Partnership for South Hampshire Strategic Flood Risk Assessment

PART 4 – Havant Borough Council

Final Report (Version 3)

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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	6th June 2022	Version 1: Draft Report for review by Environment Agency, Havant BC, and Coastal Partners.	EC	Emily Craven	Associate Director
2	15th March 2024	Version 2: Draft Report, in light of revised PPG, for review by Environment Agency, Havant BC, and Coastal Partners.	EC	Emily Craven	Associate Director
3	10th June 2024	Version 3: Updated following stakeholder comments.	EC	Emily Craven	Associate Director

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Acronymns

Acronym	Definition
AEP	Annual exceedance probability
BGS	British Geological Survey
CFMP	Catchment flood management plan
CMP	Catchment management plan
DWMP	Drainage and wastewater management plan
FCERM	Flood and coastal erosion risk management
FRA	Flood Risk Assessment
FSA	Flood storage area
GIS	Geographical Information System
GWMP	Groundwater management plan
LFRMS	Local flood risk management strategy
LLFA	Lead local flood authority
LPA	Local planning authority
NPPF	National planning policy framework
PfSH	Partnership for South Hampshire
PPG	Planning practice guidance
SFRA	Strategic flood risk assessment
SMP	Shoreline management plan
SOP	Standard of protection
SuDS	Sustainable Drainage Systems
SWMP	Surface water management plan
RBD	River basin district
RFCC	Regional flood and coastal committee
WWNP	Working with natural processes

1. Introduction

1.1.1 AECOM has been commissioned by Portsmouth City Council on behalf of ten planning authorities in South Hampshire (the 'Partnership for South Hampshire' (PfSH)) to prepare an updated level 1 Strategic Flood Risk Assessment (SFRA). The PfSH Level 1 SFRA covers the administrative areas of Portsmouth City, Havant Borough, Gosport Borough, Fareham Borough, Eastleigh Borough, Southampton City, Winchester City, Test Valley Borough, New Forest District and New Forest National Park Authority.

1.1.2 This document should be read in conjunction with SFRA Report Part 1. Together with Part 1, this document forms the Level 1 SFRA for Havant Borough Council (BC).

Table 1-1 Level 1 SFRA User Guide

PART 1 MAIN REPORT	CONTENT
1 Introduction	Explains the need for the study and the objectives. Provides a user guide and identifies who has been consulted. Identifies when the SFRA may need to be updated in the future.
2 Legislation and Policy Framework	Provides an overview of the latest legislation and national and regional policies in relation to flood risk and coastal change.
3 Datasets	Identifies the datasets used to inform the SFRA and describes the approaches taken to use and update data as part of the SFRA.
4 Applying the Sequential Test	Describes how the sequential test should be applied using the SFRA.
5 Preparing Flood Risk Assessments	Describes how site specific FRAs should be prepared.
Appendix A: GIS Floodplain Analysis Methodology	Records the methodology applied for the GIS floodplain analysis to determine those areas that may be sensitive to changes in flood level in the future.
Appendix B: Coastal Modelling Technical Notes	East Solent Flood Inundation Model Re-Simulations Technical Note (Hayling Island, Portsea Island, Gosport to Warsash) Southampton Water Model Re-Simulation Technical Note

LPA SPECIFIC REPORTS	CONTENT
PART 2 TEST VALLEY BOROUGH **PART 3 WINCHESTER CITY** **PART 4 HAVANT BOROUGH** **PART 5 PORTSMOUTH CITY** **PART 6 GOSPORT BOROUGH** **PART 7 FAREHAM BOROUGH** **PART 8 EASTLEIGH BOROUGH** **PART 9 SOUTHAMPTON CITY** **PART 10 NEW FOREST DISTRICT AND NATIONAL PARK**	For each LPA, mapping of the flood risk datasets is provided as well as a report covering the following topics: 1 Introduction 2 Local policy and plans 3 Sources of flood risk and expected effects of climate change 4 cumulative impacts of development and land use change 5 Current control, mitigation and management measures 6 Opportunities to reduce the causes and impacts of flooding 7 Recommendations of how to address flood risk in development

2. Local policies and plans

The SFRA Report Part 1 Section 2 provides a high level overview of the national and regional planning context for coastal change and flood risk management in the PfSH SFRA project area. This Section provides a summary of the local policy and guidance for Havant BC.

2.1 Shoreline Management Plans

2.1.1 The role of Shoreline Management Plans (SMPs) is to establish flood risk management policies in relation to coastal change, addressing the risks in a sustainable manner. There are four policy options:

- Hold the Line – maintain or upgrade protection from flooding or erosion by holding the shoreline in broadly the same position.
- Advance the Line – actively move shoreline defences significantly seawards.
- Managed Realignment – change the position of the shoreline in a controlled way, such as by slowing erosion or creating areas of habitat to help manage flooding.
- No Active Intervention – maintain or encourage a more natural coastline, which may involve discussing adaptation to the risk from flooding or erosion.

2.1.2 This area is covered by the North Solent SMP[1] (which extends from Selsey Bill (Chichester) to Hurst Spit (New Forest)), for which a review is currently underway. The policies for the Havant BC administrative area are summarised in Table 2-1 and the policy units are shown in Appendix A Figure 10.

Table 2-1 North Solent SMP Policies

Policy Unit	Location	Policies for the Short Term (0-20 yrs, Epoch 1), Medium Term (20-50 yrs, Epoch 2) and Long Term (50-100 yrs, Epoch 3)
5A20	Farlington Marshes	Hold the line in the short term. Hold the line in the medium and long term subject to further studies. A change in defence management in the medium or longer-term may be required to enable Managed Realignment.
5A19	Southmoor Lane to Farlington Marshes (east)	Hold the line in the short, medium and long term
5A18	Wade Lane to Southmoor Lane	Hold the line in the short term. Hold the line in the medium and long term, subject to further studies which may recommend managed realignment at Southmoor.
5A17	Maisemore Gardens to Wade Lane	Hold the line in the short term. Hold the line in the medium and long term, subject to further studies considering managed realignment at Conigar and Warblington.
5A16	Emsworth Yacht Haven to Maisemore Gardens	Hold the line in the short, medium and long term.
5AHI01	Langstone Bridge to Northney Farm	Hold the line in the short, medium and long term.
5AHI02	Northney Farm	Hold the line in the short and medium term. However, no public funding available. In the long term, consideration of managed realignment.
5AHI03	Northney Farm to Mengham	Hold the line in the short, medium and long term. However, no public funding available.
5AHI04	Mengham to Chichester Harbour Entrance (west)	Hold the line in the short, medium and long term.
5AHI05	Chichester Harbour Entrance (west) to Langstone Harbour entrance (east)	Hold the line in the short, medium and long term.
5AHI06	Langstone Harbour entrance (east) to North Shore Road, New Town	Hold the line in the short, medium and long term.

