

FLOOD HAZARD MAPPING AND ASSESSMENT PROJECT

Delivering more consistent and contemporary flood hazard mapping to better prepare for and minimise impacts arising from flood risks.

Identifying and planning for flood hazards

Natural hazards are an inherent part of the South Australian landscape and have the potential to impact on people, property, infrastructure, our economy and the environment.

Flooding is one of the most costly natural hazards in South Australia, regularly affecting households, communities, businesses and government.

It has the potential to impact our safety and natural built environments; however, by investigating, mapping and planning, we can prepare for and minimise the hazards arising from flood risk.

Mapping and planning natural hazards

The costs of natural disasters are driven by population growth, climate change, and property value growth.

As we continue to grow and develop, we need to plan for these natural disasters, identify and minimise the risk to people, property and the environment from exposure to natural hazards including extreme heat events, bushfire, terrestrial and coastal flooding.

Climate change will increase the severity of storms and significant rainfall events in South Australia, leading to an increased risk of floods state-wide.

In 2017, the Australia Business Roundtable for Disaster Resilience and Safer Communities, estimated that flooding in South Australia contributed to an annual average of \$26.6 million in damages – roughly 13 per cent of state-wide damages from natural hazards.



All floods are not the same

There are several types of floods; each differing in terms of occurrence, potential damage and management measures:

- **Riverine flooding** – occurs six or more hours after heavy rainfall when excess water flows over the banks of watercourses.
- **Flash flooding** – also known as surface water flooding, occurs less than six hours after heavy rainfall, and ranges from overbank flow from quick response streams to run-off on its way to a waterway or run-off exceeding local drainage capacity (stormwater flooding in urban catchments).
- **Infrastructure failure** – caused by failure of infrastructure that controls, conveys or stores water; e.g. pipes, pumps, dams or levees.
- **Coastal flooding** – caused by elevated sea levels as a result of tidal and/or wind-driven events, including storm surges in lower coastal waterways (which is not part of this project).

Flood mapping is an important tool, and is used:

- to draft flood-risk management plans
- to prevent flood damage through the location and design of new development
- in regional and land use planning
- to provide information on floods
- in emergency management including flood response planning
- in determining what the lowest allowable construction elevation should be to avoid flood for infrastructure planning.



01 The Role of the Flood Hazard Mapping and Assessment Project

The Flood Hazard Mapping and Assessment Project (the Project) is being undertaken to deliver more consistent and contemporary mapping of riverine and flash flooding hazards across South Australia.

The data from the Project will serve as a valuable asset across several government departments, services and activities – providing greater certainty when assessing new developments and also informing rezoning, regional planning, infrastructure planning and emergency management.

Key Project Deliverables:

- New and updated detailed flood studies to:
 - incorporate more contemporary flood data
 - incorporate a range of flood events (sizes)
 - ensure that the hazard is a measurement of the velocity and the depth of the event
 - address the impact of climate change and future development growth to 2050.
- Incorporating the detailed flood studies and updated hazard mapping to the Planning and Design Code (the Code) through two Code Amendments.

The Project will be delivered in three stages:

- Stage 1 – Flood Hazards Mapping Update Code Amendment: the Chief Executive of the Department for Trade and Investment has initiated this Code Amendment. This Code Amendment will seek to reduce the spatial extent of the existing Hazards (Flooding - Evidence Required) Overlay, in 12 local government areas and several Outback Area townships. The proposed changes are based on existing detailed flood studies and flood hazard mapping that was not previously available when the Planning and Design Code (the Code) was fully implemented in March 2021.

This Code Amendment will also seek to apply the Hazards (Flooding - Evidence Required) Overlay to a portion of the Port Adelaide Enfield Council area as a precautionary measure until the flood hazard mapping, being prepared in Stage 2 of the Project, can be implemented into the Code.

- Stage 2 – Preparation of Mapping Products: the Department is commissioning updated and new flood hazard mapping across the state to better identify flood risk using improved data and more consistent modelling.
- Stage 3 – State-wide Flooding Hazards Code Amendment: the State Planning Commission (Commission) will initiate a state-wide amendment to the Code to include the new mapping and updated policy.



