



PLYMOUTH
CITY COUNCIL

HOW DO WE MAKE PLYMOUTH RESILIENT TO THE RISK OF FLOODING AND ITS IMPACT?



Plymouth Plan topic paper
Flooding

Plymouth Plan Topic Paper Flooding

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What is this topic paper about?

This topic paper has been published as part of Plymouth Plan Connections. It is one of a series of topic papers that are being published to provide information and support the ongoing discussions with local people and organisations about the future of the city.

The topic paper considers the issue of flooding, including how to make Plymouth more resilient to flooding events and to manage the impact of flooding.

Make your comments on this document as part of the Plymouth Plan Connection is before 25 October 2014. www.plymouth.gov.uk/plymouthplan

Background

Intense rainfall events are expected to continue to increase in frequency in the coming decades throughout the UK. Sea levels are rising and will continue to do so, and storms are expected to increase in frequency and severity⁽¹⁾.

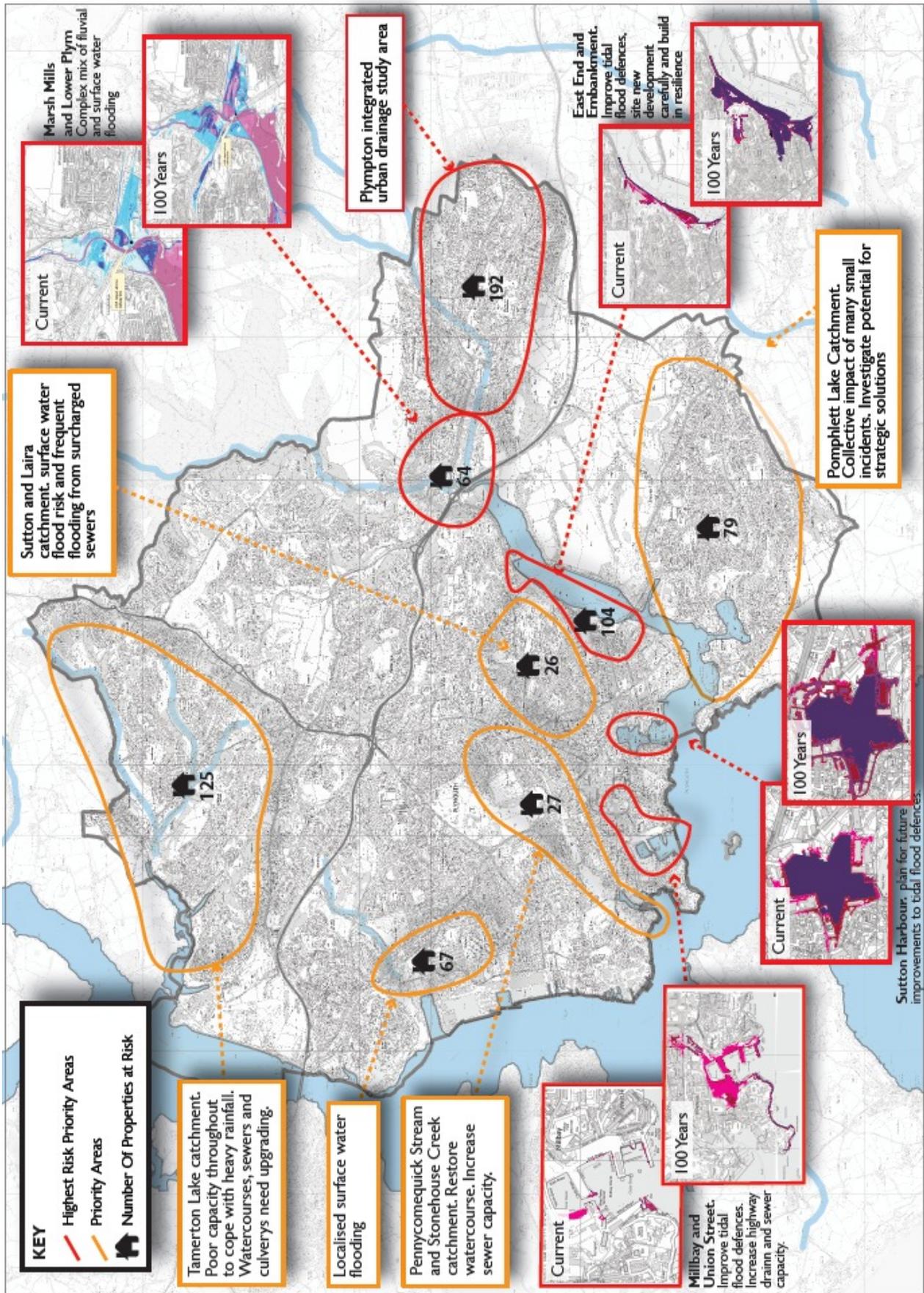
The Environment Agency reports that 2012's record-breaking wet year in England could have cost the UK economy £600million. The overall financial cost to businesses of the extreme weather was up to £200m, including commercial property and contents damage of £84m, and further indirect impacts (such as staff working-days lost) of up to £33m. Disruption caused by flooding to transport, communications and utility links in 2012 is estimated to have cost the economy a further £82m. It caused widespread disruption across the South West⁽²⁾.