[1] North Solent Shoreline Management Plan, 2010 https://www.northsolentsmp.co.uk/

5AHI07	North Shore Road, New Town to West Lane (Stoke)	No active intervention for the majority of the area. Hold the line for Newtown for short, medium and long term.
5AHI08	West Lane (Stoke) to Langstone Bridge	Hold the line in the short, medium and long term. Consideration of regulated tidal exchange at Stoke and managed realignment at West Northney.

Portchester Castle to Emsworth FCERM Strategy

2.1.3 The Portchester Castle to Emsworth FCERM Strategy[2], has been developed by the Environment Agency, in partnership with Havant Borough Council, Portsmouth City Council, Fareham Borough Council, and Chichester District Council. The Strategy was adopted in 2012 and identifies the best way of managing coastal flood and erosion risk over the next 100 years. The estimated whole life cost to implement the recommendations in the strategy is £113 million (excluding inflation). It should be noted that the recommendations set out within the Strategy do not guarantee the required funding, licenses, consents and planning permissions required to implement them.

2.1.4 The key benefits of delivering the preferred options are:

- Reduced flood risk to 901 residential and 178 commercial properties for 2020, increasing to 4,257 residential and 433 commercial properties by 2110 across the whole Strategy area,
- Reduced flood risk from typically a 5% annual exceedance probability (AEP) (1 in 20 year event) to a 1.33% AEP (1 in 75 year event), sustained for 100 years,
- Improved flood risk and erosion protection to M27, A3(M), the South Coast Rail Link,
- Improved flood risk protection for numerous heritage and recreation sites and features such as Portchester Castle,
- Farlington Marshes, Southmoor, Warblington and Conigar Point – maintain existing defences for the next 20 years. This will provide sufficient time to develop the long-term management options for the sites and establish compensatory habitat as required. The selection of a preferred long-term option requires further detailed studies which are currently underway.

Hayling Island FCERM Strategy

2.1.5 In response to the recommendations in the SMP, Coastal Partners are developing the Hayling Island FCERM Strategy[3] to identify strategic coastal management options for the next 100 years, outlining a programme of investment and identifying funding sources and partners required to deliver necessary investment.

2.1.6 The Strategy is being developed in two stages: Part 1: Hayling Island Funding and Implementation Strategy, which is now complete, and Part 2: Hayling Island Coastal Management Strategy which is currently in draft. The aim of the Hayling Island Strategy is to:

- Develop strategic coastal management options for Hayling Island for the next 100 years,
- Outline a programme of investment to reduce the risk of coastal flooding and erosion to people living on the island,
- Identify the potential funding sources and partners required to deliver that investment programme and be open and honest about where funding is likely to be a challenge,
- Incorporate adaptation strategies, as defence improvements will not be possible in all locations,
- Be holistic, yet flexible for both people and nature,
- Respond to future changes, support sustainable development of the island and take into account predicted sea level rise and climate change,

[2] Environment Agency, September 2012, Portchester Castle to Emsworth FCERM Strategy. https://coastalpartners.org.uk/project/portchester-castle-to-emsworth-strategy/
[3] Hayling Island Coastal Management Strategy, September 2023, Public Consultation Report Draft Version 2 https://coastalpartners.org.uk/project/hayling-island-coastal-management-strategy-2120/#:~:text=Hayling%20Island%20FCERM%20Strategy,people%20living%20on%20the%20island

- Make a partnership approach central, between Havant BC, Environment Agency, Natural England, Landowners, businesses and local communities, making sure local needs and priorities are at its core.

2.2 Catchment Flood Management Plans

2.2.1 The role of Catchment Flood Management Plans (CFMPs) is to establish flood risk management policies which will deliver sustainable flood risk management for the long term. CFMPs are produced by the Environment Agency. The CFMP considers all types of inland flooding, from rivers, groundwater, surface water and tidal flooding, but not flooding directly from the sea (coastal flooding), which is covered by Shoreline Management Plans (SMPs).

2.2.2 The Havant BC administrative area is covered by the South East Hampshire CFMP[4]. The policies for the sub-areas within Havant are summarised in Table 2-2 and Figure 2-2 and Table 2-3 and Figure 2-2.

Table 2-2 South East Hampshire CFMP Policies

Sub-area & Preferred Policy	Summary of proposed actions
Portsmouth and Langstone Harbours Policy 5 Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.	Increased storminess resulting from climate change will put increased pressure on the urban drainage network. Promote greater resilience to flooding through flood proofing, emergency planning and flood warning. Develop a collaborative SWMP to address current and future pressures on drainage network. New developments will need to manage drainage so that there is no net increase in flood risk. Avoid inappropriate development in areas at risk of flooding.
Havant and Denmead Policy 4 Areas of low, moderate, or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.	Improve channel capacity and conveyance through Havant by seeking to remove the constraints from urban development and naturalise the river corridors. Improve flood warning on the Hermitage and Lavant streams by seeking to expand the service, reducing lead-in times and developing better predictive tools. Increased storminess resulting from climate change will put increased pressure on the urban drainage network. Develop a collaborative SWMP to address current and future pressures on the drainage network. Raise awareness of the impacts of blocked drainage pathways from the build-up of obstructions in the watercourses.

Map of the policies in the South East Hampshire catchment.

