
PART B: Site planning controls

Section B1(b) Flood management

Applies to new development on flood prone land with flood studies undertaken after the release of the 2019 Australian Rainfall and Runoff Guidelines

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1.0 Introduction

Flood management is an essential aspect of land use planning and development. Flooding affects up to one third of all properties in the local government area (LGA), and can cause significant damage to property and infrastructure, disrupt the community and threaten public safety. Many old swamplands and floodplains are developed. New development needs to respond to the local environment as well as future intensifying flood risks associated with climate change.

2.0 Application

This section applies to all development on flood prone (flood liable) land where flood mapping after the release of the *2019 Australian Rainfall and Runoff Guidelines (ARR 2019)* is available, including:

- Land that is flood prone due to flooding from the Throsby, Cottage or Styx creek catchments (refer Post 2019 Flood Study area), and
- All other flood prone land where flood studies are undertaken to inform development after the release of ARR 2019.

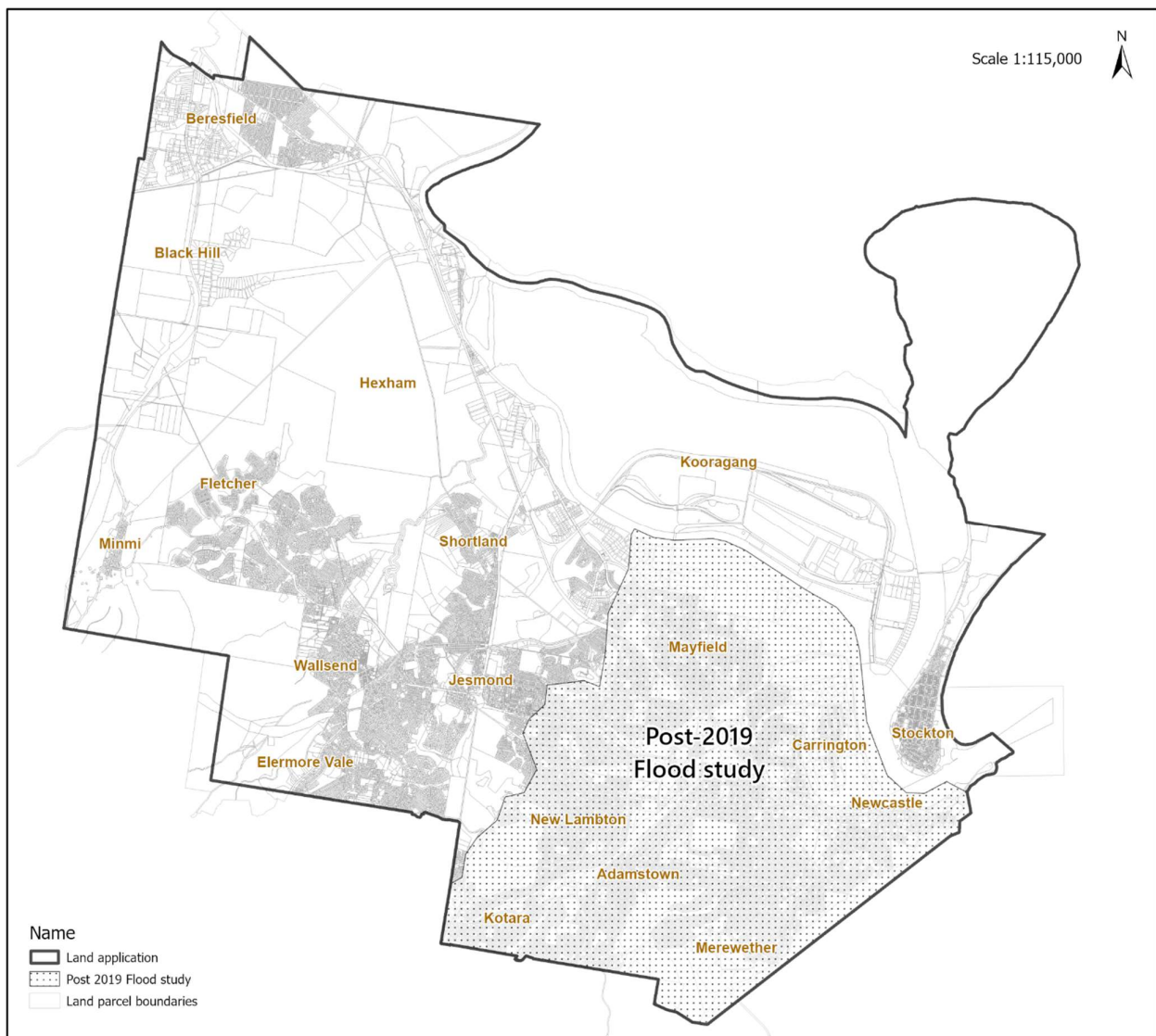


Figure B1(b).01: Application map

Flood prone (flood liable) land is defined by the (NSW) Department of Planning and Environment's *Flood risk management manual: the policy and manual for the management of flood liable land* (2023), being "land susceptible to flooding by the Probable Maximum Flood (PMF) event".

A flood information application form can be obtained from www.newcastle.nsw.gov.au or the Customer Contact Centre, 12 Stewart Avenue, Newcastle West NSW 2302.

This section applies 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.

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 this section.

3.0 Objectives

1. Guide the development of flood prone land, applying balanced strategies to economically, socially and environmentally manage risk to life and property.
2. Set aside appropriate areas to convey and/or store flood waters.
3. 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. Implement the principles of the (NSW) Department of Planning and Environment's *Flood risk management manual: the policy and manual for the management of flood liable land (2023)* to development as applicable.

4.0 Definitions

A word or expression has the same meaning as it has in *Newcastle Local Environmental Plan 2012* ([LEP 2012](#)) unless otherwise defined. Other words and expressions 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 (ARI).
- **Basement garage** – is a garage normally used to park vehicles with its floor below the street level.
