

On Site Flood Emergency Management: Setting a Standard

S. Molino¹, H. Mirfenderesk²
¹Molino Stewart Pty Ltd
²City of Gold Coast

Why a Guideline is Needed?

The City of Gold Coast (CoGC) is highly exposed to the risk from storm surge as well as riverine and flash floods. It is estimated that there are 50,000 people living in premises affected by the 1% Average Exceedence Probability (AEP) flood.

New development in flood-affected areas needs to comply with the relevant Flood Overlay Code, which includes minimum requirements in relation to access and evacuation.

Arora Constructions Pty Ltd and Jans Constructions Pty Ltd had their application for the development of 270 apartments on the Guragunbah floodplain refused by CoGC. However, the Queensland Planning and Environment Court overruled the decision, determining that measures to facilitate sheltering in place rather than evacuation, including a Flood Emergency Management Plan (FEMP), are an acceptable alternative solution to reduce risk-to-life.

This Study

Following the court decision, CoGC is seeking to establish guidelines to assess the quality and effectiveness of measures in FEMPs submitted by proponents to reduce flood risk. Molino Stewart prepared a report recommending the content that an effective FEMP would need to contain.

Molino Stewart looked at design features and emergency response measures which needed to be incorporated into developments to mitigate the risks-to-life from the direct impacts of flooding, as well as secondary risks-to-life such as medical emergencies or fires. We also considered measures to reduce the risk of people trying to leave premises while still isolated by flooding.

The recommendations are based on consideration of the duration of isolation in a Probable Maximum Flood (PMF). With this consideration, the shorter the duration of isolation, the less stringent the measures need to be, as there is a lower probability of any of the secondary risks-to-life being realised. We also considered different measures for different development types.

Shelter Requirements

Duration Threshold

Dwelling Type	<2 hrs	2-8 hrs	8-24 hrs	24-48 hrs	>48 hrs
Torrens-titled residential dwellings	>50% of habitable floor space in each dwelling above PMF	>50% of habitable floor space in each dwelling above PMF	100% of habitable floor space in each dwelling above PMF	Not suitable	Not suitable
Strata-titled residential dwellings or multi-unit dwellings under single ownership	>50% of habitable floor space in each dwelling above PMF	>50% of habitable floor space in each dwelling above PMF	100% of habitable floor space in each dwelling above PMF	100% of habitable floor space in each dwelling above PMF	100% of habitable floor space in each dwelling above PMF

FEMP Risk Mitigation Requirements

Risk	Risk Mitigation Measure	Duration Threshold (Hrs)	Rationale
Power Supply	<ul style="list-style-type: none"> Backup power supply lasting up to 3 days Power to run at least one lift Power only directed to essential items Regular maintenance of backup power supply 	48-72	<ul style="list-style-type: none"> Power outages for over one day may influence people to resort to improvised lighting and cooking which can increase fire risk Power outages for over two days can cause food in refrigerators and freezers to perish and prompt people into leaving the building
Water and Wastewater	<ul style="list-style-type: none"> Reticulated water supply of normal pressure and quality for at least two days 	48-72	<ul style="list-style-type: none"> Sustained power outages likely to reduce capacity to chlorinate drinking water supply Residual chlorine levels drop substantially after two days
Food Supply	<ul style="list-style-type: none"> Advise to stock up on food with tropical cyclone warnings or flood watches Backup power supply lasting up to 3 days 	48-72	<ul style="list-style-type: none"> Stocking up on food supplies minimises likelihood of occupants leaving the building during flood to replenish food supply Power outages for over two days can cause food in refrigerators and freezers to perish and prompt people into leaving the building
Medical Needs	<ul style="list-style-type: none"> Advise to stock up on medication with tropical cyclone warnings or flood watches Encourage early evacuation of people with life-threatening medical conditions when tropical cyclone warnings or flood watches issued Fully stocked First-Aid Kit Helicopter and/or boat access to isolated building 	48-72	<ul style="list-style-type: none"> Lack of medication can be life-threatening to those who self-administer medication regularly People who need others to administer medication or require immediate hospital care may not have access to it during flooding event Isolation for more than two days can be life threatening without fully stocked First-Aid Kit, First Aid trained personnel, and helicopter and/or boat access to building
Fire Emergencies	<ul style="list-style-type: none"> Switchboards that automatically shut down when electrical circuits in contact with water Safe evacuation access to flood-free land in event of fire OR Fire suppression equipment as required for residential high rise buildings including sprinkler systems Backup power supply and habitable floor areas to be above reach of the PMF 	Any duration ≥8 48-72	<ul style="list-style-type: none"> Risk of fire very high if water comes in contact with electrical circuitry Occupants in isolated building unable to evacuate in event of fire or take measures to put out fire Power outages may influence people to resort to improvised lighting and cooking which can increase fire risk
Communications	<ul style="list-style-type: none"> Portable radio and spare batteries for households Flood wardens, Personal Locator Beacons, internal intercoms for multi-units 	Any duration ≥2	<ul style="list-style-type: none"> Lack of communication prevents occupants from contacting emergency services or receiving latest warnings and advice in relation to the flooding event Larger numbers of occupants are harder to keep track of during communication blackout period, particularly in emergency situations
Evacuation	<ul style="list-style-type: none"> Encourage early evacuation of people with life-threatening medical conditions or others who wish to evacuate when tropical cyclone warnings or flood watches issued Cessation of evacuation after flood warning has been issued 	≥24	<ul style="list-style-type: none"> People who need immediate hospital care may not have access to it during flooding event; people who do not wish to shelter in place may risk evacuating during flooding event Evacuation after the issue of flood warnings is hazardous