PUSH Strategic Flood Risk Assessment – 2016 Update

Guidance Document: Portsmouth City Council

Flood Risk Overview

Sources of Flood Risk

The city and unitary authority of Portsmouth lies in the east of the PUSH sub-region. It covers a total area of approximately 40 km² which is split between Portsea Island and the mainland. The city has approximately 45 km of open coastal frontage, 32 km around Portsea Island and 11.5 km on the mainland. 3 km of drainage channels are designated as main river in Portsmouth. At present, approximately 47% of the city's land area is designated as within Flood Zones 2 and 3 (see SFRA Map: Flood Mapping Dataset).

The SFRA has shown that the primary source of flood risk to Portsmouth is from the sea. At present, large areas of the city both adjacent to the coast and inland are at risk of flooding from the sea, particularly large parts of north east Portsea Island, Southsea and Old Portsmouth. In addition large areas of the mainland around Farlington, Highbury and Horsea Island are also at risk of flooding frm the sea. Areas that have historically suffered occasional flooding during storm tides include Broad Street in Old Portsmouth; Southsea Common; the Eastern Road near Great Salterns Quay and Southampton Road (A27) to the north west of Port Solent. A programme of investment in flood management measures in in progress to reduce flood risks from a variety of sources within the city.

Historically, Portsmouth has also been susceptible to flooding from other sources including surface water and flooding caused by infrastructure failure. Southsea and Farlington are key areas where incidents of surface water flooding have previously occurred.

Key physical characteristics that may constrain development

Approximately 87% of Portsmouth's administrative area is currently covered by existing development. A number of environmentally designated areas represent an additional constraint on development in the city, covering approximately 8% of its area. Future developments will therefore, most likely have to occur on brownfield sites, an increase in the number of dwellings in the existing built up area likely.

The topography of Portsmouth ranges from sea level to approximately 125 metres above ordnance datum (mAOD). On Portsea Island however, very few areas are higher than 10 mAOD. On the mainland, the southern half of Portsmouth's administrative area is equally low lying, but the northern half rises steeply up Portsdown Hill to elevations of approximately 125 mAOD. Further development on Portsea Island and the southern half of the mainland will likely increase the pressure for future maintenance and improvement to existing flood defences, particularly following predicted rises in sea level in future.

Geologically, the majority of Portsea Island is underlain by low and moderately permeable bedrock formations, while the northern part of the island and the mainland part of Portsmouth's administrative area is underlain by the highly permeable chalk formation that outcrops at Portsdown Hill. Low to moderately permeable superficial deposits overly most of the bedrock in Portsmouth, however, reducing the permeability of most areas in terms of surface water runoff generation. This may potentially make the installation of Sustainable Drainage Systems (SUDS) difficult in attempting to reduce the flood risk to 'downstream' sites when promoting new development.

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Vulnerability to Climate Change

The SFRA has generated predicted tidal outlines for a number of years up to 2115 (see SFRA Map: *Flood Mapping: Climate Change* Dataset). These outlines account for the most up-to-date predicted rises in sea-level over the coming century due to climate change and they therefore allow the identification of locations that will be most vulnerable to this change due to their topography. In Portsmouth, the areas most vulnerable to rising sea levels are Southsea and Eastney.

Existing defence assets and likely future investment

The coastal frontages of Portsmouth are almost entirely defended from either wave overtopping or tidal flooding by some form of coastal defence. Approximately three quarters of the coastal defences in Portsmouth have a crest level which is higher than a present day 1 in 200 year tide based on still water level analysis.

The coastal defences in Portsmouth are, however, likely to be susceptible to climate change, as 100 years of predicted sea level rise would mean that most man-made defences fail to offer protection from a 1 in 20 year tide, with the exception of the southern frontage of Portsea Island from Eastney to Southsea Castle, Gunwharf Quays frontage and the Port Solent frontage on the mainland.

To sustain future development in Portsmouth, particularly on high risk or highly vulnerable parts of Portsea Island, significant investment in flood defences and flood defence infrastructure will be required in improving and maintaining existing flood defences (see SFRA Map: Infrastructure Dataset). In order to consider the sustainability of investing in improved defences, the 'danger to people from breaching' index (see SFRA Map: Infrastructure: Danger to Public/ Property Dataset) will provide indications as to where the residual risk due to breaching may remain unfavourably high following improvements to defences to protect from extreme tidal floods.

Sequential and Exception Test

National Planning Policy Framework (NPPF) and The National Planning Practice Guidance (NPPG) sets out the Government's objectives for achieving sustainable development through the avoidance and management of flood risk. The NPPF aims to ensure that flood risk is taken into account at all stages of the planning process to avoid inappropriate development in areas of flood risk. To achieve this aim, the NPPG provides a decision making tool to ensure that sites with a low probability of flooding are developed in preference to areas at higher risk. The Sequential Test is the decision process which Local Authorities must demonstrate when developing their Local Plans. This SFRA has developed a suite of mapping outputs to assist Local Authorities in applying the Sequential Test.