During the 2013/14 winter, Plymouth suffered severe disruption. For example:

- October 2013: Flooding responded to at 77 roads across the city, including Gdynia Way – one of the city's busiest routes, flooding to properties reported at six locations.
- January 2014: 200 sandbags were distributed to vulnerable residents and businesses, and flooding responded to at 69 roads across the city.
- February 2014: Grand Parade, Hoe Road and Madeira Road closed for public safety, during the worst of the storms, when large waves were experienced; more than 40 structures checked for damage with 19 requiring immediate attention.
- Many roads inspected since the severe storms have sustained a year's worth of deterioration over a three-month period. It can be conservatively estimated that the cost of repairing storm damage to the carriageway will be equivalent to a years' repair costs, i.e. in the order of £3m.

UK climate projections⁽³⁾ indicate that by the 2080s there could be around three times as many days in winter with heavy rainfall (more than 25mm in a day). It is plausible that the amount of rain in extreme storms could increase locally by up to 40%. Peak river flows in a typical catchment are predicted to increase between 11% and 21% and sea levels are anticipated to increase from between 12 and 42cm from 1990 levels⁽⁴⁾.

1 A Summary of Climate Change Risks for South West England. Climate UK 2012. www.climateandus.com/download/southwestCCRA
 2 www.environment-agency.gov.uk/news/150962.aspx
 3 UK Climate Projections 2009, Met Office (UKCP09) ukclimateprojections.metoffice.gov.uk
 4 Plymouth Local Flood Risk Management Strategy



National flood risk mapping indicates that there are 925 properties at risk of flooding (Flood Zone 3) in Plymouth from the sea or main rivers. There are an additional 3,291 properties at risk from surface water flooding. There is also a risk of damage to key transport infrastructure and services that would have a significant economic cost⁽⁵⁾⁽⁶⁾.

Along the Plymouth Sound frontage there are a wide range of defences that protect the toe of the cliff from wave action, although a number of the defences form part of amenity features including a lido. There are also defences associated with the commercial port of Millbay and the fishing port at Sutton Harbour.

Some of this area also benefits from the sheltering effect of the Plymouth Breakwater within Plymouth Sound, owned by the MoD. The Breakwater was completed in 1814 to help provide a safe anchorage for the Channel Fleet. It provides a large area of calmer water which limits wave action, protecting navigation routes and moorings in the Sound, and supporting the operation of the Naval Base and the commercial and passenger port. It also reduces the effects of erosion along the coastline and to a lesser extent up the Rivers Plym and Tamar, and reduces the risk of wave-induced flooding in Millbay and The Barbican. The Breakwater therefore provides significant strategic defence, economic and social benefits. During the winter storms of 2013/14, the combination of wave heights, high tides and strength and direction of wind was such that there was considerable storm damage along Plymouth's waterfront. One of the issues that the Plymouth Plan will need to consider is the resilience of the Breakwater in the context of climate change. Environment Agency plans to commission a study of wave patterns which will add to the evidence base.

The priority issues currently faced are summarised in figure 1 and in the Plymouth Local Flood Risk Management Strategy.

Do you agree with this assessment of priorities?

5 Plymouth Local Flood Risk Management Strategy
6 Plymouth Strategic Flood Risk Assessment

What are the key drivers of the need for change?

- Flood risk currently threatens to cause increasingly frequent and severe disruption in Plymouth to people and to businesses⁽⁷⁾⁽⁸⁾.
- Climate change will increase these risks as a result of higher sea levels and increased intensity of storm events. In planning for Plymouth’s future the following projections are being used for sea level rise and storm events:

	1990 - 2025	2025 - 2055	2055 - 2085	2085 - 2115
Sea level rise*	3.5mm	8mm	11.5mm	15mm
Rainfall intensity	+ 5%	+ 10%	+ 20%	+ 30%
River flows	+ 10%	+20 %	+20 %	+20 %
Wave heights	+ 5%	+ 5%	+ 10%	+ 10%

*Net sea level rise (mm per year)

- Growth in Plymouth, leading to construction of more homes, business units and roads, would increase the surface water flooding problems described above if no action is taken.

