

# 2.22

## GENERIC PROVISIONS FLOOD MANAGEMENT







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## Part 2 Generic Provisions

### 2.22 Flood Management

A flood is an overflow or accumulation of an expanse of water that submerges land. In the sense of flowing water, the word may also be applied to the inflow of the tide. Floods are a natural and inevitable event that communities must learn to live with while minimising risks to public health and safety, property and infrastructure.

This section recognises that there are some flooding risks that require development controls and guidelines in order to reduce or eliminate their impacts.

#### 2.22.1 Objectives

- O1** To maintain the existing flood regime and flow conveyance capacity.
- O2** To enable the safe occupation of, and evacuation from, land to which flood management controls apply.
- O3** To avoid significant adverse impacts upon flood behaviour.
- O4** To avoid significant adverse effects on the environment that would cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the river bank/watercourse.

**O5** To limit uses to those compatible with flow conveyance function and flood hazard.

**O5O6** To minimise risk to human life and damage to property.

#### 2.22.2 Land affected

This section complements Clause 6.3 (Flood planning) of Marrickville Local Environmental Plan 2011 (MLEP 2011). It applies to land identified on the DCP 2011 Flood Planning Area Map in Appendix 1 and land identified as being flood liable land on the DCP 2011 Flood Liable Land Map in Appendix 2.

For the purposes of this Section of the DCP:

Flood planning levels (FPLs) are the combinations of flood levels (derived from significant historical flood events or floods of specific annual exceedance probability (AEP) and freeboards selected for floodplain risk management purposes.

The Standard Flood adopted by Council is the 1% AEP or the 1 in 100 year flood. The Standard Flood has been used to derive the Flood Planning Levels.

The land identified on the DCP 2011 Flood Liable Land Map and on the DCP 2011 Flood Planning Area Map is based on information available to Council when the Plans were prepared. As new information becomes available, the DCP 2011 Flood Planning Area Map and the DCP 2011 Flood Liable Land Map may change.

##### 2.22.2.1 Flood planning level area (Cooks River)

The Flood Planning Area (Cooks River) identifies land likely to be affected by the 1% AEP 400-year flood, factoring in a rise in sea level of 400mm to the year 2050, (plus 500mm freeboard) of the Cooks River.

### 2.22.2.2 Flood planning ~~level~~ area (Overland Flow)

The Flood Planning Area (Overland Flow) identifies land (in accordance with Council's Flood Tagging Policy) likely to be affected by the ~~100-year~~ 1% AEP flood associated with various locations affected by local overland flooding.

#### 2.22.2.1 Flood planning level

The Flood Planning Level is the 1% AEP flood level plus freeboard. The applicable freeboard is 500mm unless an exception is described within a specific development control.

### ~~2.22.2.2~~ 2.22.2.2 Flood liable land

Land identified on the DCP 2011 Flood Liable Map as flood liable land identifies land within a flood planning area, and land likely to be affected by the probable maximum flood (PMF) of the Cooks River. This means that the map identifies some land as being within the Cooks River PMF area, but not within the Cooks River 100-year flood (plus 500mm freeboard) area.

**NB** *The 1% 100-year AEP flood is a flood that has a one per cent probability of occurring or being exceeded in any year. The probable maximum flood (PMF) is calculated to be the maximum flood likely to occur. Freeboard refers to a factor of safety and is expressed as a height above the flood level. Freeboard tends to compensate for factors such as wave action and localised hydraulic effects.*

### 2.22.3 Development affected

Flood management controls apply as follows:

- For land in a flood planning area, the controls apply to all development that requires development consent.
- For land that is flood liable land, but that is not in a flood planning area (land within the Cooks River PMF), the controls also apply to caravan parks, child care centres, correctional centres, emergency services facilities, hospitals, residential accommodation (except for attached dwellings, dwelling houses, secondary dwellings and semi-detached dwellings), and tourist and visitor accommodation.

