

Why is flood modelling important?



Floods are a natural part of the water cycle and have always occurred in our region, however they can have significant impacts. We cannot rely on infrastructure alone to reduce flood risk; land use planning and community awareness programs also play a vital role in flood management.

Why is flood modelling important and what are the benefits?

Flood modelling is essential foundational information for all aspects of flood management, such as emergency response, planning controls, mitigation infrastructure, and community impacts.

What does flood modelling measure?

Flood models simulate the depth of water, the velocity and the potential inundation extent across the landscape for different size flood events.

Why Melbourne Water and councils invest in flood modelling

Investment in flood modelling is important as it can help predict and manage flood risks, positively impacting the community by reducing these risks. Flood modelling outputs can be used to:

- better protect the community
- protect property and infrastructure
- reduce the cost of flood damage to the community
- inform potential future flood mitigation options
- safeguard the environment.

Benefits to Melbourne Water and councils

Flood modelling provides multiple benefits to Melbourne Water and councils, including:

- creating data needed to produce flood maps
- improving data quality for drainage and flooding to be more aligned with the *Local Government Act, 1993*
- combining data sets that provide a comprehensive picture of flood risk across the entire drainage network
- informing flood management decisions and risk reduction
- comparison of variations and changes in flood risks over time
- improving flood and drainage asset planning for minor and major works
- providing data for use in direct enquiries, building regulations and permit referrals
- reducing reactive consequence management
- making informed decisions about development and land use
- informing flood risk communication with the community
- developing emergency response plans.^{1 2 3 4}

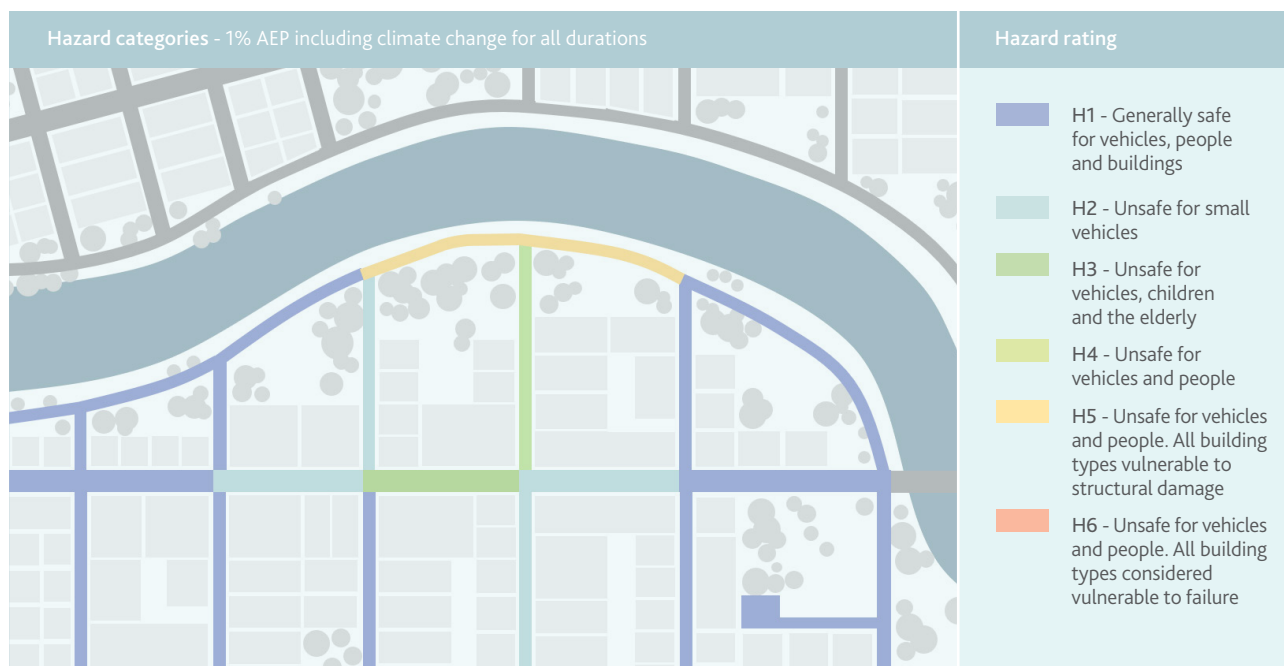
1 *Climate change in flood information and land use planning: Guideline (2023)*, Melbourne Water

2 *Melbourne Water-Monash Flood Mapping Program 2023-24 Project Brief*, Melbourne Water

3 *AM STA 6200 Flood Mapping Project Specifications: Standard (2023)*, Melbourne Water

4 *Flood Modelling Project Funding Agreement*, Melbourne Water

This map shows the maximum hazard category for each length of road for a 1% Annual Exceedance Probability (AEP) event. Most of the area is hazard category H1 (less hazardous) to H5 (more hazardous).



Infrastructure planning

Flood models enable proactive and strategic management of stormwater and flooding, supporting Melbourne Water and councils to:

- plan and assess the viability and prioritise flood mitigation projects
- proactively maintain the serviceability of the most critical pipes and pits by identifying which assets are the most important to reduce flooding
- simulate the impacts of climate change by incorporating factors such as sea level rise and increased rainfall projections.