When applying the Sequential Test, The *Flood Mapping* Dataset of the SFRA will provide all the necessary information required upon which to base decisions regarding the location of future development in relation to flood risk. Within The *Flood Mapping* Dataset, the key map required for applying the Sequential Test is the Environment Agency's Flood Map for Planning, shown as Flood Zone 2 and Flood Zone 3 in conjunction with the Historic Flood Map.

The *Flood Mapping* Dataset also contains 4 other Mapsets which provide useful information to support Local Authorities when applying the Sequential Test, these include:

- *Hazard Map* – Undefended Flood Hazard
- *Flooding from Other Sources* – including Surface Water, Groundwater, Sources of Overland Flow
- *Flood Warning Areas*
- *Climate Change* - Outlines for years 2025, 2055, 2085 and 2115

For the purpose of efficacy and ensuring this text remains contemporary guidance and advice on flood risk and planning is signposted from the links below:

- The National Planning Policy Framework
- Planning Practice Guidance: Flood Risk and Coastal Change
- Flood risk assessment for planning applications
- Flood risk assessment: standing advice

It is requested that if in applying any of this guidance that links are found to be broken or require updating that contact is made with the SFRA helpdesk through contact details on the mapping webpage.

Planning Policy

Paragraph 100 of the National Planning Policy Framework (NPPF) seeks to direct development away from areas at highest risk of flooding. Local Plans should be supported by SFRA and develop policies to manage flood risk from all sources.

Local Plans should apply a sequential, risk based approach to the location of development. Development should not be permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.

If, following application of the sequential test, it is not possible (consistent with wider sustainability objectives) for the development to be located in zones with lower probability of flooding, the exception test can be applied if appropriate. The exception test should demonstrate that there are wider benefits to the community which outweigh flood risk. It should also demonstrate, through a site specific flood risk assessment, that the development will be safe for it's lifetime.

Chapter 10 of the NPPF provides full guidance on climate change, flooding and coastal change.

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SFRA Mapping Outputs

The table below summarises the most relevant mapping outputs and their purpose, for each of the key users of the PUSH SFRA.

Key Users	Relevant SFRA Mapping Dataset	Purpose
Planning Policy	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** provides all the necessary information to help planners apply the Sequential Test and Exception Test when allocating new sites for development. ***Flood Mapping Dataset*** also allows planners to identify sites with the lowest probability of flooding and lowest flood hazard / danger and how the extent of flooding is likely to change in the future due to climate change.
Development Control	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** helps Development Control personnel to: o Prepare specifications for site specific FRAs. o Review site specific FRAs for new development sites and check for compliance with NPPF.
Risk Management	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** helps Flood Risk Managers to identify variations in flood hazards / dangers to existing development. The data also provides mapping to show how the extent of flooding is likely to increase over time due to climate change.
	Infrastructure: Appropriate Defence Standards and Levels of Investment	***Infrastructure Dataset*** helps Flood Risk Managers to: o Identify shortfalls in existing defences in providing appropriate standards of defence, now and in the future. o Identify indicative levels of investment required to provide the appropriate standards, now and in the future.
Emergency Planning	***Flood Mapping:*** NPPF Sequential Test and Relevant Supporting Information	***Flood Mapping Dataset*** can provide emergency planners with information on the variation of flood probability and hazard across the sub region. Such information can aid in the development of emergency plans and evacuation routes during flood events.
	Infrastructure: Appropriate Defence Standards and Levels of Investment	***Infrastructure Dataset*** can help Emergency Planners to: o Identify indicative standards of defence, now and in the future.

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Recommendations for Site Specific Flood Risk Assessments

Whilst the information presented in this SFRA will inform Local Authorities and facilitate their strategic allocation of sites for future development, it does not preclude the need for developers to undertake site specific flood risk assessments (FRAs). A SFRA, by its very nature, is a high level assessment of flood risk at the local authority level. It does not provide sufficiently detailed information to satisfy all of the requirements of a site specific FRA as outlined in the National Planning Policy Framework.

The Environment Agency has produced a suite of standing advice and guidance on producing Flood Risk Assessments.

- Flood Risk Assessment: Guidance for completing flood risk assessment to accompany a planning application
    - When you need an assessment
    - When you don't need an assessment
    - When to follow standing advice
    - How to do an assessment
    - Get information to complete an assessment

- Flood Risk Assessment: Guidance for planning authorities on review of flood risk assessments submitted as part of planning applications
    - Check if you need to consult
    - Flood zone 1
    - Flood zone 2
    - Flood zone 3
    - What you need to check in an assessment
    - Extra flood resistance and resilience measures

The following sections provide additional specific guidance for assessing flood risk at the site specific level within Portsmouth City Council and indicate how the outputs from the SFRA can inform such assessments.