The Code Amendment Process

The Code contains the planning rules and policies that guide what can be developed in South Australia. Planning authorities use these planning rules to assess development proposals.

A Code Amendment is a proposal to change the policies, rules or mapping within the Code, which can change the way that future developments are assessed.

Code Amendments must be prepared according to certain processes set out by legislation (under the *Planning, Development and Infrastructure Act 2016* and associated Regulations).

Code Amendments may be undertaken by a range of entities including the State Planning Commission, councils, state agencies, people who have an interest in land, or the Chief Executive of the Department for Trade and Investment.

During the period that the flood studies are being prepared and where possible, the Code will be updated to include these studies. These updates will increase the accuracy of the flood hazard mapping in the Code and ensure the maps are based on the latest available flood data. The updated flood mapping will provide greater protection for some forms of development within areas identified as having a flood hazard risk, while also helping to simplify the assessment process in areas where the flood overlays do not need to apply.

As part of the Flood Hazard Mapping and Assessment Project, two Code Amendments will be initiated and released for public consultation.

The Flood Hazards Mapping Update Code Amendment proposes to update the spatial extent of the existing Hazards (Flooding - Evidence Required) Overlay in 13 council areas and several Outback Area townships.

All participating councils have agreed to have their council areas included in this Code Amendment, and some of these councils have provided new mapping, prepared in partnership with their consultants. This Code Amendment will consider removing the Hazards (Flooding - Evidence Required) Overlay in areas where its application is unnecessary or not required.

The State-wide Flooding Hazards Code Amendment is a state-wide review of the 'Flood Hazards Overlay' and 'Water Resources Overlay' in the Code. It seeks to minimise the impact of flood hazard on people, property and nature by incorporating standardised and contemporary flood hazard mapping and policy in the Code that can be well understood by the general public and is consistent with national best practice guidelines.

The State-wide Flooding Hazards Code Amendment proposes to change the following overlays:

- Hazard (Flooding) Overlay
- Hazard (Flooding – General) Overlay
- Hazard (Flooding – Evidence Required) Overlay
- The Water Resources Overlay

Project Delivery Timeframes

The Project outcomes are expected to be delivered in the following timeframes:

1 Stage 1: October 2021 to early 2023

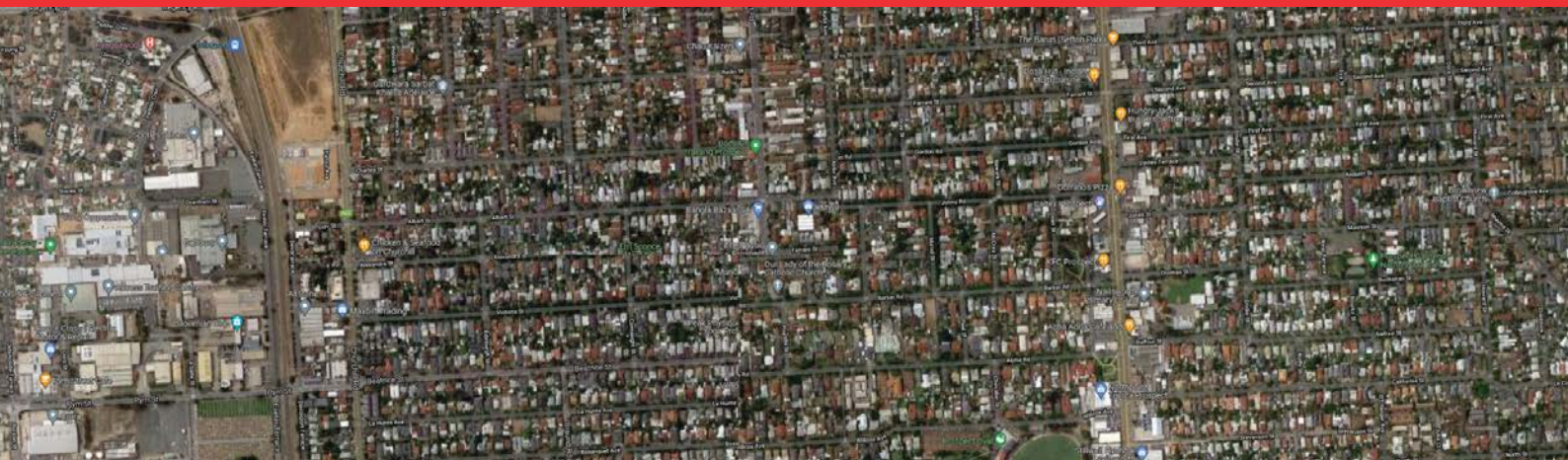
Flood Hazard Mapping Update Code Amendment will update the spatial extent of the existing Hazards (Flooding - Evidence Required) Overlay, in 13 local government areas and several Outback Area townships based on recently completed flood studies and flood hazard mapping.