- **Flood fringe areas** – means the remaining area of flood prone land 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 City of Newcastle (CN) 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 tsunami. Flooding may occur for a variety of reasons, either separately or in combination including:
 - river flooding - caused by a river or stream overtopping its banks onto a 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 manmade 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** – also flood prone land is land susceptible to flooding by the PMF event on the basis of flood information held by CN. Note the term flood liable land covers the whole floodplain, not just that part below the flood planning area (FPL).
- **Floodplain** – is an area of land along the course of a river 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 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 area plus an additional freeboard as advocated in the NSW Floodplain Development Manual. For purposes of this element, the planning flood is the 1% 2050 AEP flood, and the freeboard is generally 500mm.
- **Flood prone land** – is land that, on the basis of flood information held by CN, is estimated to be inundated by the probable maximum flood (PMF).
- **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 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.
- **Hazard Category** – Flood hazard classification is an assessment of how hazardous the physical conditions produced by a flood can be to people, cars, infrastructure and buildings if they were exposed to the flood event, independent of the population at risk. Consideration is given to hazard classification for a range of flood events including the planning flood and PMF to identify areas that require specific constraints and management. Hazard categories are defined in the *Australian disaster resilience Handbook Collection, Guideline 7-3 Flood hazard – Supporting document for the implementation of Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, 2017 (Australian Institute for Disaster Resilience)*. **Table B1(b).01**, **Table B1(b).02**, and **Figure B1(b).01** above and replace Hydraulic Behaviour thresholds in studies undertaken since 2019.

Hazard category	Description
H1	Generally safe for people, vehicles and cars
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly
H4	Unsafe for vehicles and people
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure

Table B1(b).01: Hazard categories

Hazard category	Category limit m ² /s	Maximum flood depth (D) m	Maximum flood velocity (V) m/s
H1	$D \times V \leq 0.3$	0.3	2.0
H2	$D \times V \leq 0.6$	0.5	2.0
H3	$D \times V \leq 0.6$	1.2	2.0
H4	$D \times V \leq 1.0$	2.0	2.0
H5	$D \times V \leq 4.0$	4.0	4.0
H6	$D \times V > 4.0$	-	-