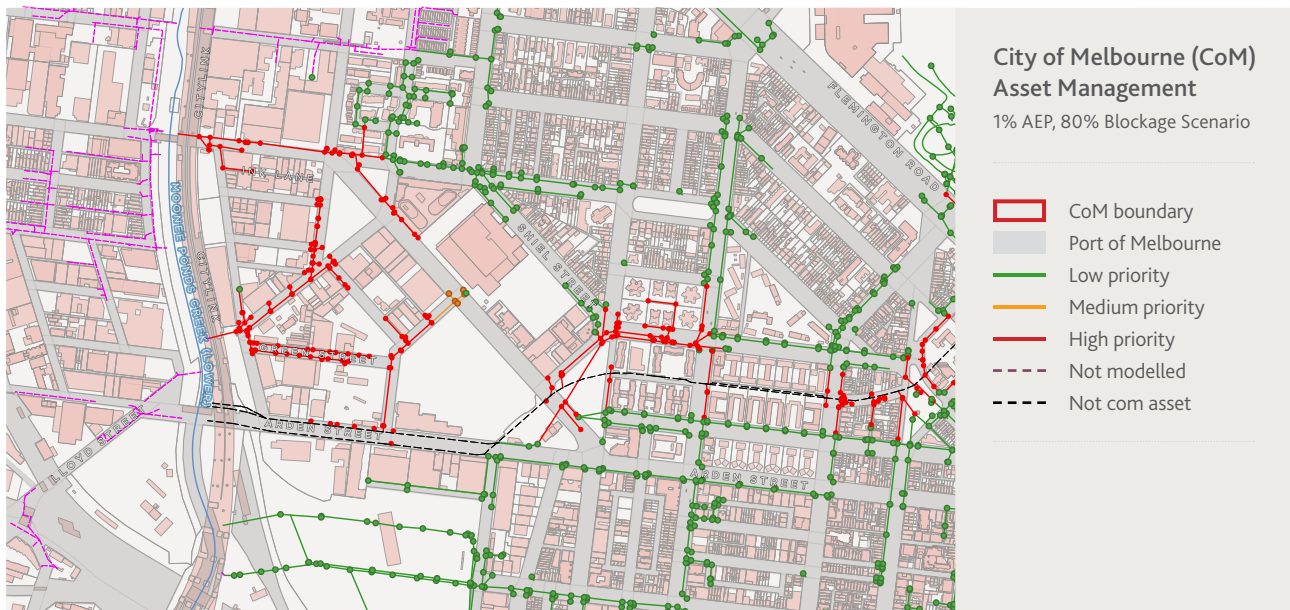
Simulating flooding to check infrastructure

Flood models can be used to simulate the impacts of fully or partially blocked pipes, identifying critical pipes and pits for maintenance and renewal, leading to improved maintenance efficiency.

Flood modelling can improve Melbourne Water and council infrastructure programs by:

- enabling prioritisation of routine maintenance schedules
- programming appropriate maintenance frequencies for key assets
- identifying critical pipes and pits to be checked for blockages before and after large rainfall events.





Testing mitigation solutions

Flood risks can be assessed and quantified using flood models to readily test the effectiveness of flood mitigation solutions, such as bigger pits, pipes or storage.

Assessing the effectiveness of proposed flood mitigation options through flood modelling gives confidence to move forward with flood solutions and allows for prioritisation and budgeting of mitigation options.

Waterway management

Increased water volume and speed can cause erosion and degradation when it enters waterways. Flood models can be used to identify where existing and persistent waterway impacts are occurring, to assess what type of interventions councils or Melbourne Water could invest in to improve waterway health outcomes. Figure 3 shows examples of bed shear stress output from a model, this can help to indicate erosion potential.



Planning scheme amendments and development

Flood modelling outputs are used to create planning scheme flood overlays, supporting appropriate development within a floodplain. Appropriate development helps mitigate the most serious impacts of flooding and helps to safeguard the community. Planning controls offer assurance, transparency and direction for property owners, developers, and other stakeholders in areas prone to flooding.

Flood models assist in assessing the potential impacts of current and proposed developments, to mitigate flood impacts, including the following:

- existing or planned drainage
- on-site water/flood detention
- use of alternative materials
- viability of basement construction
- safe entry and exit
- floor level requirements
- how the proposed changes impact flooding on adjacent properties and roads.

Providing information to the community

Flood modelling informs preparedness activities, as it enables Melbourne Water and councils to understand flood behaviour. This facilitates targeted awareness raising and builds community resilience.

Communities can make informed decisions and prepare for flood events through increased communication of flood risk based on flood models.

Flood model outputs help the community to better prepare for flooding by developing informed home emergency plans and take specific steps to reduce the risk of flood damage to properties.⁶

Emergency management

Emergency management teams benefit from accurate and up-to-date information regarding the areas that are most at risk of flooding, enabling better preparedness and response to flood events.^{7,8,9}

Melbourne Water and councils can jointly produce flood maps for improved emergency management by developing and updating flood models at the municipal scale together.

Municipal-scale flood maps show:

- the location of flooding
- the extent of flooding
- the depths of flooding
- the potential velocity flooding may reach
- the potential flood hazard and flow rates at critical locations
- affected roads, access and egress considerations.

Figure 3 - Bed shear stress map



Emergency management roles of each organisation:

- The State Emergency Service (SES) is the lead agency for flood preparedness and response in Victoria. They work within the existing emergency management governance structure to lead community preparedness.
- The SES deliver community awareness and education programs.
- Melbourne Water focuses on the awareness side, ensuring that flood information is easily accessible and understood by the community. Melbourne Water publish flood information on their Geographic Information System, Flood Zoom and Digital Twin Victoria.¹⁰

6 Flood Management Strategy 2021-31 - Action Plan 2021-26, Melbourne Water

7 Fact Sheet: Joint Municipal Flood Mapping Program, Melbourne Water

8 How the Victorian planning framework considers flood and climate impacts: A Melbourne Water perspective and forward plan, Melbourne Water

9 City of Melbourne Planning Scheme Amendment C384: Updates to Inundation Overlays (2021), Melbourne Water

10 FLOOD MODEL – inputs and endorsement process map, Melbourne Water