

4.01 Flood Management

Amendment history

Version Number	Date Adopted by Council	Commencement Date	Amendment Type
1	15/11/2011	15/06/2012	New

Savings provisions

Any development application lodged but not determined prior to this section coming into effect will be determined as though the provisions of this section did not apply.

Land to which this section applies

This section applies to all development on flood prone (= flood liable) land in the Newcastle Local Government Area, as defined by Council's Flood Policy - (adopted 2004) and *The NSW Government Floodplain Development Manual – the management of flood liable land (2005)*, being "land susceptible to flooding by the PMF event" *.

A flood information application form can be obtained from Council's website: (www.newcastle.nsw.gov.au) or Council's Customer Contact Centre, 12 Stewart Avenue, Newcastle West NSW 2302.

Development (type/s) to which this section applies

All of these provisions apply to all development on flood prone land with the exception of minor additions to existing buildings.

Minor additions (refer to definitions) are allowable without further reference to the provisions of this section, provided that the flood risk is not unreasonably increased.

Applicable environmental planning instruments

The provisions of the Newcastle Local Environmental Plan 2012 also applies to development applications to which this section applies.

In the event of any inconsistency between this section and the above environmental planning instrument, the environmental planning instrument will prevail to the extent of the inconsistency.

Note 1: Additional environmental planning instruments may also apply in addition to those listed above.

Note 2: The *Environmental Planning and Assessment Act 1979* enables an environmental planning instrument to exclude or modify the application of this DCP in whole or part.

*Supplementary note (not required for application of this DCP): This definition remains unchanged to that defined by the previous Element 4.3 Flood Management Newcastle DCP 2005.

Associated technical manual/s

- *The NSW Government Floodplain Development Manual – the management of flood liable land (2005)*. This Manual is available from the NSW Government website at the time of writing (www.environment.nsw.gov.au) or a copy may be viewed at Council's Customer Enquiry Centre.

Additional information

More information about floodplain risk management in the Newcastle Local Government Area can be found at Council's website. Copies of various flood studies and reports are also available for viewing at Council's Customer Enquiry Centre.

Definitions

A word or expression used in this development control plan has the same meaning as it has in Newcastle Local Environmental Plan 2012, unless it is otherwise defined in this development control plan.

Other words and expressions referred to within this section are defined within Part 9.00 – Glossary and include:

- **Annual exceedance probability (AEP)** – is the probability that a flood of a given or larger magnitude will occur within a period of one year. Its reciprocal is equivalent to average recurrence interval.
- **Average recurrence interval (ARI)** – the average period between the recurrence of a storm event of at least a given rainfall intensity. The ARI represents a statistical probability. For example, a 10 year ARI indicates an average of 10 events over 100 years. The ARI is not the period between actual events.
- **Basement garage** – is a garage normally used for the parking of vehicles with the floor constructed below the street level.
- **Flood fringe areas** - the remaining area of the floodplain not included in flood storage areas and floodways. Flood fringe areas can usually be developed without reference to how that development will affect the flood behaviour either upstream or downstream.
- **Flood information certificate** - is a certificate issued by Council that provides information about the likelihood, extent or other characteristics of flooding known to affect a specified parcel of land.
- **Flooding** - is relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river estuary, lake or dam, and/or local overland flooding associated with major drainage, and/or coastal inundation resulting from super-elevated sea levels and/or waves , excluding tsunamis. Accordingly, flooding may occur due to a variety of reasons, either separately or in combination including:
 - river flooding - caused by a river or stream overtopping its banks onto the surrounding floodplain
 - urban flooding - caused by urban stormwater flows during an intense rainfall event, such as surface flows, surcharge from piped drainage systems or overflow from man-made stormwater channels.
 - coastal inundation - caused by sea water inundation due to king tides, storm surge, barometric effects, shoreline recession, subsidence, the enhanced greenhouse effect or other causes.