2 Stage 2: July 2021 to December 2022

Delivery of enhanced and new flood studies and mapping products.

3 Stage 3: early 2023 to late 2023

State-wide Flooding Hazards Code Amendment will update the Code with new flood hazard mapping and policy.



02 Flood Hazard Terminology

Average Exceedance Probability (AEP):

is the term used to explain the chance of a flood of a given size (or larger) occurring in any one year. It is usually expressed as a percentage; for example, the Bureau of Meteorology (BOM) explains this as – for each year, there is a 1% chance (i.e. a 1 in 100 chance) that the defined event will be equalled or exceeded (once or more than once).

Historically, flood hazard mapping and associate planning policy has primarily been based on 1% AEP as the defined flood event. This project seeks to ensure that the planning outcomes in the future also consider a 5% and 0.2% AEP.

Note: while a 0.2% AEP is being used as the largest event for planning purposes, there is a residual risk of rarer and more significant events occurring. This means, it cannot be assumed that land is free from flood risk.

Flood Hazard: related to the type of flood and varies with severity and location in the floodplain. The hazard is characterised by the velocity and depth, rate-of-rise, the topography of the floodplain, and the timeframe from rainfall to flooding.

The faster or deeper the water, the greater the hazard.

The table below describes the hazard categories used for each of the existing Overlays in the Code relating to flood hazards.

Overlay	Hazard Category	Description
Flooding	Medium-High	Within this overlay a 1% AEP event in areas of highest risk may cause structural damage to buildings and may be unsafe for persons to escape through floodwaters and would not be safe for vehicles.
Flooding-General	Low-Medium	Within this overlay a 1% AEP will still likely be safe for children and the elderly to escape through flood waters.
Evidence Required	Unknown	Unknown flood risk is applied to those areas where no detailed flood study data is available.

Flood Risk: is a combination of the chance of a flood occurring and the consequences for people, property and infrastructure. The consequences depend on the community's exposure and vulnerability to flood impacts.

Flood risk is harder to manage where development—or the right to develop—already exists. The risk to existing infrastructure is usually reduced through improvements to protection as part of any upgrade.

While there are ways of managing flood risk to reduce the consequences of flooding—modifying flood behaviour, property modification, and community response—none of these measures are stand-alone solutions for addressing flood issues.

Usually a combination of flood response and property modification measures is the recommended option to reduce risk to an acceptable level and manage the remaining risk(s) appropriately.

Water Sensitive Urban Design (WSUD):

Stormwater is rainwater that has fallen onto roads or roofs and often contains chemicals or pollutants. WSUD is an approach that uses better urban planning and design to reuse storm water, stopping it from reaching our waterways by mimicking the natural water cycle as closely as possible.

By working at all levels – lot, street, precinct – and with a range of treatment options – rainwater tanks, rain gardens, sediment ponds, wetlands, and swales – WSUD helps to reduce the harm stormwater causes our rivers, lakes and creeks.

WSUD measures try to minimise increased water run-off or change the timing of the flows, and as a result – the flood level. Noting that the water held by WSUD measures generally only minimises impact from the more frequent and smaller flood events (e.g. up to 20% AEP).



03 Questions & Answers

General

Q – What is the chance of experiencing a 1% AEP flood event once or more in a lifetime?