### 2.22.4 Cooks River flood classification areas

Flood classifications have been applied to parts of the Flood Planning Area (Cooks River). The flood classifications are:

- Low hazard: Should it be necessary, people and their possessions could be evacuated by truck. Able bodied adults would have little difficulty wading out of the area.
- High hazard: Possible danger to life, evacuation by truck difficult, potential for structural damage, and social disruption and financial losses could be high.

The identified areas, and their flood classifications, are:

1. Riverside Crescent/Tennyson Street area (Marrickville and Dulwich Hill): Low hazard to high hazard.
2. Illawarra Road/Wharf Street area (Marrickville): Low hazard to high hazard.



3. Carrington Road area (Marrickville): Low hazard.
4. Bay Street area (Tempe): Low hazard to high hazard.

## 2.22.5 Controls

### General

~~C1~~ For proposed development, consideration must be given to such matters as the likely depth and nature of possible floodwaters, flood classification of the area (where applicable) and the risk posed to the development by floodwaters.

~~C1~~ A *Flood Risk Management Report* must be submitted for applications that are on land identified on the Flood Planning Area Map in Appendix 1 and land identified as flood liable on the Flood Liable Land Map in Appendix 2.

The report must be informed by flood information relevant to the subject property and surrounds, including the 1% AEP flood level, Flood Planning Level, Probable Maximum Flood (PMF) level and the Flood Hazard Category, as obtained from Council.

The report is not required where the assessed value of the works is under \$50,000 except where, in the opinion of Council, those works are likely to substantially increase the risk of flood to the subject or adjoining or nearby sites.

The report may be limited to a short report (Flood Risk Management Statement) for single residential dwellings, alterations and additions or change of use developments where the property is confirmed by Council as being subject only to low hazard flooding. The Flood Risk Management Statement must reference the source of flood information; specify the relevant flood information applicable to the site, then describe the proposed development and how it meets the relevant development controls.

If Council is concerned with the apparent loss of flood storage and/or flood or overland flow paths, and/or increase in flow velocities, and/or risk of life, on any type of development, the applicant may be requested to undertake further analysis in support of the proposal and detail it in a new/revised Flood Risk Management Report.

~~C2~~ The applicant must demonstrate:

- ~~i. That the development will not increase the flood hazard or risk to other properties and that details have been provided of the structural adequacy of any buildings works associated with the development with regard to the effects of possible floodwaters;~~
- ~~ii. That the proposed building materials are suitable;~~
- ~~iii. That the development is sited in the optimum position to avoid floodwaters and allow evacuation; and~~
- ~~iv. That all electrical services associated with the development are adequately flood-proofed.~~

~~C2~~ The Flood Risk Management Report must address:

- a. Description of the existing stormwater drainage system, including catchment definition.
- b. Extent of the 100 year Average Recurrence Interval (ARI) flood event in the vicinity of the development.

- c. The Flood Hazard Category affecting the subject site and surrounds. Where the site is subject to the high hazard flooding category, the Probable Maximum Flood (PMF) extent must be shown.
- d. Long and cross sections showing the Flood Planning Level(s) in relationship to the floor levels of all existing and proposed components of the development.
- e. Recommendations on all precautions to minimise risk to personal safety of occupants and the risk of property damage for the total development to address the flood impacts on the site during a 100 year ARI and PMF event. These precautions must include but not be limited to the following:
  - i. Types of materials to be used to ensure the structural integrity of the development for immersion and impact of velocity and debris for the 100 year ARI event and PMF (for high hazard);
  - ii. Waterproofing methods, including electrical equipment, wiring, fuel lines or any other service pipes or connections;
  - iii. A flood evacuation strategy (Flood Emergency Response Plan); and
  - iv. On site response plan to minimise flood damage, and provide adequate storage areas for hazardous materials and valuable goods above the flood level;
- f. Details of any flood mitigation works that are proposed to protect the development.
- g. Supporting calculations.
- h. The architectural/engineering plans on which the assessment is based.
- i. The date of inspection.
- j. The professional qualifications and experience of the author(s).