- **Flood liable land** - is synonymous with flood prone land (ie) land susceptible to flooding by the PMF event on the basis of flood information held by Council. Note that the term flood liable land covers the whole floodplain, not just that part below the FPL (see flood planning area).
- **Floodplain** - an area of land along the course of a river that is subject to periodic inundation due to the river overtopping its bank. It is commonly delineated by the area that would be flooded by an event with a given average recurrence interval.
- **Flood planning area** - the area of land below the FPL. Note that development controls that mainly relate to risk to property apply to the flood planning area, but other development controls mainly relating to risk to life and floodways and flood storages may apply to the remainder of flood liable (prone) land.
- **Flood planning level (FPL)** - is the level of the planning flood plus an additional freeboard as advocated in the NSW Floodplain Development Manual. For purposes of this element, the planning flood is the 1% Annual Exceedance Probability flood, and the freeboard is generally 500mm.
- **Flood prone land** - is land that, on the basis of flood information held by Council, is estimated to be inundated by the probable maximum flood.
- **Flood refuge** - is an area free of flooding. It can be either higher ground or it could be in the form of an area of the building, either constructed specifically for the purpose or as an intrinsic part of the building.
- **Flood storage area** - is an area where flood water accumulates and the displacement of that floodwater will cause a significant redistribution of floodwaters, or a significant increase in flood levels, or a significant increase in flood frequency. Flood storage areas are often aligned with floodplains and usually characterised by deep and slow moving floodwater.
- **Floodway** - those areas of the floodplain where a significant discharge of water flows during floods; often aligned with obvious naturally defined channels. Floodways are areas which, even if only partially blocked, would cause a significant redistribution of flood flow or increase in flood levels, which may in turn adversely affect other areas.
- **Freeboard** - is a margin applied to the estimation of flood levels to compensate for factors such as wave action, localised hydraulic behaviour, climatic change and modelling confidence.
- **Hydraulic behaviour threshold** - is a set of circumstances (that may or may not be present at some locations at some time in any particular sized flood) that constitutes a particular level of hydraulic impact, as specified below:

H ₁	hydraulically suitable for parked or moving cars $V < 0.5\text{m/sec}$ and $d < 0.3\text{m}$
H ₂	hydraulically suitable for parked or moving heavy vehicles and wading by able-bodied adults $V < 2\text{m/sec}$, $d < 0.8\text{m}$ and $v < 3.2 - 4*d$
H ₃	hydraulically suitable for light construction (<i>eg. timber frame and brick veneer</i>) $v < 2\text{m/sec}$, $d < 2\text{m}$, $v*d < 1$
H ₄	hydraulically suitable for heavy construction (<i>eg. steel frame and reinforced concrete</i>) $v < 2.5\text{m/sec}$, $d < 2.5\text{m}$ and $v*d < 2.5$
H ₅	generally unsuitable

Life hazard - is the 'risk to life hazard category' as a combination of hydraulic hazard category, warning time and escape path availability, applied to all floods, up to and including the PMF (as required by the NSW Government Floodplain Development Manual for the management of personal safety). For simplicity, the Life Hazard categories set out below are only assessed at the PMF in the application of this DCP section, on the assumption that once the PMF is managed for personal safety, all other lesser floods will also be managed. The life hazards "L1" to "L5" are defined below*:

				Hydraulic Behaviour Threshold				
				H1	H2	H3	H4	H5
Catchment Response Time	Riverine			L1				
	Flash	Escape Route to flood free land	available	L2		L4		L5
			not available	L3				

L1	Riverine flooding where there is sufficient time to remove people from the risk to their lives by means of formal community evacuation plans. Not relevant to flash flooding scenarios such as the Wallsend Catchment.
L2	Short duration flash flooding with no warning time in circumstances where there is an obvious escape route to flood free land with enclosing waters during the PMF which are suitable for wading or heavy vehicles ie. hydraulic threshold does not exceed H2. On site flood refuge not necessary and normal light frame residential building are appropriate.
L3	Short duration flash flooding with no warning time and no obvious escape route to flood free land with enclosing waters during the PMF which are suitable for wading or heavy vehicles ie. hydraulic threshold does not exceed H2. On site flood refuge not necessary and normal light frame residential buildings and appropriate.
L4	Short duration flash flooding with no warning time and enclosing waters during the PMF not suitable for wading or heavy vehicles ie. hydraulic threshold exceeds H2. On site refuge is necessary and if hydraulic threshold exceeds H3, heavy frame construction or suitable structural reinforcement required.
L5	Short duration flash flooding with no warning time and enclosing waters during the PMF have too much energy for normal heavy building construction and therefore it is generally not possible to construct a flood refuge ie. hydraulic threshold is H5. The risk to life is considered extreme and the site is unsuitable for habitation, either residential or short stay.