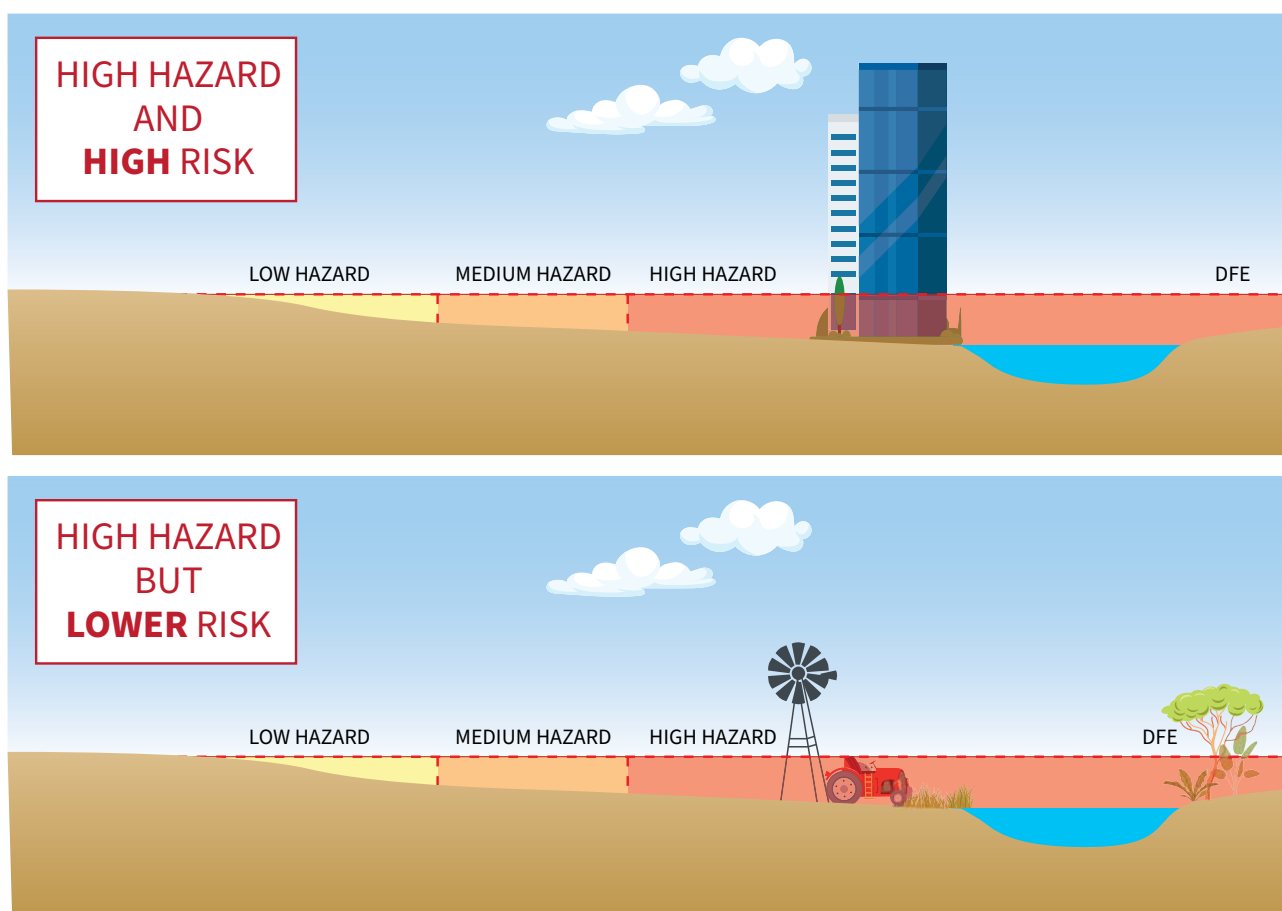
A – The chances of experiencing different sized flood events in a given period of time can be estimated mathematically. If you lived for 70 years in one location that had a 1% chance of flooding in any one year, there would be a 50% chance of you experiencing at least one flood during that 70 year period.

However, the chance that you would be affected by a flood does not just depend on the likelihood of your own property flooding. Floods can disrupt transport networks, impact tourist destinations and prevent food from reaching markets.

Likelihood	AEP	Probability of the flood occurring in a lifetime (70 years)	
		At least once	At least twice
1 in 20	5%	97%	86%
1 in 100	1%	50%	16%
1 in 500	0.1%	13%	

Q – What is the difference between flood hazard and flood risk?

