Current and Future Flood Risk

Discussion paper October 2020

Ipswich Integrated Catchment Plan

Ipswich.qld.gov.au

City of Ipswich

CONTENTS

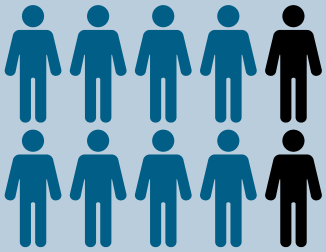
CHAPTER GOAL

To identify, analyse and evaluate current and future flood risk across the floodplain for the Ipswich local government area.

MANAGING FUTURE FLOODS SURVEY

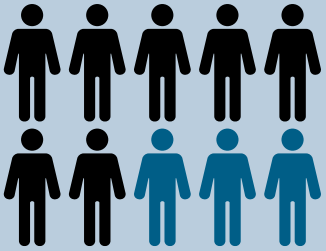
The survey had **190 respondents** from **51 Ipswich suburbs** in late 2019.

70% of respondents had lived in the Ipswich area for more than 10 years.

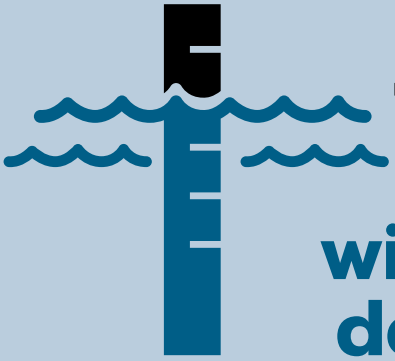


80% had experienced flood before.

70% thought a flood bigger than **1974** or **2011** was possible.



84% expect to find information on their home's flood risk in council reports.



70% also believed we would have a major flood **within a decade**.

THE PROCESS

Findings from this chapter underpin work across the rest of the Ipswich Integrated Catchment Plan (IICP). While it was some of the earliest work drafted, it has also undergone comprehensive checks and updates to ensure we are working with the most accurate information possible.

DETAILED MODELLING (CURRENT RISK)

- Model multiple potential floods, from riverine and creek flash-floods to the 'worst-case scenario' Probable Maximum Flood
- Mapping areas at risk of a flood (how often and how dangerous) across Ipswich.

DATA ANALYSIS

- Identifying infrastructure at risk such as houses, roads and critical or sensitive infrastructure
- Statistical analysis to understand community social and economic vulnerability.

ESTIMATE DAMAGES

- Assessment of total damages across Ipswich in different flood events
- Evaluation of 'Average Annual Damages'.

DETAILED MODELLING (FUTURE RISK)

- Examining flood exposure, risk and damages in a future development scenario
- Modelling likely future climate impacts on a major flood event.

FINAL REPORT

- The IICP will provide detail on the methodology and technical findings of each work package.

WHAT WE FOUND

Flood is a reality of life in Ipswich. But there are many types of floods, from the flash rise and fall of creeks after a big storm, through to a slow rise and fall of the river as a major flood flows through the catchment.

All floods have the potential to be dangerous, with water that is fast-flowing and deep. So it was vital that we modelled a variety of potential flood types and flood sizes and layered the impacts of each to understand the areas with the most significant flood risk across Ipswich. This also helps identify ways to reduce the risk for infrastructure or the community.

There was an enormous amount of computer modelling and data analysis behind this chapter. The outcome is an understanding of current and future flood risk from the city as a whole, through to 'hotspot' suburbs and individual buildings exposed to a combination of flood risk factors.

Across Ipswich, there are thousands of buildings identified as potentially exposed to hazardous floodwater, with hundreds of those being residential properties. Roads are also extensively impacted by floods, from minor local roads to major highways.

Also looking at community social vulnerability reveals that significant numbers of people with barriers to understanding or acting on flood information live within areas potentially exposed to dangerous floodwater.