*Supplementary note (not required for application of this DCP): This definition remains unchanged to that defined by the previous Element 4.3 Flood Management Newcastle DCP 2005.

- **Minor additions** - (for the purpose of section 4.01 Flood Management) are additions that fall below the following limits:

Existing building area	Minor addition limit
< 250m ²	50m ²
250m ² – 750m ²	20% of the existing building area
>750m ²	150m ²

- **Occupiable rooms** – rooms of buildings where people may be present in the normal use of the building.
- **Planning flood** - is the flood event from which the flood planning level is derived. It is expressed in terms of the probability of the event being exceeded, usually within any given year (see annual exceedance probability).
- **Probable maximum flood (PMF)** - is the largest flood that could conceivably occur at a particular location.
- **Probable maximum flood level** - the flood level calculated to be the maximum which is likely to occur.
- **Property hazard** - is the 'risk to property hazard category' as a combination of hydraulic behaviour threshold and its effect on property. The risk to property hazards are based on the peak hydraulic behaviour thresholds (H_1 - H_5) determined for the 1 in 100 annual chance flood. Five risks to property hazard categories (P1-P5) are defined as P1-P5 correlate directly with H1-H5 as follows*:

P ₁	Parked or moving cars remain stable ie. equivalent to areas of H ₁ at the Flood Planning Event.
P ₂	Parked or moving heavy vehicles remain stable ie. equivalent to areas of H ₂ at the Flood Planning Event.
P ₃	Suitable for light construction (eg. timber frame, masonry and brick veneer) ie. equivalent to areas of H ₃ at the Flood Planning Event.
P ₄	Suitable for heavy construction (eg. steel frame, reinforced concrete) ie. equivalent to areas of H ₄ at the Flood Planning Event.
P ₅	Hydraulically unsuitable for normal building construction is equivalent to areas of H ₅ at the Flood Planning Event.

The distribution of P₁-P₅ is identical to the related H₁-H₅ (at the Flood Planning Event).

- **Tsunami** - a series of ocean waves with very long wavelengths (typically hundreds of kilometres) caused by large-scale disturbances of the ocean, such as:
 - earthquakes
 - landslide
 - volcanic eruptions
 - explosions
 - meteorites.

*Supplementary note (not required for application of this DCP): This definition remains unchanged to that defined by the previous Element 4.3 Flood Management Newcastle DCP 2005.

Aims of this section

1. To guide the development of floodprone land, applying balanced strategies to economically, socially and environmentally manage risk to life and property.
2. To set aside appropriate areas to convey and/or store flood waters.
3. To ensure development, when considered both individually and as an instance of cumulative development trends, will not cause unreasonable adverse flooding impacts in other locations.
4. To implement the principles of *The NSW Government Floodplain Development Manual (2005)* to new development as applicable.

Notes: Tsunami and very minor nuisance flooding (such as the trapping of surface runoff in a road shoulder or against a building) are specifically excluded from the application of the DCP.

The life risk hazard category "L1" assumes people will respond to warnings and safely evacuate to the safety flood free high ground. Additional requirements may be necessary to manage personal safety in riverine flooding if there is evidence that a lack of response is likely, and this may lead to life threatening situations.

4.01.01 Floodways

Objectives

1. Retain floodways in a condition capable for the conveyance of essential flood flow.

Controls

1. No building or structure erected and no land filled by way of the deposition of any material within any area identified as a floodway except for minor alterations to ground levels which do not significantly alter the fundamental flow patterns for:
 - (a) roads
 - (b) parking
 - (c) below ground structures
 - (d) landscaping.
2. Where dividing fences across floodways are unavoidable, they are constructed only of open type fencing that does not restrict the flow of flood waters and are resistant to blockage. New development shall be designed to avoid fences in floodways.

Note: Floodways are shown on a flood information certificate obtainable on application from Council. In general, development other than low level driveways and parking areas is not practicable in floodways. Floodways are not necessarily indicative of high hazard flow, although the two will generally coincide. It is necessary to separately investigate hazard in order to determine if parking areas and the like are suitable within floodways.

4.01.02 Flood storage areas

Objectives

1. Protect flood storage areas to provide storage of floodwaters to ensure that other areas are not significantly worse off due to development of the site.