A – A flood hazard exists whether or not it poses a risk of impacting people. The below diagram further examines the difference between risk and hazard. The flood hazard depicted is the same in each example; however, the risk will change depend on the land use exposed to the hazard.



Source: Queensland Reconstruction Authority 2012, Planning for Stronger, More Resilient Floodplains, p.10

Q – Why isn't a 1-in-100 Average Return Interval (ARI) used?

A – All floods are different; while we don't know when or how the next flood will occur, very large floods can happen in the same year as weather is unpredictable.

The term '100-year flood' can be misleading, as it gives the impression that this flood will only occur once every 100 years. It is based on the idea of an ARI, which is the average number of years between when a flood of this size would occur; i.e. 100 years.

Another way to express this is to say that every year there is a 1 in 100 (1%) chance of a flood of this size occurring. This is why the use of the term Annual Exceedance Probability (AEP) is now the preferred term as the word emphasises that there is a chance 'every year' that a flood of this size could occur.

Conversion between AEP and ARI

ARI	AEP%
20 year	5
50 year	2
100 year	1
200 year	0.5
500 year	0.2

Flood Hazard Mapping Update Code Amendment:

Q – What is the Hazards (Flooding – Evidence Required) Overlay and how will it be removed?

A – The Flood Hazard Mapping Update Code Amendment is the first stage of the Flood Hazard Mapping and Assessment Project.

This Code Amendment is focused exclusively on the Hazards (Flooding -Evidence Required) Overlay and proposes to:

- **reduce** the extent of Hazards (Flooding - Evidence Required) Overlay in 12 local government areas and several Outback Areas where more recent flood hazard mapping has demonstrated that there is minimal risk of flooding; and
- **apply** the Hazards (Flooding - Evidence Required) Overlay to a portion of the Port Adelaide Enfield Council area, as a precaution, where the level of flood hazard has not yet been determined and until new flood hazard mapping can be implemented in future stages of the wider flooding project.

The Hazards (Flooding – Evidence Required) Overlay applies to areas where no floodplain mapping has been prepared or provided. It takes a precautionary approach to help reduce the potential impacts of flood risk through the appropriate siting and design of development.

This overlay has performance assessment policies that enable decision makers to consider whether the site is in a high or lower hazard area – and determine the suitability of the land use and whether a design response is adequate to minimise flood risk.

Q – What flood studies have been used to inform this Code Amendment?

A –

Council	Area
Burnside Council	1st to 3rd Creek Flood Study
Playford Council	Smith Creek Floodplain and Flood Hazard Study
Clare Valley and Gilbert Valley Councils	Auburn township
Mitcham Council	Sturt River urban catchment, McLaren Street catchment, Brownhill Creek urban catchment
Port Lincoln Council	Port Lincoln SMP
Naracoorte Lucindale Council	Naracoorte township
Salisbury and Port Adelaide Enfield Councils	Dry Creek SMP

State-wide Flooding Hazards Code Amendment:

Q – Will my property be affected by the State-wide Flooding Hazard Code Amendment?

A – The State-wide Flooding Hazards Code Amendment is the third stage of the Flood Hazard Mapping and Assessment Project.

The State-wide Flooding Hazards Code Amendment will update flood policies within the Planning and Design Code and introduce the new flood hazard mapping prepared in the second stage of the Flood Hazard Mapping and Assessment Project.

As a result of this Code Amendment, your property maybe placed in a flood hazard overlay for the first time. Alternatively, if your property is in a flood hazard overlay now, it may be removed from the flood hazard overlays all together or change to a different overlay, based on the provision of new flood mapping or the updated flood hazard modeling.