As well as understanding our current flood risk, the chapter also considered flood exposure and damages in a future development scenario. This was not a 'crystal ball' exercise to try and predict the future, but rather to capture potential changes to river and creek catchments and understand areas that may require tailored land use planning responses. The future flood risk work also considered how climate change could impact a major flood event known as a 1% AEP.

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.

CONNECTION WITH OTHER IICP CHAPTERS

The work in the Current and Future Flood Risk chapter underpins every chapter within the IICP.

Emergency Management – By identifying houses and roads exposed to significant flood risk we can better plan disaster responses such as evacuation.

Physical Mitigation – Part of the analysis of large-scale options to reduce flood has been modelling flood risk and calculating flood damages across the city.

Community awareness and resilience – Modelling and data analysis provides priority areas for targeted awareness and resilience actions.

Land use planning – Understanding the city's current and future flood risk is essential for decisions on land use planning and future development.

Property specific actions – Modelling highlighted houses that may be considered for flood-resilient design or voluntary house purchase.

UNDERSTANDING FLOOD RISK

One of the greatest myths about flood is that there is somehow a line between 'wet' and 'dry' or 'safe' and 'unsafe'. Flood markers for events such as 1974 and 2011 can be used as a historical reference, but it is wrong to assume that properties 'above' that line are safe from every flood.

Instead, we should understand that flooding is a risk we all face. Some areas, particularly those close to waterways or in low-lying areas, may have a greater risk. But if we all understand our local flood risk and how it might impact on us, then we can be prepared and better respond.

Risk is a combination of likelihood and consequence.

We know that every year Ipswich has the potential to flood. But some floods are more likely than others. Minor floods, for example, might have a 1-in-10 likelihood of happening in any given year (a 10% AEP). Major floods, for example, might have a 1-in-100 chance of occurring in any given year (a 1% AEP).

Just as important is consequence of a flood. This includes the physical impact on infrastructure such as buildings and roads, as well as the economic, social and environmental effects. The deeper and faster the floodwater is, the more hazardous it becomes and the greater the consequence. Flood hazard is classified based on national guidelines, with six classifications:

H1	Generally safe for vehicles, buildings and people
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly
H4	Unsafe for vehicles and people
H5	All building types vulnerable to structural damage
H6	All building types vulnerable to failure

For every type of flood we considered, we produced a map showing the flood hazard classification of the water and where it flows. By layering these modelled outputs together, showing the likelihood and consequence of each flood (river, creek and urban overland flow) we can see an overall picture of flood risk across Ipswich. This helps identify suburbs and areas that face the highest levels of overall flood risk based on how often they might experience flooding and how dangerous that flooding is.

WHAT IS AEP

You may have heard terms such as '1-in-100 year flood'. While this is common language, the appropriate way to describe the likelihood of a flood event is 'Annual Exceedance Probability', or AEP.

For example, a 'minor' flood with a 10% AEP has a 1 in 10 chance of happening in any given year. A 'major' flood with a 1% AEP has a 1 in 100 chance of happening in any given year.

The worst case scenario flood is called the Probable Maximum Flood (PMF). It is a theoretical estimate which defines the extent of the floodplain – something that is extremely rare.

FLOOD EXPOSURE FOR INFRASTRUCTURE

There are particular flood risk factors that increase the hazard for infrastructure such as roads and buildings and critical or sensitive infrastructure and vulnerable uses such as hospitals, schools and nursing homes. This chapter modelled these impacts at a property-level across Ipswich.

Time to inundation: If it takes less than six hours for floodwaters to reach a property, then residents and businesses have a short time to react. They need to know their evacuation risk and be well-prepared and may need to evacuate before being advised by official sources.

Duration of inundation: If properties are affected by floodwaters for more than 36 hours, then residents need to be self-sufficient for a more extended period if they are sheltering at home (such as in upper levels that are less likely to be inundated). Longer inundation can also increase the risk of structural damage to buildings.

Flood islands: Areas that can become surrounded by water during a flood.