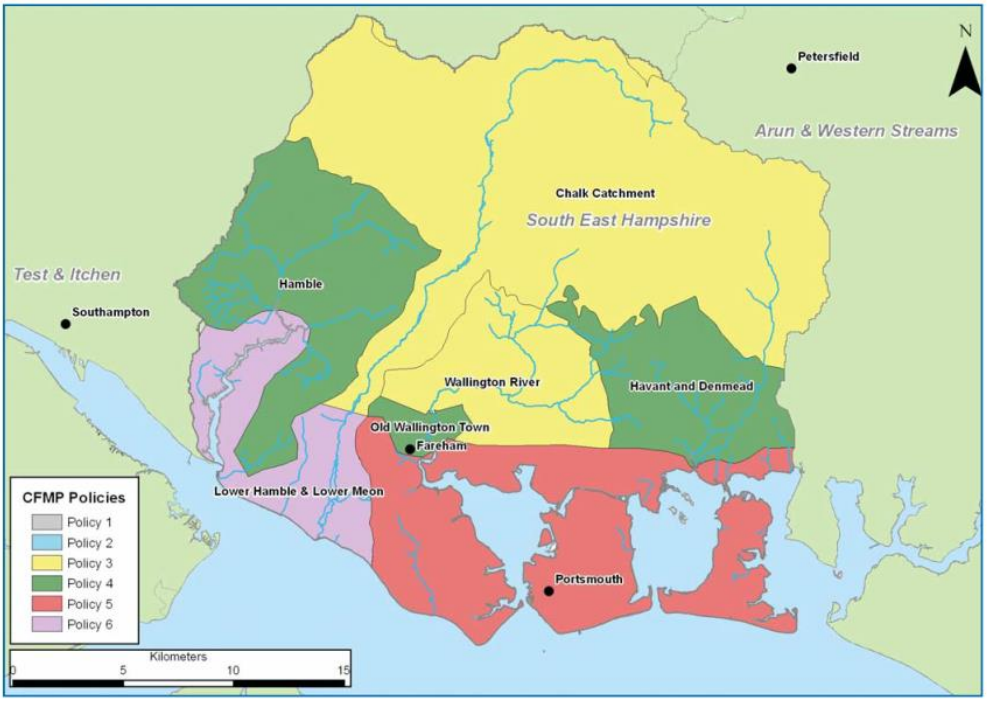


Figure 2-1 Map of the policies in South East Hampshire catchment, CFMP 2009

[4] Environment Agency, December 2009, South East Hampshire Catchment Flood Management Plan, Summary Report https://www.gov.uk/government/publications/south-east-hampshire-catchment-flood-management-plan

Table 2-3 Arun and Western Streams CFMP Policies

Sub-area & Preferred Policy	Summary of proposed actions
Lower Chalk Streams Policy 4 Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.	Surface water and groundwater flooding can be relatively frequent and expected to become higher and more damaging in the future. Climate change and urban development are expected to have an effect on flood risk. River Ems, Westbourne and Emsworth improvement scheme proposed to investigate setting back flood embankments and inform riparian owners on operating flow and level control.

Map of the policies in the Arun and Western Streams catchment.

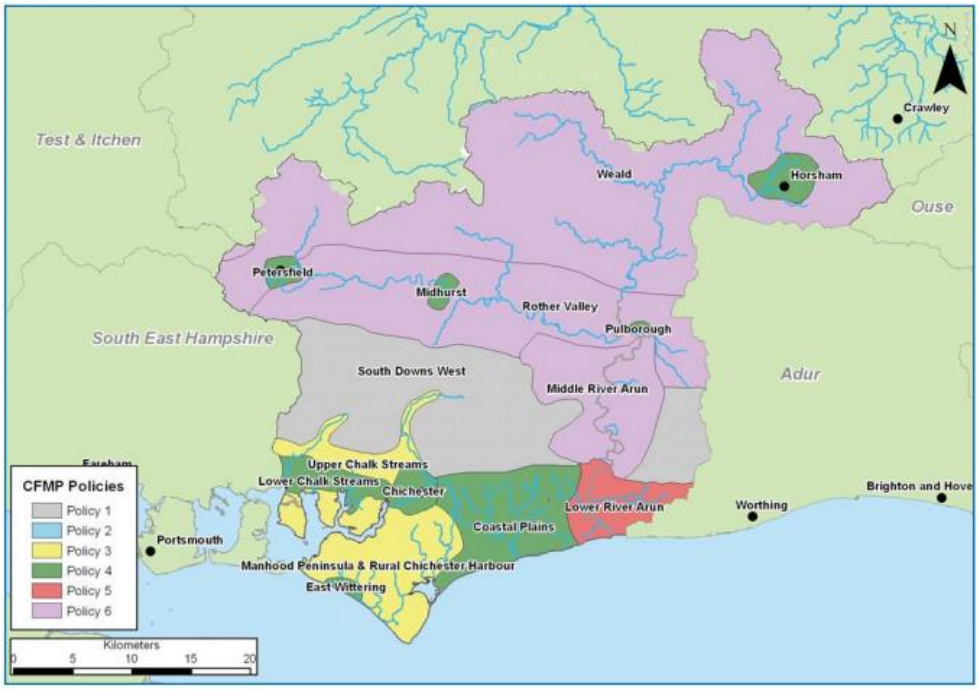


Figure 2-2 Map of the policies in Arun and Western Streams catchment, CFMP 2009

2.3 Lead Local Flood Authority

2.3.1 Hampshire County Council (HCC) are the Lead Local Flood Authority (LLFA) for the Havant administrative area. HCC have plans in place to assess and manage flood risk in the study area:

- Preliminary Flood Risk Assessment
- Local Flood Risk Management Strategy
- Catchment Management Plans
- Groundwater Management Plan

Preliminary Flood Risk Assessment

2.3.2 Under the 2009 Flood Risk Regulations, HCC is required to prepare a Preliminary Flood Risk Assessment (PFRA) for the area, which compiles high level information on significant local flood risk from past and potential flood events. The PFRA[5] helps to identify areas that should be prioritised for Surface Water Management Plans, which will in turn form the Local Flood Risk Management Strategy.

2.3.3 The Environment Agency has set out a national methodology identifying areas with the highest risk of flooding in England. Those with populations more than 30,000 people at risk should be identified as 'Flood Risk Areas' and may require further assessment. Areas below this threshold should be assessed by each LLFA and used to identify areas for which Surface Water Management Plans or other similar

[5] Hampshire County Council, April 2011, Preliminary Flood Risk Assessment
https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/preliminary-flood-risk-assessment

plans are required. No Flood Risk Areas above the Environment Agency threshold were identified within Hampshire, and therefore the PFRA focuses on identifying local flood risk areas within the region.

2.3.4 The PFRA identifies eight areas within Hampshire that are considered to have substantial potential flood risk; however, none are located within the Havant administrative area.

Local Flood Risk Management Strategy

2.3.5 As an LLFA, HCC is required to investigate and manage flood risk from non-main river sources within the administrative area and develop a Local Flood Risk Management Strategy (LFRMS)[6] for the area. The priority of the council is to protect people, homes, businesses, and key infrastructure by avoiding risks and managing water resources through effective planning and design; preventing future flooding, adapting to flood risk; enabling communities to be better prepared for flood events, and adopting sustainable and affordable effective practices.

2.3.6 The Hampshire LFRMS sets out seven policies that aim to bring about effective flood risk management in Hampshire with the support of the Hampshire Strategic Flood Risk Management Partnership:

- Undertake effective partnership working,
- Develop a catchment approach to better understand the risks associated with the movement of water,
- Understand risks and develop clear priorities to help protect communities most vulnerable to flooding,
- Support the planning process by encouraging sustainable and resilient development,
- Record, prioritise and investigate flood events to increase knowledge and understanding,
- Work with multi-agency groups to develop schemes to reduce flood risk in vulnerable areas, and,
- Empower and support community resilience to improve adaptation to and recovery from flood events.