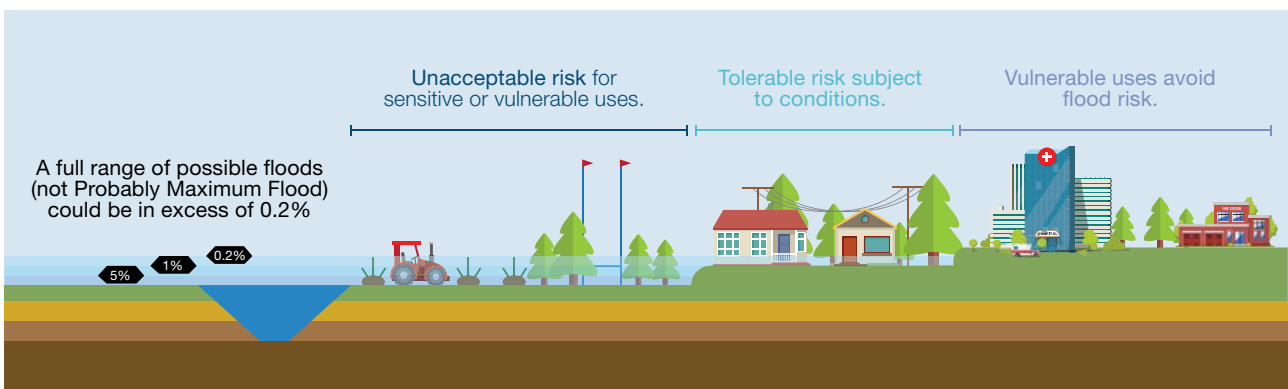
With new and enhanced mapping being prepared, some properties may have a change to what flood hazard overlay applies, due to the impact of climate change and updated hydrological information.

Changes to the flood overlays may result in new or revised policy being applied to development on your property.

The State-wide Flood Hazard Code Amendment will be released for community consultation after of the flood studies and updated mapping being undertaken as part the Project have been completed.

Q – What mapping differences will be seen through the Statewide Code Amendment?

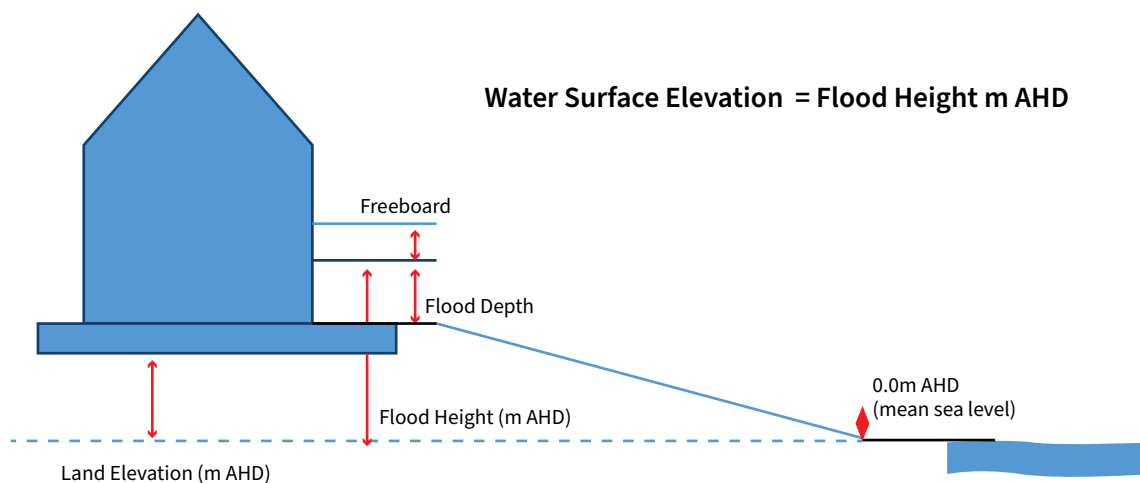
A – The Project has set a new standard for flood studies, which will help ensure flood hazard policies in the Code are applied consistently across the state. To learn more about how the maps are developed and used, refer to the set of Frequently Asked Questions ‘Flood Hazards - Understanding and Using Flood Maps’ on the PlanSA portal.



The changes being proposed to the spatial application of existing Overlays in the Code relating to flood hazards are as follows:

- Removal of the Hazard (Flooding – Evidence Required) Overlay for the majority of the state.
- The flood hazard overlays will be divided into the following areas:
 - areas that are generally intolerable for development and subject to regulations – additional structures are classed as development in these areas
 - areas that are tolerable for development based on design responses (e.g. building above the floodplain)
 - areas that require the avoidance of critical land uses, such as hospitals and emergency services that needs to be accessible and safe during a 0.2% Annual Exceedance Probability (AEP) flood event.
 - Updates to the reference layers within the South Australian Property and Planning Atlas (SAPPA) will help support the policy by depicting the flood risk for 1%, 5%, and 0.2% AEP, as indicated in the diagram above.