Tidal Flooding

Flooding from tidal sources is one of the primary sources of flood risk within Portsmouth and the areas at risk are predicted to increase significantly by 2115. The *Flood Mapping* Dataset shows the existing areas at risk of tidal flooding and the associated undefended flood hazard. The index of flood hazard represents a gradation of hazard within the Flood Zones based on a combination of the depth of flood water and the velocity of the water (indicative ranges for which have been assumed based on distance from the coastline). It should also be noted that this dataset was derived during the evolution of the 2007 work package and the mapping has not been updated as part of the 2015 review. For this reason in areas where there have been flood mapping updates since 2007, there may be discrepancies in the data presented. Where this occurs it is recommended that further advice is sought from the SFRA Helpdesk team or local Environment Agency office.

The frontages where existing defences provide the minimum standards required for new development (i.e. 1 in 200 years for tidal flooding), are identified in the *Infrastructure: Overview* Dataset by a purple line. Indicative Areas Benefiting from Defences (ABDs) are also shown in this dataset. The Indicative ABDs have been defined as areas where the crest levels of the existing defences are consistently equal to or higher than the present day 1 in 200 year extreme sea level.

If small lengths of defences have crest levels which fall below the 1 in 200 year extreme sea level (even for a short length), the area behind the defence has not been classed as an Indicative ABD. The frontage of Southsea is an example of where this study has not been able to define an Indicative ABD due to small lengths of defence where the crest levels fall below the 1 in 200 year extreme sea level. The gaps in the defence level can also be viewed in more detail using *Infrastructure: Defence Level*. It should be noted that other areas may potentially be classified as ABDs if more detailed modelling assessments of the defences, which is beyond the scope of this SFRA, are carried out.

The *Flood Mapping: Hazard Map* Dataset shows the flood hazard (in terms of danger to people) associated with a hypothetical breach in the defences for the whole of the tidal frontage. The Indicative ABDs shown in *Infrastructure: Overview* defines which of the hazard maps is most appropriate for consideration. Hazard Map for Flood Zone 2 is only appropriate for considering present day flood hazards within an ABD. To aid interpretation, the areas where this index is not appropriate for present day analysis are hatched out. The benefit of showing hazard information in the hatched out areas is to allow planners and developers to understand the likely residual risks that would remain if they were to invest in defending an area to a 1 in 200 year standard. The Hazard Map for Flood Zone 2 (Undefended Flood Hazard) should be used to assess the variation of flood hazard within the Flood Zones for all areas outside the Indicative ABDs.

The benefit of both the undefended flood hazard maps and the danger from breaching maps is that the gradation of flood hazard within the Flood Zones can help both planners and developers to ensure that development is steered away from the areas of highest hazard. The hazard mapping presented in *Flood Mapping: Hazard Map*, however, should only be applied when appropriate consideration has been taken of alternative sites at a lower probability of flood risk (i.e. within Flood Zone 1) have been considered.

The flood hazard information, for both the undefended and breach scenario, developed as part of this SFRA, has been undertaken at a strategic level and is therefore at an appropriate level of detail to allow Local Authorities to strategically allocate sites for development. The hazard data has been classified into 4 categories to illustrate the gradation of flood hazard within Flood Zones 2 and 3 in line with best practice guidance as set out in Defra/ EA Guidance FD2320. The hazard data has not been calculated using modelling or other detailed numerical methods and is therefore not appropriate for identifying design parameters as part of site specific FRAs. It is therefore recommended that FRAs for sites located within the flood hazard zones should still include a quantitative assessment of flood hazard based on more detailed assessments of defence standards, defence failure scenarios and overland conveyance of flood flow.

The impact of climate change on increasing sea levels has a significant effect on the extents of Flood Zones 2 and 3 by 2115, especially in Southsea and North Portsea Island. The NPPF expects consideration to be given to both current and future flood zones at the site specific level, taking

account of climate change. The climate change flood extents presented should be used when undertaking a site specific FRA to inform the assessment of the long term sustainability of developments currently within Flood Zone 1 and the likely increases in flood risk in Flood Zones 2 and 3.

The defence information provided in the *Infrastructure Dataset* can provide developers undertaking site specific FRAs with an indication of the equivalent tidal return period of the crest level of the existing defences and an indicative level of investment that may be required to raise defence standards to the minimum required for new development. Such investment could be secured through the development process by Community Infrastructure Levy or Section 106 agreements.