2.3.7 In 2017, Atkins developed a Geographical Information System (GIS) tool[7] for HCC which helped in prioritising catchments most at risk from flooding within Hampshire. The tool provides a robust, evidence-based approach to support strategic prioritisation of investment and informs discussions with key stakeholders and underpins HCC's LFRMS.

Catchment Management Plans

2.3.8 Following the approach set out in the LFRMS, HCC have developed Catchment Management Plans (CMP) for 18 catchments that cover Hampshire[8]. The purpose of the CMPs is to identify areas within each catchment that are at high risk of flooding and that have experienced flooding in the past, identify the causes and mechanisms of flooding and support the introduction of a stepped approach to interventions and measures that will reduce the risk now and in the future.

2.3.9 The CMPs, of relevance to Havant BC, are:

- CMP3 River Meon and Wallington – with priority areas Purbrook and North Waterlooville.
- CMP7 Lavant – with priority areas Havant West, Havant East, Emsworth, South Hayling and Waterlooville.

2.3.10 The CMPs set out policies and action plans for local flood risk management.

2.3.11 Previously HCC had begun to prepare Surface Water Management Plans (SWMP), which assess the risks posed by surface water flooding for specific areas and set out an action plan for who will do what to better manage these risks. These plans have now been superseded by the CMPs which seek to

[6] Hampshire County Council, October 2020, Local Flood Risk Management Strategy
https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/local-flood-risk-management-strategy
[7] Atkins, January 2017, Hampshire Catchment Prioritisation Tool.
[8] Hampshire County Council, Catchment Management Plans
https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/catchment-management-plans

provide a more holistic and joined up approach to managing flood risk. The Hampshire SWMP Strategic Assessment and Background Information report[9] highlights several areas potentially at risk from surface water (and other forms of) flooding, none of which are within the Havant administrative area.

2.3.12 The CMP for the River Meon and Wallington identifies that in Purbrook the principal flood sources are groundwater and surface water associated with temporary overland flow during heavy rainfall events. In North Waterlooville, there is risk from groundwater, surface water and fluvial flooding associated with the River Wallington, Old Park Stream, and Hermitage Stream.

2.3.13 The CMP for the Lavant identifies in Havant West, Havant East and Waterlooville, the principal flood risk sources are groundwater, surface water and fluvial associated with the Hermitage Stream and its tributaries and an unnamed watercourse. In Emsworth, the River Ems and its tributaries also pose a risk. In South Hayling, the dominant source of flooding is the sea. Groundwater flood risk is also assessed as high.

2.3.14 **Recommendation:** Review and implement the catchment policies and priority area policies set out by HCC in the CMPs.

Groundwater Management Plan

2.3.15 Hampshire has an established risk from groundwater flooding, with over 400 properties flooded and significant disruption and damage to infrastructure occurring during the winter of 2000/2001. The Groundwater Management Plan (GWMP)[10] for Hampshire has therefore been prepared in partnership with several other risk management authorities to gain a better understanding of where the risk of groundwater flooding is greatest and how to manage this risk. The GWMP builds on the work undertaken on the Local Flood Risk Management Strategy for Hampshire.

2.3.16 No areas within the Havant administrative area were identified as being at high risk from groundwater flooding in the GWMP. Immediately to the north of Havant in East Hampshire, groundwater flooding has been experienced in Rowlands Castle. The GWMP highlights generic actions that could be applied across all high risk areas and suggests which organisation or body might be best places to deliver them, in addition to a more detailed assessment for each area in the form of an Action Plan.

2.4 Other relevant plans

Greenprint for South Hampshire

2.4.1 Since the COVID-19 pandemic, there has been a demand from the public for more permanent and sustainable change, focusing more on the wellbeing of people and environmental impact. The Greenprint for South Hampshire: The Opportunities Ahead[11] is a report written by members of the Green Halo Partnership, Future South, and the Southern Policy Centre. It sets out a possible way forward, embracing ideas and partners from within and beyond the immediate PfSH area. The Greenprint is a model for policy making which could reflect commitment to a green recovery, shaping plans and programmes across sectors to deliver a world class economy in a world class environment.

2.4.2 Many communities across South Hampshire face common economic, social, and environmental opportunities and challenges. Working together under a common planning framework to find shared solutions will be more effective and beneficial for all parties, rather than trying to solve problems individually and potentially exacerbating issues elsewhere, or developing inconsistent, incompatible approaches in different localities.

[9] Hampshire County Council, March 2010, Surface Water Management Plan Strategic Assessment and Background Information https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/catchment-management-plans
[10] Hampshire County Council, October 2013, Hampshire Groundwater Management Plan https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/groundwater-management-plan
[11] Partnership for South Hampshire, September 2020, A Greenprint for South Hampshire: The Opportunities Ahead https://www.push.gov.uk/wp-content/uploads/2020/09/Item-6-Greenprint-for-South-Hampshire-30.09.20.pdf

Southern Water DWMP

2.4.3 Water and sewerage companies must produce Drainage and Wastewater Management Plans (DWMPs) covering a minimum of 25 years, setting out how they intend to improve and maintain a robust and resilient drainage and wastewater system in the face of risks to the network such as climate change and population growth. Companies will need to produce final plans in 2023 and the production of plans will be made statutory through the Environment Act.

2.4.4 Southern Water have developed 11 DWMPs across their entire operational region[12]. The East Hampshire Catchment DWMP and Arun and Western Streams Catchment DWMP cover the Havant BC administrative area.

2.4.5 The East Hampshire Catchment DWMP highlights that storm overflows, nutrients and pollution are the main concerns for this river basin. The Budds Farm wastewater system which serves most of the Havant BC area is already at significant risk from rainfall related flooding and this is likely to increase as a result of climate change unless measures are taken. The sewer system will need to adapt to reduce the volume of rainfall entering the sewer network. This adaptation may provide the capacity within the wastewater system to allow for future growth and therefore reduce both the need for significant increases in the capacity of the existing wastewater systems and reduce discharges from storm overflows.

2.4.6 The Arun and Western Streams Catchment DWMP highlights that storm overflows and nutrients are the main concerns in this river basin. The Thornham wastewater system serves Emsworth in the east of the study area and the DWMP considers that the current performance of the drainage and wastewater system needs to be improved to reduce the impacts on customers and/or the environment.