A 'Low flood island' is an area that becomes cut off as flood waters rise in more frequent flood events (such as a 1 in 10 AEP for example), and eventually the whole 'island' goes underwater in larger flood events. This is particularly dangerous as the only way to evacuate may be via air or boat.

A 'High flood island' becomes isolated from surrounding areas but remains dry, even up to the most extreme flood events so residents may need to be self-sufficient until roads reopen and utility services such as electricity, water and sewerage are re-connected.

Road immunity: Understanding how floodwater affects the road network is vital for planning evacuation routes. It is essential to understand which roads are likely to flood first or are prone to flooding in more frequent flood events, as well as roads that are unlikely to flood during particular flood events. This can help the community understand what routes to take and which ones might be affected, which is important to improve how each of us responds in an event.

FLOOD VULNERABILITY FOR COMMUNITY

There are particular characteristics of a community that can affect the ability to prepare, respond and recover from a flood. This chapter used Australian Bureau of Statistics data to analyse these indicators of vulnerability at a suburb-level across Ipswich.

Physical: Reflects the level of vulnerability based on assistance needs due to either age or disability. The analysis included the percentage of the population aged under five years; aged 65 years and over; aged 65 years and over and living alone; and those who require assistance with everyday living.

Social and economic: Reflects the level of vulnerability due to capacity to financially recover from damages. This included the percentage of people living in rental accommodation; households with an income less than $650 per week; and those who are unemployed.

Mobility: Reflects the level of ability for the community to self-evacuate during a flood. This included the percentage of households with no private vehicles; single-parent households; households with five or more people.

Awareness: Reflects the level of vulnerability due to the inability, level of awareness or barriers to access or understand flood warning information. This included the percentage of the population who were new to the area; with poor expertise in English; and with limited or no access to the internet.

FLOOD DAMAGES

The damage caused by flood goes beyond what you can see and touch – it's also the human and social impact from a disaster.

'Tangible' damages are direct impacts which can be calculated with reasonable accuracy as there is data from previous flood events. This includes direct damages such as internal, structural and external damage to buildings, as well as indirect damages such as the cost of clean-up and recovery activities.

'Intangible' damages are more complex as they result from the human and social impact of flooding. It's harder to calculate as a figure, but this chapter adopted a regionally-consistent method established as part of the Brisbane River Strategic Floodplain Management Plan.

All council flood study results including tangible and intangible results were used in the assessment of flood damages. The results were merged and processed as entire damages across Ipswich.

There are many limitations to creating an exact flood damages figure, such as:

- property floor levels can have a substantial impact on damages figures
- information on the value of commercial building contents was not available
- actual damage in a flood is almost always less than the potential damage.

As a result, we don't consider these figures to provide an 'exact bill' of costs likely to occur as a result of a flood event. Instead, it helps us to understand the magnitude of impact for different events. While the total damages for a particular flood event are important to consider, the 'Average Annual Damages' is the defining factor of how much flood damages are expected to cost the Ipswich community each year on average.

The IICP is a multi-pronged approach to reduce the overall impact of flooding, which reduces the 'Average Annual Damages'.

Another powerful outcome from this chapter was using data to assign an 'Average Annual Damages' figure to each property. With this data, the project team could visually understand damage hotspots across the city and use that to understand how to prioritise possible actions such as a flood-resilient design program. Areas with clusters of properties with high 'Average Annual Damages' were used to investigate the benefits of potential large-scale flood mitigation options.

WHAT HAPPENS NEXT

The modelling and data analysis in this chapter was used to underpin work across the rest of the IICP.

There were some limitations to the modelling and data, so it may be necessary for more detailed management plans on areas of high risk or concern after the IICP is complete.

City of Ipswich

Ipswich City Council
PO Box 191, Ipswich QLD 4305, Australia

Phone (07) 3810 6666
council@ipswich.qld.gov.au
Ipswich.qld.gov.au

Join us online:

/IpswichCityCouncil
/IpswichCouncil
/ipswich-city-council
/IpswichCityCouncilTV