dwellings, businesses and infrastructure.

Whilst innovative design solutions such as raising dwellings and water proof building materials can significantly contribute to flood mitigation measures, the construction costs often discourage developers and builders from adopting 'flood proofing' measures to avoid the additional costs of building a home and associated infrastructure. Following the recent Queensland floods, Brisbane City Council Lord Mayor Campbell Newman indicated that height restrictions could be negotiable if residents applied to raise their flood-affected properties.[12] However, Queensland Master Builders Association director of housing policy Paul Bidwell said constructions cost could increase by $20,000 if new homes were raised above the flood line and even more to lift existing homes. The Urban Development Institute of Australia state president Warren Harris suggested cost of raising flood-prone houses would be better absorbed in new developments rather than existing communities, however this is yet to be proven. [13]

Many existing communities are already located in flood prone areas which poses significant risk to people, their homes, businesses and community infrastructure. Following the recent floods, suggestions have been made to abandon flood prone areas and replace them with other lands uses such as parkland. Alternatively, these areas need to adapt to potential flood threats through

[12] The Age. 24 January 2011. Article: *Queensland: higher homes out of reach*. Accessed from: http://theage.domain.com.au/real-estate-news/queensland-higher-homes-out-of-reach-20110125-1a3gf.html
[13] Ibid.

modifications to existing buildings (e.g. raising dwellings, using flood-proof materials), infrastructure and emergency management.

Our natural environment is ever changing and flood characteristics are so variable and often unpredictable. To be able to respond to these unforeseeable events, it is not always possible to provide flood immunity but more importantly we can implement measures to mitigate flood impacts through better planning practice and management, mitigation measures and building and development controls.

Possible solutions

There has been much speculation in the media concerning the most appropriate solutions for addressing the flood recovery and dealing with future flood events. It is not only important to get flood affected communities back on their feet but to also ensure events like these will not cripple our towns and cities to the same extent again. Looking at the success and failures of past management techniques and government policies can assist with the rebuilding of our communities and bring about integrated long-term management solutions without re-inventing the wheel.

The integration of flood management and policy frameworks throughout all levels of government (commonwealth, state, local) is crucial to achieve the objectives set by these instruments. Ensuring all existing policy instruments (e.g. Natural Disaster Mitigation Program, State Planning Policies, local government planning schemes) are transparent and current will establish a flood management system that is consistent through all levels of government. This requires a coordinated and collaborate dialogue between departments to establish consistency for managing hazard risk.

Federal and State intervention can play a key role in achieving a coordinated flood management system through overseeing the regular reviewing and updating of policies, building codes and standards, new development and building controls, Defined Flood Event (DFEs) levels for flood-prone areas to maintain accuracy and certainty and fast tracking of key documents such as regional plans, specific issues plans and interim planning instruments. According to the CSIRO's *Floodplain Management in Australia: Best Practice Principles and Guidelines* (2000), planning agencies have several roles in floodplain management process including:

- *Ensuring that local agencies take into account the provisions of regional plans and special issue plans (e.g. wetlands) when drawing up floodplain management plans*
- *Increasing awareness of flooding matters at the local agency and community level (possibly by development model planning provisions for flood-prone areas)*
- *Advising local agencies on land use planning matters for flood-prone land*
- *Acting as an arbiter for planning appeals.* [14]

[14] Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ). 2000. *Floodplain Management in Australia: Best Practice Principles and Guidelines.* CSIRO, Australia.

There is a degree of discrepancy between local government flood risk measures in Queensland with some planning agencies providing detailed flood mapping data, prescriptive code requirements and policies whilst others lack much of this information. Improvements to State Government consultation and collaboration on natural hazard management and its implementation in local government planning schemes and by-laws, has the potential to establish consistency and inclusiveness in the legislative framework. This involves ensuring that local governments reflect the most current flood mitigation measures including:

(a) appropriate land use designations;
(b) selection of DFEs for flood-prone areas; and
(c) appropriate development and building controls within codes and policies.