[12] Southern Water, Drainage and Wastewater Management Plans https://www.southernwater.co.uk/dwmp

3. Sources of flood risk and expected effects of climate change

This Section provides a description of the local geology and hydrology in the study area, and an assessment of the risk of flooding from all sources based on available datasets. Refer to Part 1 Main Report for details of the datasets.

3.1 Geology and Hydrology

Geology

3.1.1 The Havant Borough is underlain by tertiary bedrock and a chalk escarpment at Portsdown, which forms part of the Hampshire basin[13]. The outer ridges of the escarpment form the South Downs to the north and the Isle of Wight to the south. The Portsdown escarpment is remarkably constant in height throughout its length as a result of the lithological uniformity of the chalk.

3.1.2 The tertiary bedrock surrounding the chalk escarpment consists of Lambeth Group, London Clay formation and Wittering Formation. The Lambeth Group stretches across the middle of Hayling Island as a broad band and to the north of the Borough at Cowplain. The London Clay Formation is present as a band to the south of Hayling Island and as a broader band from Waterlooville across to the northern edges of Emsworth. The Wittering formation is found around Purbrook to the west of the Borough and along the southern side of Hayling Island where it can become exposed on the beach as a result of storms.

3.1.3 Superficial deposits across Havant include River Terrace Deposits along the mainland coastline and covering the majority of Hayling Island, Raised Marine Deposits and Blown Sand around the Hayling Island coastline, Alluvium around the coast of Havant town, and Head (clay and gravel) around Havant town centre and further from the coastline.

3.1.4 The topography varies throughout the Borough as a result of the underlying geology, past erosion processes and human intervention. Towards the north the topography is undulating, dominated by small, rounded hills and gently meandering shallow and small river valleys. This land flattens out towards the south and the harbour side, and Hayling Island is low lying with central elevated areas at around 5m AOD. Within the Borough the ridge height reaches a maximum of 96m AOD at Fort Purbrook.

Hydrology

3.1.5 Havant Borough has 56km of coastal frontage and 32km of main river frontage, as shown in Appendix A Figure 1. It also has one of the best examples of Chalk karst springs in the UK, which rise in Bedhampton. The springs are large, with a combined flow of approximately 104 000 m^3/day (Atkinson and Smith, 1974) — enough to fill 40 Olympic-sized swimming pools every day[14].

3.1.6 Three main rivers and their tributaries flow through the mainland part of the Borough: the Hermitage Stream, Lavant Stream and River Ems. This part of the study area therefore falls into two operational catchments as identified in the Catchment Data Explorer[15]; East Hampshire Rivers and Western Streams. Table 3-1 provides a description of the watercourses and their study area and identifies the type of modelling and mapping that is available within the SFRA for each watercourse.

[13] Havant Borough Council, 2007, Havant Borough Townscape, Landscape and Seascape Character Assessment – Formative Influences on Landscape. https://www.havant.gov.uk/landscape-character-assessment
[14] British Geological Survey, Karst hydrogeology of the Bedhampton and Havant springs. https://www2.bgs.ac.uk/groundwater/about/karstAquifers/bedhamptonHavantSprings.html#:~:text=The%20Bedhampton%20and%20Havant%20spring,sized%20swimming%20pools%20every%20day.
[15] Environment Agency Catchment Data Explorer. https://environment.data.gov.uk/catchment-planning

Table 3-1 Watercourses in Havant BC

East Hampshire Rivers Operational Catchment

Watercourse	***Description***	***SFRA Mapping***
Hermitage Stream	The Hermitage Stream forms the main drainage system within the north of Havant. The source of this stream is in the upland chalk in Cowplain, from where it flows south through Waterlooville and southeast Bedhampton, before turning southwest and discharging into Langstone Harbour. The watercourse is 7km in length. Between Waterlooville and Havant, the stream has a natural meandering form, but in the built environment of Havant its form has been straightened and enclosed into a regular trapezoidal concrete lined channel.	Flood Zones – Appendix A Figure 1. Modelled Flood Outlines – Appendix A Figure 12.
Lavant	6.5km river which flows from Southleigh Forest (Chichester), southwest through Rowlands Castle, West Leigh and Havant, and into Langstone Harbour at Southmoor Nature Reserve. From Havant town, some of the water from the river is pumped across to the Hermitage Stream.	Flood Zones – Appendix A Figure 1. Modelled Flood Outlines – Appendix A Figure 12.

Western Streams Operational Catchment

Watercourse	***Description***	***SFRA Mapping***
Ems	The Ems is a small chalk fed coastal stream which rises at Stoughton within the Chichester administrative area, flows along the Havant-Chichester border, into Emsworth, through eastern millpond, and then out into the Emsworth channel within Chichester Harbour basin. The watercourse is 9km long. The Emsworth Stream system has been used since medieval times to power water mills in its lower reaches. The complex channel system is testament to this.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

3.1.7 Several other smaller watercourses also flow through mainland Havant and Hayling Island.

3.1.8 On the mainland, West Brook rises in Southleigh Forest and flows through agricultural land and then to the urban area of Emsworth. The stream is increasingly modified along its course. There are several culverts which constrain its flow. At Bridge Road the watercourse flows through a highly modified largely artificial channel before entering Bridge Road Culvert and discharging into Emsworth Mill Pond. The Mill Pond has an outflow to Chichester Harbour. Water levels in the pond can be controlled through sluice gate but are influenced by tidal conditions.

3.1.9 The Nore Barn Stream rises north of the A27 and is channelled southwards through a series of drainage ditches across agricultural land. It is culverted beneath the A27 and railway line and beneath Nore Farm Avenue. The stream continues southwards at the boundary of the residential properties at Brook Gardens, where it is constrained by a variety of flood defences, to Nore Barn Wood and finally via marshland into Chichester Harbour.

3.1.10 The Nore Rythe, Fowley Rythe, Sweare Deep, Mill Rythe and Mengham Rythes all drain into the Emsworth Channel, within Chichester Harbour[13].

3.1.11 Langstone harbour is fed by the Hermitage Stream and the Langbrook Stream which both flow through a series of harbour lakes (Broad Lake, North Lake and South Lake) before entering the Langstone Channel. From Hayling Island, drainage flows through a dendritic series of Rythes (Cockle Rythe, Upper Rythes, Rod Rythes) and lakes (Stoke Common Lake, North Lake, Rabbit Lake, Boathouse Lake, Goldring Lake) before also joining Langstone Channel.

3.1.12 On Hayling Island, central areas are characterized by a dense network of manmade ditches, which can be seen aligning field margins. Around the edge of the island short stream systems drain towards the estuary edge and minor inlets.