The reference layers will, where possible, assist in providing information for determining the building height (i.e. the water surface elevation plus the free board); and can also be used for the preparation of Regional Plans, for rezoning investigations—as part of the Code Amendment—and for impact-assessed developments requiring an Environmental Impact Statement (EIS).



Q – How will the new flood policy be developed?

A – Research on best practice national and international planning policy and comments on the current Code have been collated.

It is intended that policy issues will be workshopped with councils – with the initial draft policy options to be tested against the mapped scenarios to determine their practicality from an urban form and design sense.

Once the draft flood policy has been tested, other planning issues will be considered including the impact of the streetscape design and accessibility to housing.

Q – How does stormwater flooding and Water Sensitive Urban Design (WSUD) impact flood hazard?

A – It is expected that local roads in metropolitan Adelaide may flood in more frequent events as most council underground stormwater systems cater for a 5% to 10% AEP event. Roadways are designed to accommodate excess stormwater; it is also possible that gardens, driveways and sheds on properties may experience shallow flooding regardless of whether they are included within a flood overlay.

This scenario is called “nuisance flooding” due to the impact and costs associated when flooding is relatively low.

Incorporating WSUD measures into new developments can help to mitigate risks from flooding; by changing the timing of flows and therefore the flood level. Noting, that the water held by WSUD measures generally only minimises impact from the more frequent and smaller flood events (e.g. up to 20% AEP).

The Project scope does not cover “nuisance flooding” associated with frequent rainfall events; it focuses on flooding hazard events—between a 5% AEP and 0.2% AEP event—as shown in yellow in the table below.

WSUD is designed to assist in reducing stormwater flooding but does have a significant impact on riverine or surface water flood hazard events, which is covered by the Project.

Planning and Building	Uses in Engineering Design	Frequency of Event	AEP(%) rough range	ARI (x/100 years)
Stormwater Management Overlay Building Rules Requirements	WSUD	Very frequent	99.75% - 65%	Less than 1
Stormwater Management Overlay Design in Urban Areas General Policy Building Rules Requirements Storm water pipe design	Minor System Frequent	65% - 10%	Between 1 and 9	
FOCUS Hazard Overlays	Major System Floodplain management & Waterway design	Infrequent	10%- 1%	Between 9 and 100
		Rare	1%- 0.05%	Between 100 and 2000
	Design of high-consequence infrastructure (e.g. major dams)	Extremely rare	0.05% - PMP	2000- PMP

Q – What about the requirements under the Building Code of Australia?

A – Whilst the Building Code of Australia (BCA) has standards for building in flood prone areas, these standards are currently not applied to South Australian legislation.

These standards are only relevant if there is a risk of new buildings being vulnerable to failure or structural damage due to a flood hazard. This occurs when the flood hazard classification is a H5 or H6. The minimum depth of a H5 is around 0.6m with a velocity of 2m/s or a depth of 2m with zero velocity.

The State currently does not propose development within areas deemed to have these classifications and so it is not considered necessary to apply the BCA requirements.

Q – What does it mean if I am located in one of the Overlays?

A – To understand how the Overlays may apply to development on your property, refer to the set of Frequently Asked Questions '[Understanding the Flood Hazard Overlays in the Planning and Design Code](#)' on the PlanSA portal.



04 Learn more and Have your Say:

Q – When will I have a chance to have my say on this Project?

A – Public consultation on the Flood Hazard Mapping Update Code Amendment is expected to be held in early 2023. Consultation on the State-Wide Flooding Hazards Code Amendment is expected to be held in mid-2023. Details will be available on the PlanSA portal closer to the time of each consultation.

Q – Where can I find more information about this Project?

A – Visit the [Flood Hazard Mapping and Assessment Project](#) page on the PlanSA portal and refer to the Project Information Series.

Flood Hazard Mapping and Assessment Project Information Series

1. Flood Hazard – Project Overview
2. Flood Hazard – Understanding the Flood Hazard Overlays in the Planning and Design Code
3. Flood Hazard – Understanding and Using Flood Maps





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