Land use designation is critical for local government areas as they need to be appropriate to the level of hazard to both maximise the benefits of using a floodplain and minimise the risks and consequences of flooding. The adopted land use for flood prone land can largely define the resulting flood hazard.[15] Land use designations are important at a regional level (e.g. South East Queensland Regional Plan) down to the local level (e.g. planning schemes) to manage where development occurs and protect people from natural hazard.

Selecting DFEs is equally important and is a fundamental decision that forms a basic foundation of floodplain management. An adopted DFE determines the area of land subject to flood related development and building controls (defined flood areas).[16] For most Australian States and Territories the 1% AEP flood event has been adopted as the appropriate DFE which is adopted under SPP1/03 in Queensland.

The DFE forms the basis for planning and building controls for land in a floodway, in a flood fringe or land outside a defined flood area. Until the DFE is reviewed and then revised to reflect additional flood data and changes in development or flood behaviour, the DFE will not change during the life of an adopted floodplain management plan.[17] Consequently, flood events like those experienced in Brisbane January 2011 can come as a surprise to the community when properties thought to be outside a flood prone area are not. This raises the question of how frequent DFE's should be reviewed and to what extent should they be relied upon.

From a practical planning perspective, basically the DFE provides an acceptable level of risk by which development should be built above but does not necessarily protect properties from the risk of flood inundation. DFEs map out the level of risk with a definitive boundary and depth of possible flood inundation and with this information planning agencies, developers and builder can identify potential flood prone land and make informed decisions about carrying out further flood hazard assessments and incorporate detailed design measures to mitigate flood impacts. It is not only the responsibility of

[15] Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ). 2000. *Floodplain Management in Australia: Best Practice Principles and Guidelines.* CSIRO, Australia.
[16] Ibid.
[17] Ibid.

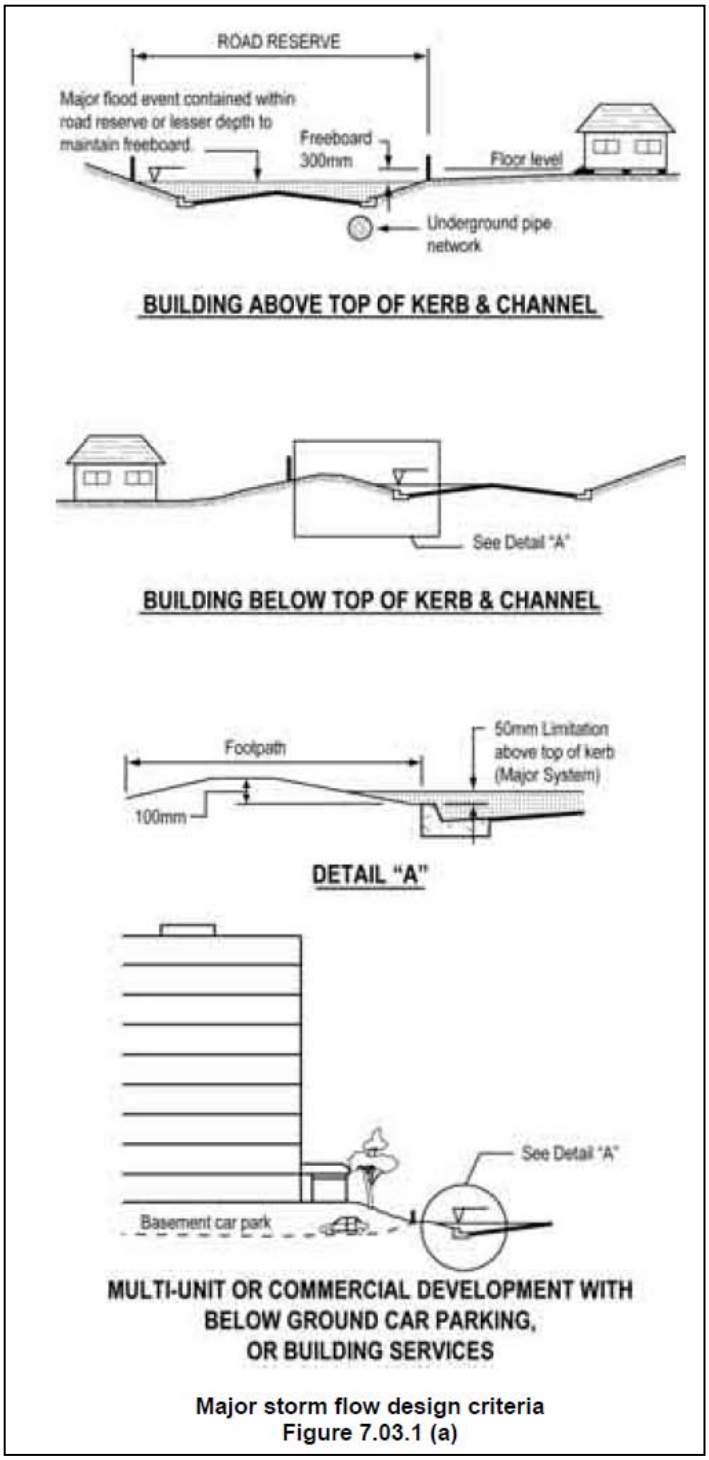
policy makers but also the responsibility of our building and development industry to protect our communities from natural hazard.