3.1.13 Along with Portsmouth Harbour, the Langstone and Chichester Harbours, which surround Hayling Island, form an unusual intertidal ecosystem receiving comparatively little freshwater and possessing a characteristic hydrology arising from only narrow connections to the sea via the Solent[16].

3.1.14 The tidal range of Havant is comparatively large, typically between 4 and 5m on Spring tides, which means that there is an extensive intertidal area, especially in the harbours, and strong tidal flows, especially at the harbour mouths. Strong tidal processes have resulted in a series of channels, islands and mud creeks, which become progressively sandier and more shingly towards the southern reaches of the harbours.

3.2 Flooding from the sea

3.2.1 The risk of flooding from the sea is the principal source of flooding in the Borough, particularly on Hayling Island and along the southern coastline of the mainland. Tidal flooding can develop through a combination of factors coinciding, including spring (high) tides, strong coastal winds, and low atmospheric pressure.

3.2.2 High tide conditions can lead to tide locking, when flap valves at surface water outfalls close to stop sea water entering the system. This prevents drainage channels from discharging and instead surface water accumulates upstream of the outfalls. During heavy rainfall events this can result in flooding from manholes and gullies. The combination of heavy rainfall events and high tides can therefore contribute to significant surface water flooding.

Flood Map for Planning

3.2.3 The Flood Zones on the Flood Map for Planning provide an indication of the risk of flooding from rivers and the sea ignoring the presence of flood defences. (Refer to Table 3-1 in the Main Report for more information on Flood Zones).

3.2.4 Appendix A Figure 1 shows Flood Zones 2 and 3 for the study area. A large part of Hayling Island is shown to have a medium and high probability of flooding from the sea. Parts of the island in the east and west are shown to have a reduced risk of flooding due to the presence of defences. Langstone is also defined as Flood Zone 3, high probability of flooding from the sea.

Historic flooding

3.2.5 Recorded Flood Outlines published by the Environment Agency, presented in Appendix A Figure 2, show minimal flooding on mainland Havant, with small areas of tidal flooding recorded along the coasts of Langstone and Emsworth. On Hayling Island, significant coastal flooding is recorded along the north-eastern and south-eastern coasts, some of which surrounds properties. All recorded tidal flooding is within the mapped Flood Zones 2 and 3. The dates and timescales for approximately half of the coastal and tidal recorded flood events are unknown, whilst the remaining half occurred in December 1981, April 1985, October 2000, November 2005, and March 2008.

3.2.6 Emsworth is located on the coast and includes the Nore Barn Stream, the West Brook and the River Ems. Over recent years, extreme weather and high tides have resulted in a high frequency of flood events, which have affected local residents and businesses and caused considerable damage to properties. These flood events were caused by a combination of fluvial and tidal influences and principally affected Selangor Avenue, Victoria Road, North Street and Bridge Road in Emsworth[17].

3.2.7 Many of the past flood events experienced on Hayling Island have occurred in the south east of the Island at the Eastoke Peninsula, South Hayling and Mengham, where the coastline is most exposed to the impacts of the open sea and waves.

[16] Ramsar Sites Information Service, 1995, Portsmouth Harbour https://rsis.ramsar.org/RISapp/files/RISrep/GB720RIS.pdf
[17] Havant Borough Council, March 2015, Emsworth Flood Risk Strategy Review
https://cdn.havant.gov.uk/public/documents/Emsworth%20Flood%20Risk%20Strategy%20Review%20-%20March%202015.pdf

3.2.8 At Eastoke, severe coastal flooding events have occurred in 1978, 1979, 1985, 1989, 2005 and most recently the winter of 2013/14, causing flooding of large areas, affecting roads and internal property flooding to more than 15 properties. The vast majority of these events were a result of very high tides coinciding with stormy conditions and high winds, which resulted in overtopping of the existing defences.

3.2.9 The northern part of Hayling Island is more sheltered and prone to flooding from surge tides rather than large wave action. Residential roads and extensive areas of grazing land have flooded in the past as well as properties in Northney Road, Mill Rythe Yacht building yard and an industrial area. Significant flooding occurred around Northney and Langstone in February 2014. The A3023 Langstone Bridge has been closed at high tide during previous tidal flood events over the last 20 years.

3.2.10 Most recently in April 2024, significant flooding was experienced across the Borough during high tide.

Coastal Modelling

3.2.11 As part of this SFRA update, coastal modelling has been updated, to determine the extent of tidal flooding predicted. Details of the modelling undertaken are presented in SFRA Part 1 Appendix B. Maps showing the outputs for some of the key model scenarios are presented in Appendix B of this Report. (The full set of outputs have been provided to the LPAs as GIS files).

Flood Zone 3b Functional Floodplain

3.2.12 The Functional Floodplain is defined in the NPPF[18] as 'land where water from rivers or the sea has to flow or be stored in times of flood'. The Functional Floodplain (also referred to as Flood Zone 3b), is not separately distinguished from Flood Zone 3a on the Flood Map for Planning. Rather the SFRA is the place where LPAs should identify areas of Functional Floodplain in discussion with the Environment Agency.

3.2.13 The PPG states that the identification of Functional Floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. With this caveat, as a starting point the Functional Floodplain will normally comprise land having a 3.3% AEP or greater annual probability of flooding (1 in 30 year), with existing flood risk management infrastructure operating effectively. Within these mapped extents, existing infrastructure or solid buildings that resist water ingress are not providing a flood storage function.

3.2.14 The coastal inundation model for Hayling Island has been simulated for the 3.3% AEP (1 in 30 year) flood event, including the presence of defences, to identify areas at more frequent risk of flooding from the sea. (It is noted that this modelled scenario just applies the still water level and does not account for wave action). These areas are shown in Appendix A Figure 13 and include:

- Bridgefoot Path and Bath Road in Emsworth
- Coastal frontage along Emsworth Harbour and Langstone
- Southmoor and Brockhampton
- Coastal frontage around Hayling Island including Verner Common, Tye, Northney Road, Tournerbury, north of Marine Walk, Mengeham Rythe Sailing Club, Sparkes marina, Sinah Warren, Hayling Ferry Sailing Club and the southern coastline.

3.2.15 Land is not needed to store tidal flood water given the proximity of the wider Solent. Therefore, a review of these areas has been undertaken in the light of these local circumstances and in agreement with the Environment Agency these areas will be included within the Flood Zone 3a definition and no Flood Zone 3b associated with the sea will be defined.

3.2.16 Where development is proposed within an area at 3.3% AEP or greater annual probability of flooding from the sea, particularly within the floodplains of tidal watercourses or constrained estuaries, further evidence may be required to confirm the assumption that the area at 3.3% AEP or greater annual probability of flooding does not provide a flood conveyance and/or storage function.