7 A Summary of Climate Change Risks for South West England. Climate UK 2012. www.climateandus.com/download/southwestCCRA
 8 Plymouth Local Flood Risk Management Strategy

What are the opportunities for addressing these needs?

Some areas in Plymouth with capacity and potential for new development are in areas at risk of flooding from surface water, from watercourses, or from the sea. Whilst this is a constraint to development, there is also an opportunity to increase the city's resilience to flood risk through well-considered development.

Plymouth's Local Flood Risk Management Strategy (LFRMS) identifies flood risks and remedial actions and identifies opportunities for working closely with South West Water and the Environment Agency to jointly fund flood alleviation schemes.

Plymouth City Council will be required to set and implement standards for design, construction and management of Sustainable Urban Drainage (SUDs) systems, which aim to reduce pressure on the drainage system during heavy rainfall.

There are mechanisms available that enable local authorities to secure funding from developers as contributions to infrastructure within the city, such as flood defences and sewer and other drainage and water management solutions. Policies should set out the Council's stance on these mechanisms.

Use of these and other approaches should aim to:

- Reduce the amount of rainwater reaching the sewers and water courses in Plymouth.
- Improve the capacity of particular water courses and sewers, so that flood risk is significantly reduced during storm events.
- Restrict the volume and nature of development in risk areas, and ensure any development in these areas is resilient to flooding.
- Secure financial contributions to the maintenance of tidal flood and erosion defences.

Alternatives – what alternative strategies are we considering?

Alternative	Commentary	Evidence
Coastal and fluvial flooding		
No development in flood zone 2 or 3	National Planning Policy Framework includes a ‘sequential test’ designed to direct development to areas of no or minimal flood risk. This option would preclude development in some areas that have been identified in the current Core Strategy as key sites to support Plymouth’s growth, including: Sutton Harbour; East End; Embankment; Millbay. This would have a significant impact on the Council’s ability to meet its housing need.	EA Flood Maps. Plymouth SFRA (PCC)
Limited and carefully considered development in flood zone 2 and 3a, protected by a high standard of flood defences	The NPPF sequential test allows for development in areas of lower flood risk if there is no alternative, subject to design and use conditions to minimise detrimental flood impacts. This would enable development on key sites where flood risk is a concern, conditional upon appropriate risk management actions. Sustainable development of this nature can help to meet the council’s housing need and improve the flood and climate change resilience of the city.	EA Flood Maps. Plymouth SFRA (PCC)
Managed realignment in areas of high flood risk	As pressures from flood risk increase on existing defences and render them uneconomic to maintain, infrastructure is retreated inland. The Shoreline Management Plan has considered this option for Plymouth and has determined instead a ‘hold the line’ policy position for Plymouth because of the importance of the housing, transport and business infrastructure at risk. This means maintaining and strengthening flood defences to provide continued protection to national standards to properties in risk areas.	South Devon and Dorset Shoreline Management Plan (SMP) 2
No active intervention	Existing sea defences are not maintained or renewed. Any assets within the flood risk area are recognised as having a limited lifespan. This policy would leave important areas of existing property and infrastructure at risk, and constrain future growth. The Shoreline Management Plan has considered this option and has determined instead a ‘hold the line’ policy position for Plymouth.	South Devon and Dorset Shoreline Management Plan (SMP) 2

Alternatives – what alternative strategies are we considering?

Alternative	Commentary	Evidence
Surface water and fluvial flooding (where caused by urban surface water runoff)		
Do nothing. Accept periodic surface water flooding	Roads will occasionally be impassable. Properties (domestic and business) in flood risk areas will be damaged from time to time.	LFRMS
Improve existing sewer and watercourse capacity	<p>Where the need has been identified, install new surface water sewers of sufficient capacity to remove any level of flood risk, against recognised climate change scenarios. Where new development takes place policies would require developers to meet the cost. In existing urban areas the cost would be met through water charges to consumers and public sector investment.</p> <p>The Flood and Water Management Act does not allow this option exclusively, as SUDS are now required.</p>	LFRMS
Require Sustainable Urban Drainage systems on all new development, in line with national standards.	<p>The Flood and Water Management Act 2010 provides powers for the council to require SUDS and so help reduce growth in pressure on existing drainage capacity</p> <p>However, there are already significant surface water flooding problems in Plymouth (most of the city is within a 'Critical Drainage Area' designated by the Environment Agency)</p>	LFRMS
Require developments to achieve standards higher than national for SUDs	At the time of writing it is unclear as to whether local authorities will be able to set their own standards for SUDS or whether only national standards will apply	

Do you think that there are other alternatives that we need to consider?

What do we think is the preferred strategy?