Table B1(b).02: Hazard threshold classification limits

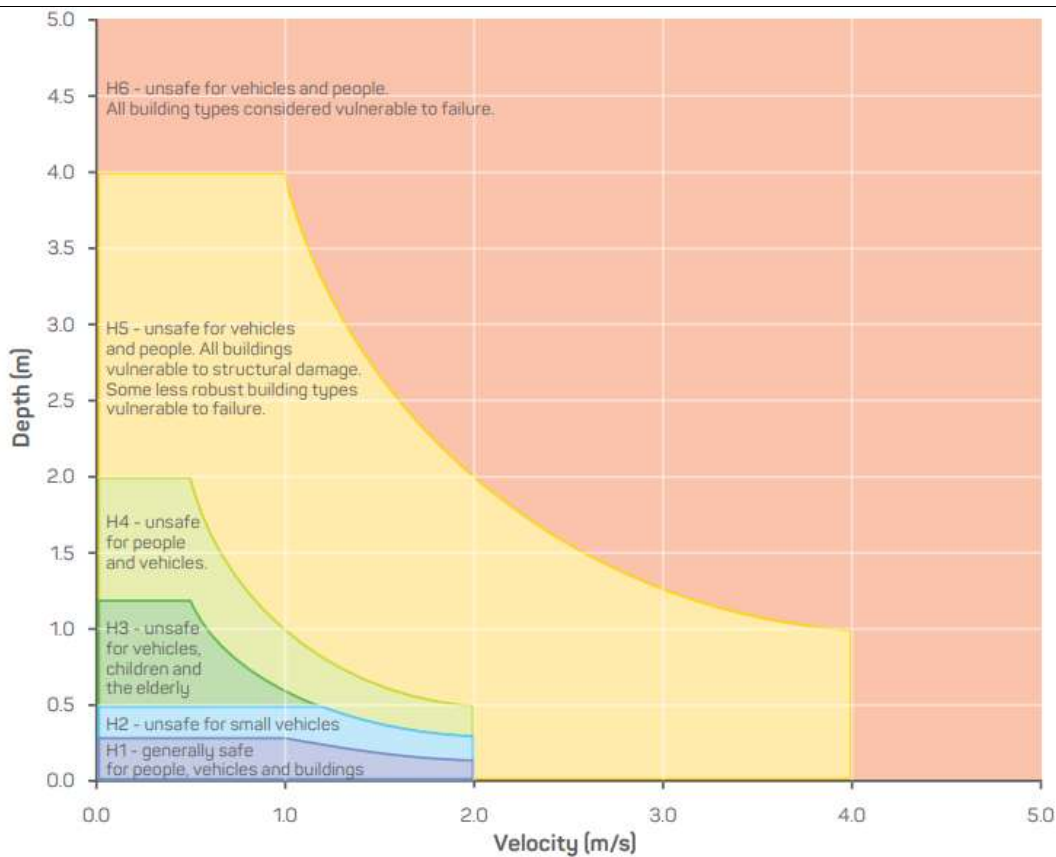


Figure B1(b).02: Flood hazard vulnerability curves

Image courtesy of Australian Institute for Disaster Resilience and sourced from *Australian disaster resilience Handbook Collection, Guideline 7-3 Flood hazard – Supporting document for the implementation of Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, 2017.*

- **Risk to Life** – is a combination of hydraulic hazard category, warning time and escape path availability, applied to all floods, up to and including the PMF (as recommended in the ADIR 2017 guidelines for the management of personal safety). For simplicity, the Risk to Life categories set out below are only assessed for the PMF in the application of this section of Development Control Plan 2023 (DCP 2023), on the assumption that once the PMF is managed for personal safety, all other lesser floods will also be managed.

An L1 Risk to Life classification is applied when flood risk on the flood information certificate is defined as subject to Riverine and Ocean flooding. This lower risk classification is applied as there is sufficient time to remove people from the risk to their lives by means of formal community evacuation plans. This lower risk classification assumes people will respond to warnings and safely evacuate to the safety of flood free high ground. Additional requirements may be necessary to manage personal safety in Riverine and Ocean flooding if there is evidence that a lack of response is likely, and this may lead to life threatening situations. The lower risk to life classification is not relevant to flash flooding scenarios such as the Wallsend Catchment.