Wave Overtopping

The Wave Energy mapset included within *Flood Mapping: Flooding from Other Sources*, shows how exposure to wave energy varies along the frontage of the study area. Such information can be used to assess, at a high level, the risk of flooding caused by extreme wave overtopping. Based on information from other similarly exposed frontages in the PUSH sub-region, it is recommended that all applications for development within the vicinity of the southern frontage of Portsea Island include an assessment of extreme wave overtopping, regardless of which Flood Zone the site is in. This will ensure that this risk is always considered for new development in the relevant locations. The assessment of extreme wave overtopping should be appropriate to the scale of risk and may, in some cases, be ruled out as a significant risk quite easily, but should nevertheless be addressed.

Fluvial Flooding

According to the Environment Agency Flood Zones, there are no watercourses which pose a fluvial flood risk within Portsmouth. As such, site specific FRAs in the city do not generally need to consider this type of flood risk. The risk of flooding from small localised drainage ditches and channels should still be assessed where they exist close to a development site.

Surface Water/Overland Flow Flooding

The dataset *Flood Mapping: Flooding from Other Sources* show both maps for potential surface water flooding and the variation in the potential source of overland flows. The areas shown in red and orange relate to areas of very high and high potential for generating overland flow. Notably, the urban areas are indicated as red or orange due to the high runoff potential from urban land uses.

Due to the highly urbanised nature of the city, almost all areas in Portsmouth are shown as having a high or very high potential for overland flow. It is recommended that all site specific FRAs within the city boundary should consider the impacts and management of flooding due to overland flow both to and from sites. Even undeveloped areas on Portsdown Hill, underlain by permeable chalk, have a moderate potential for generating overland flow due to the steeply sloping gradient there.

The data shows that new development located on the small amount of Greenfield Land in Portsmouth is likely to have either a moderate or high impact on the surface water runoff regime. Site specific FRAs should therefore carefully consider the impact of development on the local surface

water runoff regime and should investigate SUDS options to manage surface water where achievable and if appropriate

Groundwater Flooding

There have been no observed incidences of groundwater flooding in Portsmouth. Site specific FRAs within Portsmouth should not need to consider this form of flooding.

Flooding from Infrastructure

Historically, parts of Portsmouth have recorded incidents of flooding caused by problems relating to drainage infrastructure, often due to the age and limited capacity of the existing combined sewer system, as shown in Dataset *Flood Mapping: Flooding from Other Sources*. Increased runoff rates and volumes as a result of new development could, if unmanaged, make the existing situation far worse. Developers should therefore seek opportunities to apply SUDs measures to relieve issues relating to overloading of the existing sewerage system.

When undertaking a site specific FRA for a large development site, consultation with Southern Water should always be undertaken to investigate whether the proposed development will have an adverse impact on the local drainage system.

Sustainable Urban Drainage Systems (SUDS)

Conventional surface water drainage systems have traditionally used underground pipe networks to efficiently convey water away from sites. In the past this has led to problems of downstream flooding, reductions in groundwater recharge and waste pollution incidents associated with surface water overwhelming combined sewers. Both 'Making Space for Water' and the 'Water Framework Directive' have highlighted the need for an improved understanding and better management of how our urban environments are drained. The SUDS management train approach is the principle that a range of SUDS which feed into each other can often offer benefits to the delivery of a successful surface water system/strategy. This approach dictates that there may be more than a single option that will allow for successful surface water attenuation and control.

NPPF states that Local Authorities should prepare and implement planning strategies that help to deliver sustainable development, by using opportunities offered by new development to reduce the causes and impacts of surface water flooding. By implementing polices to encourage developers to incorporate SUDS wherever possible, Local Authorities can help to mitigate the impacts that development has on surface water runoff rates and volumes.

Emergency Planning

As well as informing the development control process, the outputs of the SFRA can also be used by the Local Authority to inform their Emergency Planning Polices. The Flood Mapping Datasets are particularly useful when considering the feasibility and sustainability of key access routes within their administrative boundaries. The benefit of producing such outputs on a sub-regional scale mean that the Local Authority can also consider access beyond their administrative boundary where key access routes (e.g. M27) cross a number of Local Authorities.

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Additional Guidance

- Flood risk assessment for planning applications; Environment Agency
- Flood risk assessment: standing advice; Environment Agency
- National Planning Policy Framework; DCLG
- National Planning Policy Framework Quick Guide; Environment Agency
- Planning Practice Guidance – Online web-based resource: DCLG
- Flood and coastal risk guidance: climate change allowances: Environment Agency
- Development and Flood Risk: Guidance for the Construction Industry CIRIA (2004)
- Flood Risk Assessment Guidance for New Development: FD2320/TR2 Environment Agency / DEFRA
- Susdrain online resource: The community for sustainable drainage CIRIA
- Portsmouth City Council emergency planning flooding – online resource
- The Portsmouth Plan – online resource
- South East Hampshire Catchment Flood Management Plan, Environment Agency
- Local Flood Risk Management Strategy, Portsmouth City Council