In relation to coastal and fluvial flooding, the preferred strategy is to direct new development away from areas of high flood risk, with limited and carefully considered development in flood zones 2 and 3 where there are wider sustainability benefits, and where the development can be made safe. Development will be expected to contribute to the strengthening of defences according to priorities identified in the Shoreline Management Plan and Local Flood Risk Management Strategy. The storms of winter 2014 have highlighted the need to clarify the future of Plymouth Breakwater and its role in protecting the city's waterfront.

For surface water flooding the preferred strategy is likely to be a combination of improving existing sewer and watercourse capacity (because we already experience flooding because of a lack of capacity) and requiring SUDS systems on all new development (to ensure that we don't create new surface water flooding problems).

The suggested policy approach is as follows:

1. The Plymouth Plan should enshrine the aspiration to become a flood resilient city. Thus to:
 - ensure that the risks of local flooding are understood and expectations managed so that investment in risk management can be prioritised effectively
 - set out clear and consistent plans to inform businesses, communities and relevant organisations so that the remaining risk can be managed effectively
 - ensure strong partnership working between the local flood risk management authorities of Plymouth City Council, Environment Agency and South West Water
 - minimise disruption and damage caused by local flooding and coastal erosion.
2. The Plymouth Plan should seek to direct development away from areas at risk.
3. Where a development provides wider benefits to the community and these are considered to outweigh flood risk, a development may be permitted if flood risk assessment evidence shows it can be made safe for its lifetime, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall
4. The Plymouth Plan should drive forward a programme of investment that protects the water quality in our surrounding natural environment from growing surface water flood risk.
5. The Plymouth Plan will adopt policies that provide the context and purpose for the full implementation of SUDS. This will involve requiring all new development to achieve drainage standards set out in EA's Critical Drainage Area guidance in relevant areas.

The Council will be required to establish a body to approve SUDS plans, and will be required to adopt SUDS. This will require a range of corporate and planning policies. Further guidance from Government is awaited regarding the setting of local SUDS standards and regarding the changing of approval fees and financial arrangements regarding adoption.

6. To deliver these drainage standards all developments will be required to confirm to the hierarchy illustrated below. Where this is not possible a financial contribution will be sought for investment in offsite SUDs solutions.

SUDs Hierarchy				
Most Sustainable	SUDs Technique	Flood reduction	Pollution reduction	Landscape & wildlife benefit
	Living roofs	√	√	√
	Infiltration devices <ul style="list-style-type: none"> soakaways infiltration trenches and basins 	√	√	√
	Basins and Ponds <ul style="list-style-type: none"> Constructed Wetlands Balancing Ponds Detention basins Retention Ponds 	√	√	√
	Filter Strips and Swales	√	√	√
	Permeable surfaces and filter drains <ul style="list-style-type: none"> gravelled areas solid paving blocks porous paviers 	√	√	×
Least Sustainable	Tanked systems <ul style="list-style-type: none"> over-sized pipes/tanks storm cells 	√	×	×

7. Policies should also promote the retrofitting of SUDs where opportunities arise through consented development. Given that this will be one of many competing priorities for wider benefit from development, the Plymouth Plan should identify priority objectives and locations in relation to retrofit of SUDs to aid negotiation of planning conditions and planning gain.
8. The Plymouth Plan should identify (based on the LFRMS and Green Infrastructure Strategy) strategic interventions to improve the capacity of the water environment to slow down (attenuate) surface water flows during storm events and to provide additional storage capacity upstream of flood risk areas where these have been identified as beneficial.

9. The Plymouth Plan should contain policies that prioritise the upgrading of sewage and watercourse capacity at known pinch-points, and of sea and flood defences in priority risk areas for coastal flooding, erosion and storm damage.
10. Plan policies should secure financial contributions from relevant development, and promote closer working with strategic partners, to enable maintenance and renewal of coastal defences, including Plymouth Breakwater.

Do you think that there are additional or alternative policies that we should consider?

What happens next?

Any comments received on this topic paper will be considered in the preparation of the Plymouth Plan. You can make comments at www.plymouth.gov.uk/PlymouthPlan or by email plymouthplan@plymouth.gov.uk. Alternatively, please post your comments to :

Strategic Planning and Infrastructure Department
Plymouth City Council
Ballard House
West Hoe Road
Plymouth
PL1 3BJ

The closing date for consultation responses is 25 October 2014.

List of key Plymouth Plan evidence base documents

- UK Climate Projections 2009 <http://ukclimateprojections.metoffice.gov.uk/>
- Plymouth Local Flood Risk Strategy
- A Summary of Climate Change Risks for South West England. Climate UK 2012. www.climateandus.com/download/southwestCCRA

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CONTACT

Strategic Planning and Infrastructure Service
Plymouth City Council
T 01752 305477
E plymouthplan@plymouth.gov.uk
www.plymouth.gov.uk/plymouthplan