There are several development and building controls that can be incorporated into individual building and development applications for consideration in their assessment; some of which include raising minimum habitable floor levels, raising houses and flood proofing development.

Raising minimum habitable floor levels above the defined flood level is an effective flood mitigation measure that can be easily incorporated into planning scheme amendments. Regardless of this, if the DFE level is regularly reviewed and as a result increases, the freeboard is co-dependent to this measure and therefore can reduce the risk of flooding.

For commercial and residential buildings with basement car parking, general freeboard recommendations are made by the Queensland Urban Drainage Manual Second Edition 2007 as seen in Figure 7.03.1 (a).

As seen in this figure, there is only a 50mm raised freeboard threshold required for entering a basement car park[18] which is considered fairly negligible as a measure for minimising flood inundation. Local governments can choose to adopt higher freeboard requirements and additional hydraulic checks, however where they are absent these standards apply. From a planning perspective, simply raising this minimum freeboard for entrances into basements could prevent significant inundation of basements in high rise buildings which



Major storm flow design criteria
Figure 7.03.1 (a)

[18] Department of Environment and Resource Management (DERM). Queensland Urban Drainage Manual Second Edition 2007. Accessed from http://www.derm.qld.gov.au/water/regulation/pdf/guidelines/flood_risk_management/qudm_1.pdf

was widespread in the January 2011 Brisbane flood.

Another suitable measure for flood mitigation is raising a house. There are some limitations as not all houses are suitable for raising. Houses built with single or double brick or slab-on-ground construction are either impossible or very costly to raise, whilst those built of timber frame and clad with non-masonry material are the best suited to raise.[19]

An example of this being applied to local planning, is Brisbane City Council's recently approved temporary local planning instrument that is aimed at flood victims wanting to rebuild their homes. Residents in flood affected areas will be able to raise their houses above the existing maximum height of 8.5 metres to 9.5 metres without a planning approval. These changes will apply for 12 months and require State Government approval. Cr Cooper advised that the new standards would apply only to residents building new homes, units and townhouses. [20] The temporary local planning instrument (TLPI) will also include Council's interim residential flood level, requiring new homes in flood areas to use the January 2011 flood level as a guide.

An example of this solution being applied in the development industry is the recently approved development by 'Minamarc' in Merrimac on the Gold Coast that incorporates the concept of raising houses with the entire suburb built on stilts. The development is located within the Merrimac floodplain and will house 13 duplexes and 112 units built on a concrete slab four metres above the floodplain. All car parks are above ground and access to the dwellings will be by stairs. Premier Anna Bligh said the State Government will consider houses on stilts as a way to stop homes being inundated by floods.[21] Innovative solutions like this will become increasingly seen in areas affected by flood as a means to supply much needed housing and make use of land which might otherwise be undevelopable.