		Life Risk Threshold					
		H1	H2	H3	H4	H5	H6
Flood Type	Riverine and Ocean	L1					
	Flash	L2	L2	L3	L4	L5	L6

Table B1(b).03: Risk to Life

- **Minor additions** – (for the purpose of section B1 Flood Management) are the total proposed 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

Table B1(b).04: Existing Building Areas

- **Occupiable rooms** – are rooms of buildings where people may be present in the normal use of the building.
- **Planning flood** – is the flood event from which the FPL is derived. It is expressed in terms of the probability of the event being exceeded, usually within any given year (see AEP).
- **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.
- **Risk to Property** – The risk to property is based on the hazard categories (H1-H6) determined for the Flood Planning event, and the associated risk to property as recommended in the ADIR 2017 guidelines. The six risk to property categories are P1-P6, these correlate directly with H1-H6 as follows:

Risk to property	Hazard category	Description
P1	H1	Low Hazard to structures. Suitable for light construction (eg. timber frame, masonry and brick veneer). Safe for all vehicles
P2	H2	Low Hazard to structures. Suitable for light construction (eg. timber frame, masonry and brick veneer). Unsafe for small vehicles
P3 - P4	H3 – H4	Low Hazard to structures. Suitable for light construction (eg. timber frame, masonry and brick veneer). Unsafe for all vehicles
P5 – P6	H5 – H6	Extreme hazard to structures. Hydraulically unsuitable for normal building construction. Unsafe for all vehicles

Table B1(b).05: Risk to Life

The distribution of P₁-P₆ is identical to the related H₁-H₆ (at the Flood Planning Event).

- **Tsunami** – means 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.

Notes: Tsunami are specifically excluded.

5.0 Application requirements

Development category	Application requirements	Additional information
All development on flood prone land	A Statement of Environmental Effects and/or layout plans submitted to support a development application (DA) shall include wording and where relevant, calculations, demonstrating that the controls of this section of DCP 2023 have been addressed.	<p>All development on flood prone land shall be designed in accordance with the flood controls in LEP 2012.</p> <p>The (NSW) Department of Planning and Environment's <i>Flood risk management manual: the policy and manual for the management of flood liable land (2023)</i> is available from the NSW Government website.</p> <p>More information about floodplain risk management in the Newcastle LGA can be found on CN's website.</p> <p>A Flood Information Certificate application form can be obtained from www.newcastle.nsw.gov.au or the Customer Contact Centre, 12 Stewart Avenue, Newcastle West NSW 2302.</p>

6.0 Floodways

Objectives	
1. Retain floodways in a condition capable for the conveyance of essential flood flow.	
Controls (C)	Explanatory notes
C-1.No building or structure can be built, and no land can be filled with any materials in areas identified as floodways, except for small changes to ground levels that do not significantly change the flow patterns for: <ol style="list-style-type: none"> roads parking below ground structures landscaping 	Fill is identified in LEP 2012. Floodways are shown on a flood information certificate obtainable on application from CN. 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.
C-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 is designed to avoid fences in floodways.	

7.0 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 (C)	Explanatory notes
<p>C-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.</p> <p>Where a development is proposing to build over more than 20% of the site area, the portion of the structure being suspended is to have a floor level at the FPL as a minimum. As part of the structure's design, it must allow water to flow freely into and out of the underfloor area and must not be restricted by solid cladding or similar around the perimeter of the structure below the floor level.</p>	Flood storage areas are identified on the flood information certificate.
C-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.	

8.0 Management of risk to property

Objectives	
1. Manage risks to property up to an acceptable level of risk (the FPL).	
Controls (C)	Explanatory notes
C-1. Floor levels of all occupiable rooms of all buildings are not set lower than the FPL.	These controls limit the risk of inundation relative to the FPL. The FPL is the water surface level of the relevant 'planning flood' plus a freeboard. Compliance with the FPL does not guarantee that flooding will not affect work carried out in accordance with Risk to Property Development Controls: In most cases, the FPL 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% 2050 AEP event, where this level is known.
C-2. Garage floor levels are no lower than the 1% 2050 AEP 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.	
C-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 controls for risk to life set out below.	
C-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.	

