

Appendix G
Flood
Assessment
Study
Requirements



1 FLOOD ASSESSMENT REQUIREMENTS

A flood assessment shall be undertaken where development lies within **Potentially Flood Prone Land** or where required by this Plan.

The primary objective is to determine a reasonable assessment of the extent of flood prone land and the 1% AEP flood level, to identify what development controls may apply and whether a more detailed Flood Study is required (see Schedule 7).

Flood Assessment Requirements

Unless instructed otherwise, site specific Flood Assessments shall be prepared under the following guidelines:

- The assessment shall be undertaken and certified by a professional Civil/Hydraulic Engineer with qualifications suitable for admission as a corporate Member of Engineers Australia or other suitably qualified professional. A suitably qualified professional is someone who is a member of a recognised organisation and has suitable experience, education, qualifications and indemnity insurance to undertake the work competently.
- All levels shall be relative to Australian Height Datum (AHD).
- Topographic levels shall be to an accuracy of 0.1m, structures and the like shall be to an accuracy of 0.01m.
- Rainfall intensity/frequency/durations shall be determined from Australian Rainfall and Runoff (ARR) 1987 or later.
- Flows shall be assessed using a rainfall-runoff hydrologic model and compared to peak flows using the Rational Method from ARR for urban or rural catchments as appropriate.
- The 1% AEP and the PMF flood events shall be assessed using a steady state backwater analysis technique (or better) with a sensitivity analysis on assumed or assessed parameters.
- Flood heights shall be reported in metres to two (2) decimal places, while flood velocity shall be reported in metres per second to one (1) decimal place.
- The assessed flood levels shall be compared to historic flood levels in the vicinity, if available.
- Anecdotal data and assessments based on extrapolating levels or flows from other parts of the catchment or adjacent catchment will generally not be accepted unless it can be demonstrated that such an assessment is clearly conservative and results in an upper bound design level.
- Developers shall be requested/required to make data available to Council free of cost, to form part of a local government area database.
- The Flood Assessment report shall:
- Clearly set out the objectives of the assessment, the methodology adopted and provide sufficient detail to enable easy checking of calculations and validity of assumptions used.
 - Present all historical rainfall and flood height data.
 - Present complete model results including those for sensitivity testing
 - Include maps/figures of the catchment, site, model layout and cross section locations.
 - Include tabulations and/or figures model parameters and results.

- Present the findings in sufficient detail to support the validity of the conclusions.
- Identify appropriate access routes and emergency management procedures over the full range of flood up to the PMF.
- Provide survey data including Digital Terrain Model (in a format compatible with Council's GIS) and model data files arranged in an orderly file structure.
- Clearly demonstrate the flood impacts associated with the development (if applicable).

Where development is proposed below the 1% AEP flood level or where required otherwise by this Plan, a more detailed Flood Study shall be undertaken in accordance with part 2 of this appendix - Flood Study Requirements.

2 FLOOD STUDY REQUIREMENTS

A Flood Study shall be undertaken in accordance with these requirements where called for by this Plan.

Flood Studies are generally required to identify the flood behaviour in the vicinity of the development; to identify what impacts the development would have upon flood storage or flood flow, adjacent properties and the like, and/or to assess the impact of the development and/or the cumulative impacts associated with further similar developments.

Flood Study Requirements

Unless instructed otherwise, Flood Studies shall be prepared under the guidelines of the NSW Government's Floodplain Development Manual 2005 and the following:

- The study shall be undertaken and certified by a professional Civil/Hydraulic Engineer with qualifications suitable for admission as a corporate Member of Engineers Australia or other suitably qualified professional. A suitably qualified professional is someone who is a member of a recognised organisation and has suitable experience, education, qualifications and indemnity insurance to undertake the work competently.
- All levels shall be relative to Australian Height Datum (AHD).
- Topographic levels shall be to an accuracy of 0.1m, structures and the like shall be to an accuracy of 0.01m.
- Rainfall intensity/frequency/durations shall be determined from Australian Rainfall and Runoff (ARR) 1987 or later.
- Flows shall be determined using an appropriate computer based hydrologic model and compared to peak flows derived from the Rational Method of ARR for rural and urban catchments as appropriate (contemporary models such as RAFTS<lt RORB or WBNM would be acceptable).
- Local flood behaviour shall be determined using an appropriate computer based hydraulic model (steady state backwater analysis models such as HEC-RAS area acceptable where loss of flood storage is not an issue, otherwise the unsteady version of HEC-RAS or other 1D or 2D unsteady state models such as MIKE11, ESTRY, Rubicon, RMA-2, SOBEC or TUFLOW shall be used).
- Flood heights shall be reported in metres to two (2) decimal places, while flood velocity shall be reported in metres per second to one (1) decimal place.
- Where sufficient historical information is available, the hydrological and hydraulic models shall be calibrated and verified.
- For the purposes of the study, design floods shall include 5% AEP, 2% AEP, 1% AEP and PMF flood events.
- Sensitivity analysis shall be carried out to assess how much influence the model parameter values have on the results of the calibration, verification and design events (sensitivity analysis would normally include but not limited to variations in flow, friction, infiltration and energy losses at structures).

- Where development is proposed below the 1% AEP flood level, a hydraulic quantification of the impacts of the development shall be assessed over the full range of flood events.
- Developers shall be requested/required to make data available to Council, free of cost, to form part of a Council wide database.
- The flood study report shall:
 - Clearly set out the objectives of the study, the methodology adopted and provide sufficient detail to enable easy checking of calculations and validity of assumptions used.
 - Present all historical rainfall and flood height data.
 - Present complete model results including flood heights (levels), flow distributions, velocities and flood storage variations for all calibration, validation and design events.
 - Where development is proposed below the 1% AEP flood level, present the change in hydraulic behaviour at the structure, at the property boundaries and all sites across the floodplain affected by the development.
 - Include maps/figures of the catchment, site, model layout, cross section location, flood profiles, flood extents, flood contours, flow and velocity distribution.
 - Include tabulations and/or figures depicting the spatial distribution of model parameters, flow and velocity at each section.
 - Information on preliminary hydraulic categories and preliminary hazard categories.
 - Present the findings in sufficient detail to support the validity of the conclusions.
 - Identify appropriate access routes and emergency management procedures over the full range of flood up to the PMF.
 - Provide survey data including Digital Terrain Model (compatible with Council's GIS) and model data files arranged in an orderly file structure.
 - Clearly demonstrate the flood impacts associated with the development (if applicable).