- C3** All applications for development must be accompanied by a survey plan including relevant levels to AHD (Australian Height Datum). Consideration must be given to whether structures or filling are likely to affect flood behaviour and whether consultation with other authorities is necessary.
- C4** Compliance with flood management controls must be balanced by the need to comply with other controls in this DCP.

### Controls for new residential development

- C5** Floor levels (Flood Planning Levels) of habitable rooms must be a minimum of 500mm above the standard flood level at that location. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.
- C6** Any portion of buildings below the Flood Planning Level) must be constructed from flood compatible materials (See Schedule 1).
- C7** Flood free access must be provided where practicable.

### Controls for residential development – minor additions

- C8** Once-only additions with a habitable floor area of up to 30m<sup>2</sup> may be approved with floor levels below the Flood Planning Level at that location if the applicant can demonstrate that no practical alternatives exist for constructing the extension above the standard flood level.





- C9** Additions greater than 30m<sup>2</sup> will be considered against the requirements for new residential development (refer C5, C6, and C7).
- C10** Any portion of buildings below the Flood Planning Level must be constructed from flood compatible materials.

### Controls for non-habitable additions or alterations

- C11** All flood sensitive equipment must be located above the Flood Planning Level at that location.
- C12** Any portion of buildings below the Flood Planning Level must be built from flood compatible materials.

### Controls for new non-residential development

- C13** Floor levels (except for access-ways) must be at least 500mm above the ~~standard-1% AEP~~ flood level, or the buildings must be flood-proofed to at least 500mm above the ~~standard-1% AEP~~ flood level. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.
- C14** Flood-free access must be provided where practicable.

### Controls for non-residential development – additions

- C15** Where the proposed development is for an addition to an existing building within the Flood Planning Area, the development may be approved with floor levels below the Flood Planning Level if the applicant can demonstrate that all practical measures will be taken to prevent or minimise the impact of flooding. In determining the required floor level, matters which will be considered include:
- The nature of the proposed landuse;
  - The frequency and depth of possible flooding;
  - The potential for life and property loss;
  - The suitability of the building for its proposed use; and
  - Whether the filling of the site or raising of the floor levels would render the development of the site impractical or uneconomical.
- C16** Any portion of the proposed addition below the Flood Planning Level must be built from flood compatible materials.

### Controls for change of use of existing buildings

- C17** Development consent for change of use of an existing building with floor levels below the Flood Planning Level will only be given where there is no foreseeable risk of pollution associated with the proposed use of the building in the event that the standard flood occurs.
- C18** In determining whether to grant development consent for change of use of an existing building with floor levels below the ~~standard-1% AEP~~ flood level, consideration will be given to whether the proposed development would result in increased flood risk for the property on which the building is located, or other land. In this regard, the following matters will be considered:
- The nature of the proposed use and the manner in which it is proposed to be carried out within the building or on the land; and
  - The foreseeable risk of pollution associated with the proposed use of the building/land in the event that the standard flood occurs.

### Controls for subdivision

- C19** Development consent for the subdivision of flood liable land may depend on whether the land to which the proposed development relates is unsuitable for any development made likely by the subdivision, by reason of the land likely to be subject to flooding.
- C20** Development consent for the subdivision of flood liable land may depend on whether the carrying out of the subdivision and any associated site works would:
- Adversely impede the flow of flood water on the land or land in its vicinity;
  - Imperil the safety of persons on that land or land in its vicinity in the event of the land being inundated with flood water; and
  - Aggravate the consequences of flood water flowing on that land or land in its immediate vicinity with regard to erosion or siltation.