As an adjunct to other measures already discussed, floodproofing buildings can provide the solution for minimising damage to buildings that are likely to be inundated by flood waters through designing and constructing buildings with water-resistant materials. Common building materials including plasterboard and chipboard for internal wall linings and built-in cupboard fittings are generally irreparably damaged when submerged and need replacing. The Department of Infrastructure and Planning suggest a number of ways to use water resistant products as an alternative to traditional building materials, including:

- *replacing kitchen plasterboard wall linings with fibre cement sheeting then tiling over the sheeting using waterproof adhesive*
- *replacing kitchen bench tops with stone or reconstituted stone products*

[19] Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ). 2000. *Floodplain Management in Australia: Best Practice Principles and Guidelines.* CSIRO, Australia.
[20] Vogler, S. 29 March 2011. *Extra Height to boost flood recovery rebuild.* Courier Mail, Brisbane.
[21] Lappeman, S. Killoran, M. Stigwood, E. (20.01.11) *Coast Suburb Plans for Stilts.* Gold Coast Bulletin.

- *using hardwood framing as it's more likely withstand water inundation—better than materials such a particleboard or pine*
- *using water resistant products such as glass blocks to create a feature wall*
- *replacing insulation batts in your wall cavities with plastic or polystyrene insulation boards*[22]

Although these solutions will minimise flood damage to a house and make the clean up much easier after a flood, this solution can be a costly alternative to traditional building materials. Floodproofing alone does not provide protection against flood inundation and the associated social and economic disruption of major flood events but can assist in protecting existing houses in flood prone areas from significant damage.

Recommendations

Whilst there are several existing flood management solutions beyond those discussed in this paper, many fail to be recognised and implemented in the planning and development industry. Those which have been discussed are not far removed from existing policies and controls; however sometimes it is a matter of reviewing the current management strategies and rethinking the way they are applied and implemented through the legislative framework and building and development controls.

In summary, from a practical planning perspective, possible solutions to establish better flood management and mitigation measures in Queensland, include:

- Increased State scrutiny of local government planning schemes and policies through overseeing the regular reviewing and updating of policies, building codes and standards, new development and building controls and Defined Flood Event (DFEs);

- Improvements to State Government consultation and collaboration on natural hazard management to establish consistency and inclusiveness in the legislative framework;

- Fast track key documents such as regional plans, specific issues plans, State Planning Policies (in particular SPP 1/03) and interim planning instruments to make certain they are responsive to current issues and trends;

- Shift State Government to proactive investment in flood management and mitigation strategies such as investment in whole of region flood studies for Queensland, rather than a reactive approach that provides disaster funding after the fact.

[22] Department of Infrastructure and Planning (DIP). Facts Sheet – January 2011. *Repairing your house after a flood, Water resilient products and building techniques.*

- Implement state-wide planning reform in local government planning schemes to implement consistent mapping, policies and building codes for natural hazard management and establish reliable and accurate information;

- Regularly review and amend DFE's to incorporate additional flood data and changes in development or flood behaviour of catchments;

- Increase community awareness and knowledge of flood risk so they can make informed decisions when purchasing properties that may or may not be subject to future flood hazard;

- Increase accountability for the building and development industry in protecting our communities from natural hazards such as flood;

- Increase the minimum habitable floor levels above the defined flood level as an effective measure to reduce flood risk;

- Raise the minimum freeboard threshold required for entering a basement car park in high rise commercial and residential buildings under the Queensland Urban Drainage Manual Second Edition 2007;

- Allow for innovative development solutions for house raising in local government planning schemes;

- Provide incentives for floodproofing homes with water-resistant materials.

Improving the current flood management practices and policies will rely on a collaborative effort from all levels of government as well as accountability from the building and development industry. From a planning perspective, the key message from the Queensland flood event is to change our current management practices from reactive to proactive investment in natural hazard management and provide our local governments and decision-makers with the information and knowledge to make informed decisions in the best interest of the community. At the end of the day, our focus needs to be on minimising risk of natural hazard in our community to avoid the devastating experience in the December 2010/January 2011 flood in Queensland.

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