Controls

1. Not more than 20% of the area of any development site in a flood storage area is filled. The remaining 80% is generally developed allowing for underfloor storage of floodwater by the use of suspended floor techniques such as pier and beam construction.
2. Where it is proposed to fill development sites, the fill does not impede the flow of ordinary drainage from neighbouring properties, including overland flow.

Note: Flood storage areas are identified on the flood information certificate.

4.01.03 Management of risk to property

Objectives

1. Manage risks to property up to an acceptable level of risk (the flood planning level).

Controls

1. Floor levels of all occupiable rooms of all buildings are not set lower than the FPL.
2. Garage floor levels are no lower than the 1% Annual Exceedance Probability Event. However, it is recognised that in some circumstances this may be impractical due to vehicular access constraints. In these cases, garage floor levels are as high as practicable.
3. Basement garages may be acceptable where all potential water entry points are at or above the probable maximum flood (PMF), excepting that vehicular entry points can be at the FPL. In these cases, explicit points of refuge are accessible from the carpark in accordance with the provisions for risk to life set out below.
4. Electrical fixtures such as power points, light fittings and switches are sited above the FPL unless they are on a separate circuit (with earth leakage protection) to the rest of the building.
5. Where parts of the building are proposed below the flood planning level, they are constructed of water-resistant materials.
6. Areas where cars, vans and trailers are parked, displayed or stored are not located in areas subject to property hazard of P2 or higher. Containers, bins, hoppers and other large floatable objects also are not stored in these areas. Heavy vehicle parking areas are not located in areas subject to property hazard P3 or higher.

7. Timber framed, light steel construction, cavity brickwork and other conventional domestic building materials are generally not suitable forms of construction where the property hazard is P4 or higher. Where property hazard is P4, the structure is certified by a practising structural engineer to withstand the hydraulic loads (including debris) induced by the flood waters.
8. Property hazards of P5 are generally unsuitable for any type of building construction and building is discouraged from these areas. Where building is necessary, the structure is certified by a practising structural engineer to withstand the hydraulic loads (including debris) induced by the flood waters.

Note: This provision limits the risk of inundation relative to the flood planning level (FPL). The FPL is the water surface level of the relevant 'planning flood' plus a freeboard. Compliance with the flood planning level does not guarantee that flooding will not affect work carried out in accordance with Risk to Property Development Controls: In most cases, the flood planning levels and the property hazards are given on the flood information certificate for the relevant property. The "planning flood" for all development in all areas of Newcastle is the 1% Annual Exceedance Probability event.

4.01.04 Management of potential risk to life

Objectives

1. Only permit new development or redevelopment where the full potential risk to life from flooding can be managed for all floods up to and including the PMF.

Controls

Risk to life category L5

1. Risk to life hazards of L5 are generally unsuitable for any type of building construction and building is discouraged from these areas. Reliable safe escape to high ground is likely not possible and normal building construction would likely suffer structural failure from the force of floodwaters, so that any people seeking refuge in the building would likely perish. Where building is necessary, the structure is certified by a practising structural engineer to withstand the hydraulic loads (including debris) induced by the flood waters.

Islands

2. The formation of islands in the floodplain during a flood is a potentially dangerous situation, especially when floods larger than the FPL totally inundate the island for an extended period. Development of such land is considered with great care.

On-site refuge

3. On-site refuge is to be provided for all development where the life hazard category is L4 unless the proposed development is less than 40m from the perimeter of the PMF extent and the higher ground is accessible.

Note: Refuge can be in the form of on-site refuge or convenient access to flood free ground. In general, it is not acceptable to rely on refuge provided by or on other development sites. In all cases where on site refuge is provided, it is to be both intrinsically accessible to all people on the site and an integrated part of the development (eg a second storey with stair access). The route to the refuge is to be fail safe, plainly evident and self-directing. In most cases, life hazard categories are nominated on the flood information certificate for the relevant property.

Standards for on-site refuge

4. Where on-site refuge is required for a development, it should comply with the following minimum standards:
 - (a) The minimum on-site refuge level is the level of the PMF. On-site refuges are designed to cater for the number of people reasonably expected on the development site and are provided with emergency lighting.
 - (b) On-site refuges are of a construction type able to withstand the effects of flooding. Design certification by a practising structural engineer that the building is able to withstand the hydraulic loading due to flooding (at the PMF).

Note: In most cases, the potential risk to life hazards categories are given on the flood information certificate for the relevant property.

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