Emergency Management
Discussion paper October 2020

Ipswich Integrated Catchment Plan

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City of Ipswich

CONTENTS

CHAPTER GOAL

To provide a suite of contemporary approaches that enhance how council and the community respond and recover from flood events.

MANAGING FUTURE FLOODS SURVEY

The survey had **190 respondents** from **51 Ipswich suburbs** in late 2019.
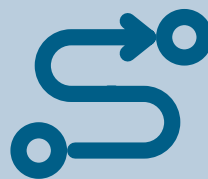
Almost **60%** would wait for advice from authorities during a flood. The three most trusted sources of information are State Emergency Service (SES), Bureau of Meteorology (BoM) and Police.

Two thirds of people said they could stay isolated at home for three days.

More than **80%** expected to have regular travel routes affected during a flood.
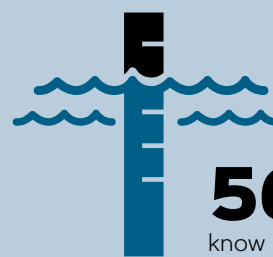
The top 3 actions taken after a flood event were:

- found out where I need to go in a flood
- sought information about flood maps
- took out insurance with specific flood cover.

More than **60%** said they understand what minor, moderate and major flood terms mean, and

56% know how these classifications affect them.

More than **half** do not have an emergency plan.

THE PROCESS

Emergency Management is often described through the cycle of prevention, preparedness, response and recovery. This chapter focuses on the response and recovery phases of a disaster event. These measures are important for community safety during and in the immediate aftermath of a flood.

MODELLING AND DATA ANALYSIS

(Work undertaken in Current and Future Flood Risk Chapter)

- Areas with potential for flash-flooding or water to affect buildings and roads in less than 6 hours
- Areas with potential for buildings and roads to be affected by water for more than 36 hours
- Social and economic vulnerability factors that potentially make it more difficult for community members to understand and respond to flood warnings.

EVALUATION AND APPLICATION

- Evacuation considerations for priority areas
- Flood forecasting technology options and products
- Flood classifications and warnings from Bureau of Meteorology
- Emergency alert notifications to phones within specific areas
- Analysis of flood risk to critical infrastructure.

FINAL REPORT

- Options for improving community and council response and recovery efforts during a flood event.

WHAT WE FOUND

Responsibility for emergency management is a complex arrangement between different levels of government depending on the size of the disaster.

Council's role is coordinated through the Local Disaster Management Group (LDMG) which activates in response to disasters and significant events that threaten community safety.

Ipswich already has established emergency management systems and resources.

The work in this chapter has provided options that could build upon Ipswich's current capabilities, particularly in five key topics:

- **Evacuation:** Using extensive modelling, identifying specific evacuation measures for the highest priority clusters of at-risk properties

- **Flood forecasting:** Examining a range of technology options that could extend council's existing flood forecasting capability

- **Flood classifications:** Providing potential updates to community messaging about what 'minor', 'moderate' and 'major' flood impacts are at key local flood gauge sites

- **Emergency alerts:** Suggesting electronic maps, known as polygons, linked to flood triggers which would send customised messages to phones registered to homes in that area

- **Critical infrastructure:** Understanding the flood risk to vital infrastructure - such as emergency services stations, hospitals, power and water supply - required to operate during and after a flood.

CONNECTION WITH OTHER IICP CHAPTERS

Current and future flood risk – The modelling and data analysis on flood risk and community vulnerability has highlighted areas that required further investigation for emergency management actions.

Community awareness and resilience – Emergency Management is focused on the response and recovery phases of a flood disaster. This information must be embedded in localised community awareness and resilience strategies so people understand their risk and how to manage it.

BE INVOLVED

Submissions on this and other IICP chapters can be made on the 'Managing Future Floods' page of Shape Your Ipswich.

The final IICP report will be provided to Ipswich City Council Q4 2020 for consideration.

EVACUATION DURING A FLOOD

When a flood strikes, it is much safer for people to shelter in place (if safe to do so) or to voluntarily evacuate to family and friends outside of flood areas well before floods happen.

Large-scale mandatory evacuation operations are difficult to manage. Adding to the complexity is human behaviour under stress, flood hazards on roads, as well as the sheer number of people, resources, organisations and government departments needed to undertake mass evacuation.

This chapter has used detailed flood modelling and data analysis to identify the highest priority clusters of at-risk properties that would be targeted for early evacuation during a flood. These clusters were in East Ipswich, Booval, Moores Pocket and Bundamba.