### Controls for filling of land within the Flood Planning Area

- C21** Development consent will not be granted to filling of flood ways or high flood hazard areas. Consideration will only be given to granting development consent to the filling of other flood liable land where:
- Flood levels are not increased by more than 100mm by the proposed filling.
  - Downstream velocities are not increased by more than 10% by the proposed filling.
  - Proposed filling does not redistribute flows by more than 15%.
  - The potential for cumulative effects of possible filling proposals in that area is minimal.
  - The development potential of surrounding properties is not adversely affected by the filling proposal.
  - The flood liability of buildings on surrounding properties is not increased.
  - The filling creates no local drainage flow/runoff problems.

**NB** *The above criteria can only be addressed by the submission of a detailed flood study prepared by an appropriately qualified professional. Such a flood study should involve hydrologic (relating to rainfall and runoff) and hydraulic (relating to water flow in water courses) analysis of the floodplain and the effects of the proposed filling on flood levels. The report should address the seven matters listed in C21. Data to be collected for the flood study should include survey cross-sections of the river system (where applicable) to provide representative topographic information. The flood study should be calibrated against recorded flood data, inconsistent data should be identified, and discrepancies should be explained. Where the proposal has the potential to increase flood levels, depths, velocities and/or the risk to life or property, through loss of flood storage and/or blockage/ redirection of overland flowpaths, the Flood Risk Management Report supporting the development application must include detailed flood analysis. Such analysis should address compliance with all relevant development controls and include survey cross-sections to provide representative topographic information. The proponent should approach Council to determine available Council flood studies for the area, with the analysis based on or calibrated against relevant studies. In some cases, flood model data can be obtained from Council, subject to application and payment of fees.*



## Controls for land uses on flood liable land identified on the DCP 2011 Flood Liable Land Map

- C22** A site emergency response flood plan must be prepared in case of a PMF flood.
- C23** Adequate flood warning systems, signage and exits must be available to allow safe and orderly evacuation without increased reliance upon the State Emergency Service (SES) or other authorised emergency services personnel.
- C24** Reliable access for pedestrians or vehicles must be provided from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF.

## Controls for garages, carports, open car parks and underground basement garages

- C25** The floor level of new enclosed garages must be at or above the 100 year ARI flood level plus 200mm. In extenuating circumstances, consideration may be given to a floor level at a lower level, being the highest practical level but no lower than 180mm below the 100 year ARI flood level, where it can be demonstrated that providing the floor level at the Flood Planning Level is not practical within the constraints of compliance with Australian Standard AS/NZS 2890.1 Parking facilities as amended.
- C26** The floor levels of open car park areas and carports must meet the same criteria as above for garages. In extreme circumstances, for single dwelling residential development, a floor level below the 1% AEP minus 180mm may be accepted for a single car space, subject to bollards being provided along the 'free' perimeter (excluding the vehicle entry on one side only) at 1.2m intervals and the floor level being raised as high as practical within the constraints of compliance with Australian Standard AS/NZS 2890.1 Parking facilities as amended.
- C25C27** On properties with a low flood hazard classification, basement (below natural ground level) car parking must have all access and potential water entry points above the Flood Planning Level, and a clearly signposted flood free pedestrian evacuation route provided from the basement area separate to the vehicular access ramps. Refer to C31(f) for basement car parking in properties affected by High Hazard flooding further considerations will apply. Freeboard protection of 500mm must be provided above the standard flood within the internal driveway prior to descending into the underground garage.
- C28** Basement garages must include:
  - a. Suitable pumps must be provided within the garage to allow for the drainage of stormwater should the underground-basement garage become inundated during flooding.
  - b. Adequate flood warning systems, signage and exits must be available to allow safe and orderly evacuation without increased reliance upon the SES or other authorised emergency services personnel.
- C26C29** For parking areas servicing more than two parking spaces, Reliable access for pedestrians or vehicles must be provided from the building, commencing at a minimum level all parking areas, to a safe haven which is above the PMF, equal to the lowest habitable floor level to an area of refuge above the PMF.