[18] Ministry of Housing, Communities and Local Government, 2021, National Planning Policy Framework https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf

3.2.17 It is noted that areas close to defences and low lying areas behind defences may also be susceptible to flooding because of wave action which is not included in the 3.3% modelled scenario presented in Appendix A Figure 13. This should be considered as part of site specific FRAs.

Future flood risk

3.2.18 Climate change is expected to increase the frequency, extent, and impact of flooding in coastal areas, as a result of sea level rise. Coastal modelling scenarios have been undertaken to show predicted future changes in flood extent within the study area. This modelling was undertaken for the years 2055 and 2122. The Environment Agency's guidance on the application of climate change allowances[19] states that LPAs should assess both the higher central (70th percentile) and the upper end (95th percentile) allowances for SFRAs.

Defended Model Scenarios

3.2.19 Maps showing the maximum flood depths and maximum hazard ratings for some of the key defended model scenarios are presented in Appendix B of this Report.

3.2.20 **Present Day Flood Risk**: Appendix B Figures 3 and 10 show that for the 0.5% AEP event for the year 2022 flooding occurs on the mainland and around Hayling Island up to approximately 1m in depth with a corresponding hazard rating of Significant (danger for most). There are some deeper areas of flooding in low lying tidal locations. Properties and roads are shown to be at risk of flooding in Langstone on the mainland, and on Hayling Island in Northney, Tye, Stoke, Mengham, Eastoke, Selsmore and South Hayling. The only highway link onto the island (the A3023 across Langstone Bridge) is shown to be at Low to Medium hazard on both the Hayling Island side and on the mainland.

3.2.21 **'Higher Central' Climate Change Allowance:** Appendix B Figures 4 and 11 show the 0.5% AEP event for the year 2055 (higher central allowance), and Appendix B Figures 5 and 12 show the 0.5% AEP event for the year 2122 (higher central allowance). By 2055, flood extents increase at Selsmore, Westmore, Stoke Common, Eastoke Avenue and in Emsworth. The A3023 has a section of Significant hazard both on both the Hayling Island side and on the mainland. By 2122, flooding extends further inland and flood depths and hazard ratings increase. The A3023 is shown to be at Extreme hazard on both sides of the Langstone Bridge.

3.2.22 **'Upper End' Climate Change Allowance:** Appendix B Figures 6 and 13 show the 0.5% AEP for 2122 (upper end allowance) and Figures 7 and 14 show the 0.1% AEP event for 2122 (upper end allowance). When considering the 0.5% AEP event, the flood depth and hazard ratings increase all along the coastline and around Hayling Island. This predicted increase in flooding will put properties and roads at risk that were previously unaffected. For the 0.1% AEP event, flood depths and hazard ratings generally remain in the same extent with some small increases.

3.2.23 All these modelled scenarios present the situation with the current flood defences in place. The planned improvements as part of the Langstone Coastal Defence Scheme and the South Hayling Island Beach Management Plan could further contribute to reduce the risk of flooding. Alongside this, the Hayling Island Coastal Management Strategy[3] sets out the leading option for the single access route in and out of Hayling Island which is to maintain the viability of the A3203 into the future as sea levels rise by constructing new defences to a 1 in 200 year standard. However, it should be noted that the strategy is not yet approved and funding to deliver the schemes within it is yet to be identified.

Undefended Model Scenarios

3.2.24 Model scenarios have also been undertaken *without defences*, in order to help inform how the Flood Zones may alter in the future. Appendix B Figures 8 and 15 show the undefended 0.5% AEP event for 2122 (Upper End) and Figures 9 and 16 show the undefended 0.1% AEP event for 2122 (Upper End).

Future flood zones

3.2.25 To provide an indication of how the Flood Zones may change in the future as a result of climate change, a future Flood Zone 2 and future Flood Zone 3 have been generated, included in Appendix B Figure 2.

3.2.26 Flood Zones 2 and 3, as shown on the Flood Map for Planning (Rivers and Sea), are generally described as presenting the risk of flooding from the sea *assuming defences are not in place*. However, it is noted that, somewhat counterintuitively, in some locations the maximum flood extent is greater during the defended model simulation compared to the undefended simulation. The removal of raised

[19] Flood risk https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#sea-level-allowances

flood defences from the model enables water to flow back out to sea as the tide recedes prior to the next peak tide, whereas during the defended scenarios the floodwater remains in the model domain and accumulates with the next tidal cycle leading to higher flood levels and greater flood extents.

3.2.27 As a result, the future Flood Zones presented in this SFRA are derived from the maximum flood extent from both the undefended and defended scenarios, rather that solely the undefended scenario. This is further described in SFRA Part 1 Appendix B1.

3.2.28 Future Coastal Flood Zones are mapped in Appendix B Figure 2 and show that the area around Brockhampton and Langstone will become Flood Zone 3a, and more of Hayling Island will become defined as Flood Zone 3a including the entirety of Selsmore and Eastoke.

3.3 River flooding

Flood Map for Planning

3.3.1 Appendix A Figure 1 shows Flood Zones 2 and 3 for the principal watercourses within the study area. The majority of flood risk from fluvial sources is found on the mainland around the Hermitage Stream, Lavant, Ems, and other smaller watercourses. Most of this flooding does not extend very far laterally due to high ground on either side of the watercourses. Exceptions are found in the upstream part of the Potwell tributary, in Waterlooville, where a larger area is defined as Flood Zone 2 north of Hambledon Road and South Sunnymeade Drive., In western Leigh Park, a large area, associated with the Hermitage Stream, east and west of Middle Park Way, is defined as Flood Zone 3. There is a risk of fluvial flooding through Emsworth from the River Ems, West Brook, as well as in Bedhampton and Brockhampton from the Hermitage and Brockhampton Streams. These are also tidally influenced.

3.3.2 No fluvial areas have been recognised as having a reduced risk of flooding due to the presence of defences in the Havant administrative area, although fluvial flood defences are present along Hermitage Stream, the Ems, and the Lavant. More information on flood defences is presented in Section 5.1 and Appendix A Figure 2.

Flood Zone 3b Functional floodplain

3.3.3 The Functional Floodplain is defined in the NPPF as 'land where water from rivers or the sea has to flow or be stored in times of flood'. The identification of Functional Floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise land having a 3.3% AEP or greater annual probability of flooding (1 in 30 year), with existing flood risk management infrastructure operating effectively, or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). The Functional Floodplain (also referred to as Flood Zone 3b), is not separately distinguished from Flood Zone 3a on the Flood Map for Planning. Rather the SFRA is the place where LPAs should identify areas of Functional Floodplain in discussion with the Environment Agency.