Evacuation for each of these clusters was complex due to a range of factors including:

- potential for flash-flooding or fast inundation of roads and houses (under six hours)
- potential for hazardous water (deep and fast flowing) to affect roads and houses
- potential for flooding from multiple sources (urban overland flow, creek and river) which all behave in different ways
- potential for areas to be isolated on a flood island
- social and economic vulnerability factors.

One of the most crucial aspects was the impact to local roads, which would be key evacuation routes for these clusters. The chapter calculated the best case (normal route) and worst-case (semi-blocked route) using road capacity figures to calculate estimated evacuation times.

FLOOD CLASSIFICATIONS

Flood classifications for stream gauges are critical for planning and flood response. The Bureau of Meteorology uses these classifications to communicate flood impacts.

MINOR	Causes inconvenience. Low-lying areas next to watercourses are inundated. Minor roads may be closed, and low-level bridges submerged. In urban areas, inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas, removal of stock and equipment may be required.
MODERATE	In addition to the above, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas, removal of stock is required.
MAJOR	In addition to the above, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted.

These general classifications can then be applied at a local level using key flood gauges. Each flood gauge has an area of influence around it which contains assets such as buildings, roads and utility services.

Describing how these local assets and the surrounding community could be affected in a minor, moderate or major flood and linking that to a specific gauge height provides a common reference point.

- Residents and businesses can understand the possible consequences to their local area and what actions they may need to take.

- Councils can determine the emergency management resources required for the flood operations centre.

Part of the work undertaken for this chapter was to review the areas of influence around key Ipswich flood gauges and the potential flood impacts for each. Ipswich City Council is one of the first councils in Queensland to investigate improvements to the BoM flood gauge network based on a number of technical reviews by the State Government.

FLOOD FORECASTING AND INTELLIGENCE

Flood forecasting systems are an extremely important component of a total flood warning system. In particular, they are important for areas subjected to flash flooding and fast time to inundation.

The systems have been attributed to reducing the costs of flood damages significantly by providing the necessary warning time to plan and adequately react to flood events. Also, with the advantage of further planning time, high risk residents can be provided further warning and, if necessary, evacuated from dangerous situations.

There are a multitude of forecasting systems that range from simple and inexpensive such as river and rainfall gauges, to complex and expensive such as live hydraulic models. It should be noted, however, that advanced systems require adequate technical resourcing and staff to operate during flood events. Flood forecasting is also targeted at high risk or complex catchments, and isn't feasible for all flooding types, such as smaller streams or stormwater.

Ipswich City Council is considered advanced in flood forecasting, operating a combination of the more complex systems that run 'synthetic' flood events with a team that includes specialised staff - but there are always improvements that could be made depending on available resources.

Flood forecasting and intelligence is a multi-agency effort that requires federal, state and local government input. There are opportunities to improve data such as formalising data sharing arrangements and potential automation such as system data transfers.

Data from the IICP such as property levels and road low points could also be incorporated into flood forecasting systems to increase local flood intelligence.

USING DATA TO PREDICT FLOOD BEHAVIOUR

Flood is complex, with the water's behaviour depending on an incredible number of variables. That's why it is vital that data from multiple sources is shared and modelled for each flood.

One of the systems that Ipswich City Council currently operates is a Hydraulic Extent Model (Bender). This is how it would typically operate for flood forecasting on large rivers:

1. Seqwater estimates (based on rainfall forecasts and other mechanisms) predicted Wivenhoe Dam gate releases. These estimates are transferred to the Bureau of Meteorology (BoM).

2. BoM use their systems and data to predict water levels at nominated flood forecasting locations.

3. Council receives these predicted forecast levels. BoM may also provide further informal forecast predictions at other locations in the council area.

4. Council uses its 'bender' system that uses the predicted flood levels and converts those to a flood surface. Further processing of this data provides flood intelligence including lists of properties and roads that may be flooded.

Ipswich City Council also operate a Live Hydrologic/Live Hydraulic model system. The Bundamba and Woogaroo flood forecasting systems are well known examples in Australia and were used as case studies by BoM.

The systems can run live hydrologic models using a variety of forecasting and real-time rainfall products and/or information from rain gauges.

These types of systems require a high level of development and a team with specialised flood engineers. They are suited to high risk or complex catchments and can provide powerful flood intelligence.

WHAT HAPPENS NEXT

The final IICP report will provide more detailed information on flood forecasting systems that council could consider for local river and creek catchments. Council can consider these options in conjunction with potential upgrades to key evacuation routes in the highest at-risk areas.

Council will work with the Bureau of Meteorology as well as regional and state organisations to update flood classifications at key gauge sites and refine alert maps, based on flood gauge locations, which will send warning messages to phones registered in the area.