C-5. Swimming pools are to be located to ensure they are not inundated from minor flooding events. Electrical connections and fixtures around swimming pools are to be sited at the FPL.	
C-6. Where parts of the building are proposed below the FPL, they are constructed of water-resistant materials.	
C-7. Areas where cars, vans and trailers are parked, displayed or stored are only located in areas subject to property hazard of P1. Containers, bins, hoppers and other large floatable objects are not to be stored in these areas. Heavy vehicle parking areas can only be located in locations subject to P1 or P2 categories.	
C-8. Timber framed, light steel construction, cavity brickwork and other conventional domestic building materials are generally suitable forms of construction where the property hazard is P1 to P4.	
C-9. Property hazard of P5 is generally unsuitable for 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.	
C-10. Property hazard of P6 is unsuitable for any type of building construction	

9.0 Management of risk to life

Objectives	
1. Only permit 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 (C)	Explanatory notes
C-1. Risk to life category L5 is generally unsuitable for 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.	
C-2. Risk to life category of L6 is unsuitable for any type of building construction	
C-3. Islands 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.	

<p>C-4. On-site refuge</p> <p>On-site refuge is to be provided for all development where the risk to life category is L3 or higher unless:</p> <ul style="list-style-type: none"> a. the proposed development is less than 40m from the perimeter of the PMF extent and the higher ground is accessible, or b. the proposed use is defined as commercial premises or industry in which case onsite refuge is only required where the hazard category is L4 or higher. 	<p>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 (e.g., 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.</p>
<p>C-5. Standards for on-site refuge</p> <p>Where on-site refuge is required for a development, it should comply with the following minimum standards:</p> <ul style="list-style-type: none"> 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). 	<p>In most cases, the potential risk to life categories are detailed on the flood information certificate for the relevant property.</p>

C-6. Emergency egress procedure for basements

A plan is developed detailing emergency egress procedures during a flood, as well as any refuge areas in reasonable proximity of the development. The plan is to be positioned in the basement car park in an easily recognisable location/s. Refer to **Figure B1(b).03**.

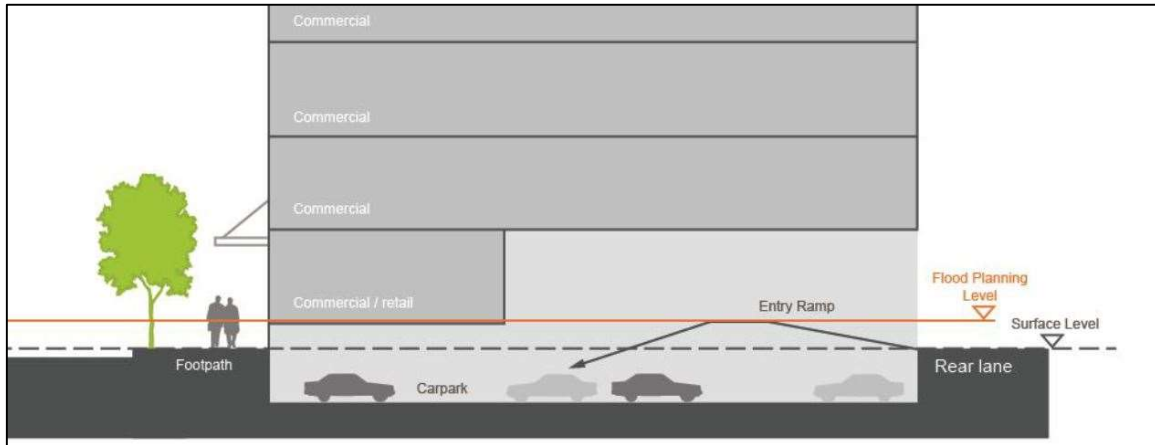


Figure B1(b).03: Basement ramp design to minimise inundation