## 2.22.6 SCHEDULE 1 – Flood compatible materials

Building component	Flood compatible material
<b>Flooring and sub-floor</b>	<ul style="list-style-type: none"> <li>concrete slab-on-ground monolith</li> <li>suspended reinforced concrete slab</li> </ul>
<b>Floor covering</b>	<ul style="list-style-type: none"> <li>clay tiles</li> <li>concrete, precast or in situ</li> <li>concrete tiles</li> <li>epoxy, formed-in-place</li> <li>mastic flooring, formed-in-place</li> <li>rubber sheets or tiles with chemicals-set-adhesive</li> <li>silicone floors formed-in-place</li> <li>vinyl sheets or tiles with chemical-set adhesive</li> <li>ceramic tiles, fixed with mortar or chemical-set adhesive</li> <li>asphalt tiles, fixed with water resistant adhesive</li> </ul>
<b>Wall structure</b>	<ul style="list-style-type: none"> <li>solid brickwork, blockwork, reinforced, concrete or mass concrete</li> </ul>
<b>Roofing structure</b> (for situations where the relevant flood level is above the ceiling)	<ul style="list-style-type: none"> <li>reinforced concrete construction</li> <li>galvanised metal construction</li> </ul>
<b>Doors</b>	<ul style="list-style-type: none"> <li>solid panel with water proof adhesives</li> <li>flush door with marine ply filled with closed cell foam</li> <li>painted metal construction</li> <li>aluminium or galvanised steel frame</li> </ul>
<b>Wall and ceiling linings</b>	<ul style="list-style-type: none"> <li>fibro-cement board</li> <li>brick, face or glazed</li> <li>clay tile glazed in waterproof mortar</li> <li>concrete</li> <li>concrete block</li> <li>steel with waterproof applications</li> <li>stone, natural solid or veneer, waterproof grout</li> <li>glass blocks</li> <li>glass</li> <li>plastic sheeting or wall with waterproof adhesive</li> </ul>
<b>Insulation windows</b>	<ul style="list-style-type: none"> <li>foam (closed cell types)</li> <li>aluminium frame with stainless steel rollers or similar corrosion and water resistant material</li> </ul>
<b>Nails, bolts, hinges and fittings</b>	<ul style="list-style-type: none"> <li>brass, nylon or stainless steel</li> <li>removable pin hinges</li> <li>hot dipped galvanised steel wire nails or similar</li> </ul>



## **SCHEDULE 1: Flood compatible materials (cont.)**

### **Electrical and mechanical equipment**

For development constructed on land to which this section of the DCP applies, the electrical and mechanical materials, equipment and installation must conform to the following requirements:

#### **Main power supply**

Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, must be located above the relevant flood level. Means must be available to easily disconnect the dwelling from the main power supply.

#### **Wiring**

All wiring, power outlets, switches, must be to the maximum extent possible, located above the maximum flood level. All electrical wiring installed below this level must be suitable for continuous underwater immersion and must contain no fibrous components. Each leakage circuit-breaker (core balance relays) must be installed. Only submersible type splices must be used below maximum flood level. All conduits located below the relevant designated flood level must be so installed that they will be self-draining if subjected to flooding.

#### **Equipment**

All equipment installed below or partially below the relevant flood level must be capable of disconnection by a single plug and socket assembly.

#### **Reconnection**

Should any electrical device and/or part of the wiring be flooded it must be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.

### **Heating and air conditioning systems**

Where viable, heating and air conditioning systems should be installed in areas and spaces of the development above maximum flood level. When this is not feasible, every precaution must be taken to minimise the damage caused by submersion according to the following guidelines:

#### **Fuel**

Heating systems using gas or oil as fuel must have a manually operated valve located in the fuel supply line to enable fuel cut-off.

#### **Installation**

Heating equipment and fuel storage tanks must be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks must be vented to an elevation of 600mm above the relevant flood level.

#### **Ducting**

All ductwork located below the relevant flood level must be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, a closure assemble operated from above relevant flood level must protect the ductwork.