

How are flood model outputs used?

Flood model data can be used for various purposes, such as providing development advice, setting capital works programs, resolving land development issues, updating planning scheme overlays, and planning emergency response strategies.

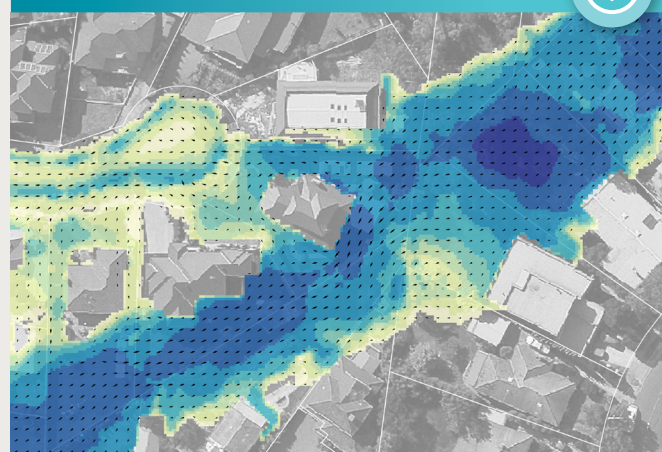
How flood model data can be used

The data directly from the model is generally shown as a raster dataset. A raster file is similar to an image file, comprising numerous pixels, each containing its own data. For example, a depth raster file would include information on the expected depth of water for a flood scenario on a pixel-by-pixel basis. The pixel size typically ranges from 1 metre to 10 metres for municipal-wide flood models.

Vector files are also used in flood mapping because they can represent geographic features such as properties and water bodies while maintaining scalability. This means that the file retains its resolution regardless of zoom level. Vector data can be overlaid with raster data to represent the impact on specific features such as properties, transportation networks, and public facilities.

Other information such as pipe flow rates or overland flow volumes are shown as vector line and point datasets in a GIS. These are simply lines and points that are added by the modeller to show flood information at a specific point or cross-section. Flood model outputs are all accessible in various GIS software packages, commonly ArcGIS, QGIS, ArcMap or MapInfo.

Figure 1 - Raster dataset



The data directly from the model is generally shown as a raster dataset.

Flood modelling outputs

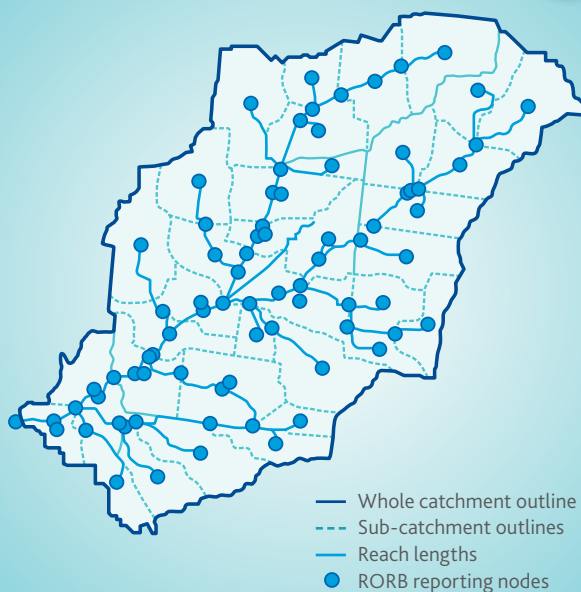
Flood model outputs include the Hydrology Model Report (RORB), Hydraulics Model Report (TUFLOW), Geographic Information System (GIS) data and final modelled flood extents of 20%, 10%, 5%, 2% and 1% Annual Exceedance Probability.

Geographic Information Systems

GIS data includes:

- hydrology models - RORB model schematic
- grid points with associated flood data and flow values
- plot output lines of flood levels, depth, velocities
- flood contours and flood extents
- levels of service and flood study maps
- flood hazard safety maps
- parcels and buildings flooded maps.

Figure 2 - RORB spatial file



RORB spatial file showing the model schematic

The role of flood data in community engagement

Community engagement is an important aspect of using flood data for awareness and preparedness. Ways to engage the community include:

- obtaining anecdotal information (e.g. flood marks) from the community to inform flood modelling
- through community newsletters and questionnaires, which can help to introduce the objectives of flood management and gather feedback from the community
- community flood awareness and preparedness information sessions
- allowing access to flood data to enable the community to be aware of the risks and take precautions to protect themselves and their property from flooding.

Flood data supports the planning scheme

Melbourne Water incorporates climate change flood modeling techniques into all future flood-related planning and development schemes.

Planning teams are usually the first officers to receive applications for development. Following the development application, flood models may need to be run to confirm and check reported development impacts and/or the effectiveness of mitigation works to address the identified flood impact for a proposed development.

Planning teams that can better understand the details of flood maps may be able to streamline referrals and request engineering teams to:

- undertake further modelling studies to inform development approvals
- interpret flood model results to provide guidance on setting building and planning conditions prior to a planning scheme amendment being endorsed

Having data easily accessible is key to being able to make quick and appropriate planning approval and building permit decisions. This means that flood information may need to be translated into a format that works within council's GIS or online mapping system. This is best undertaken during the flood modelling project. Other information such as flow rate lines and water surface contours can be produced to assist council engineers in the flood impact assessment decision-making process when assessing development applications.

Melbourne Water and councils should use the best available information they have when reviewing planning and building applications. Sometimes they may have flood modelling and mapping, but no planning tool to make a formal referral.

Communication is important if council wishes to use flood model outputs prior to changing or updating the Planning Scheme. If planning officers know that buildings or properties may be in a future overlay, they can send these applications to engineering departments for comment. Council can then talk to the applicant about requirements, but there is no planning scheme support to ask for changes.

The building regulations provide another avenue. Through the building permit process, building surveyors can ask for more information based on flood modelling or known flood risk. This can include changes in how the building is built so it can withstand flooding (i.e. raising floor levels).

In all cases, councils can use the *Guidelines for Development in Flood Affected Areas (Department of Energy, Environment and Climate Action DELWP, 2019)* to help decision makers interpret flood results to inform development proposal determinations.

'Filtering' the flood model output for Planning Scheme Amendments

Planning scheme overlays are based on flood modelling outputs from the flood study. The flood model outputs have large datasets of gridded data such as flood depth for each grid cell. The gridded data goes through a series of steps to define the final extent of the overlay. This is often referred to as 'filtering'.

Melbourne Water works with each council on this step, following an industry standardised process to generate agreed flood overlay extents that cover both Melbourne Water and council areas of responsibility.

Typically, this filtering process results in the formation of:

- Special Building Overlays (SBO)
- Land Subject to Inundation Overlays (LSIO)
- Flood Overlays (FO)

For further information on roles and responsibilities with respect to the administration of the overlays, refer to fact sheet Land and Development.

Figure 3 - Guidelines for Development



Guidelines for Development in Flood Affected Areas, 2019