3.3.4 For the Hermitage Stream, Lavant and River Ems, modelling of the 3.3% AEP flood event is not available within the received hydraulic models to delineate Flood Zone 3b functional floodplain. Therefore, the extent of Flood Zone 3a should be used as a surrogate for Flood Zone 3b to ensure the risk isn't underestimated. The Environment Agency guidance 'How to prepare a Strategic Flood Risk Assessment'[20] encourages the use of site specific flood risk assessments to determine whether a site is affected by functional floodplain. **If sites are proposed for development in such areas in Havant BC's Local Plans, it may be necessary to undertake additional assessment to map the location of the functional floodplain as part of a Level 2 SFRA.**

Historic flooding

3.3.5 Recorded Flood Outlines published by the Environment Agency, as seen in Appendix A Figure 2, show areas of fluvial flooding recorded around Emsworth, Havant Town, Bedhampton, Purbroook and Waterlooville. Some minor fluvial flooding is also recorded within Hayling Island. Most, but not all, of this

[20] Defra, Environment Agency, How to Prepare a Strategic Flood Risk Assessment Updated September 2020. https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment

recorded fluvial flooding was located within the mapped Flood Zones 2 and 3. The dates and timescales for the majority of recorded flood events on the mainland are unknown. For those that are known, most flooding occurred between October and December 2000.

3.3.6 Emsworth is one of the Borough's few urban areas to suffer from flooding. The settlement is located on the coast and includes the Nore Barn Stream, the West Brook and the River Ems. Over recent years, extreme weather and high tides have resulted in a high frequency of flood events, which have affected local residents and businesses and caused considerable damage to properties. These flood events were caused by a combination of fluvial and tidal influences and principally affected Selangor Avenue, Victoria Road, North Street and Bridge Road in Emsworth.

3.3.7 Flooding in winter 2010/2011 affected 21 properties in Bridge Road and Selangor Avenue. The properties on Bridge Road were affected by water overflowing from the West Brook and the properties on Selangor Avenue were affected by overflow from the Nore Barn Stream. More recent flooding events have highlighted the very low standard of protection to the properties in Selangor Avenue and Bridge Road.

3.3.8 The culvert system underneath Selangor Avenue and Nore Farm Avenue restricts the flow of the Nore Barn Stream from its original condition of an open watercourse. As a result, properties in Selangor Avenue flooded in November 2010, and June and December 2012.

3.3.9 On West Brook, flooding has occurred in the proximity of the final culvert at Bridge Road. The capacity of this culvert is 20% of that required for an urban area. Bridge Road is therefore prone to frequent flooding when the culvert capacity is exceeded. The flood water then becomes trapped and held back at Bridge Road by the A259, as the raised level of this road prevents water draining out to the Mill Pond.

Future flood risk

3.3.10 Climate change is expected to increase the frequency, extent, and impact of flooding, reflected in peak river flows. Wetter winters and more intense rainfall may increase fluvial flooding and surface water runoff and there may be increased storm intensity in summer. Rising river levels may also increase flood risk.

3.3.11 As recorded within SFRA Part 1, there were no fluvial hydraulic models within the Havant BC administrative area that could be re-run to simulate the impacts of climate change. For the Lavant and Hermitage Stream, the available 1% AEP, 1% AEP plus 20% climate change allowance, and 0.1% AEP flood extents have been mapped in this SFRA to provide an indication of the impact of climate change. The results of this are presented in Appendix A Figure 12. GIS Floodplain Analysis (Appendix A Figure 11) has been undertaken to supplement the available modelling by identifying those areas of floodplain that could be sensitive to increases in flood levels. It is recommended that the two map sets are used in conjunction. GIS Floodplain Analysis has also been undertaken for all other watercourses in Havant, where no detailed hydraulic modelling was available. Note that this mapping does **not** show the expected impacts of specific climate change predictions. For more information on the GIS Floodplain Analysis refer to SFRA Part 1 Section 3.1 and Appendix A. The results of the analysis are presented in Appendix A Figure 11 and show that the floodplains associated with almost all of the watercourses in Havant could be sensitive to increases in water levels, with the most sensitive areas around Waterlooville, Park Community School, Bedhampton, Langstone, east of Havant town centre and west of Emsworth. Should development be proposed in these areas, it is recommended that hydraulic modelling is carried out to map the future risk of flooding more accurately.

3.3.12 Areas currently at risk of flooding may be susceptible to more frequent, more severe flooding in future years. This is because the changes in climate patterns and physical conditions, as a result of climate change, can increase the volume and frequency of precipitation, leading to an increase in the frequency of flooding. It is essential therefore that measures are implemented during the development management process to carefully mitigate the potential impact that climate change may have upon the risk of flooding to a property.

3.3.13 For this reason, all of the development management recommendations set out in Section 7 require all floor levels, access routes, drainage systems and flood mitigation measures to be designed with an allowance for climate change; and the potential impact that climate change may have over the lifetime of a proposed development should be considered as part of a site-specific FRA. This provides a robust and sustainable approach to the potential impacts that climate change may have over the next 100

years, ensuring that future development is considered in light of the possible increases in flood risk over time.

3.4 Groundwater flooding

3.4.1 The BGS dataset 'Susceptibility to Groundwater Flooding' is mapped in Appendix A Figure 5. This map does not show the risk of groundwater flooding, rather it identifies areas where geological conditions could enable groundwater flooding to occur. A suite of rules founded upon geological, hydrogeological, and topographic data were used to assign a class value indicating the susceptibility to groundwater flooding to each vector polygon. The three classes are as follows:

- A: Limited potential for groundwater flooding to occur
- B: Potential for groundwater flooding of property situated below ground level
- C: Potential for groundwater flooding to occur at surface

3.4.2 The remaining areas are not considered to be prone to groundwater flooding. The 'Susceptibility to Groundwater Flooding' should be used, in conjunction with other relevant information, to establish the relative risk of groundwater flooding, and is most suitable for informing land-use planning decisions at the strategic scale. The dataset shouldn't be employed in isolation to inform land-use planning decisions at any scale and shouldn't be utilised for this purpose at the site scale.

3.4.3 The map shows that no potential for groundwater flooding has been identified across a large section of the west of the Havant administrative area mainland, as well as smaller areas scattered around the mainland and Hayling Island. The north of Hayling Island and a few other areas around the administrative area have limited potential for groundwater flooding to occur, whilst most of Hayling Island and a significant proportion of the mainland, particularly towards the east, has either potential for groundwater flooding of property situated below ground level or potential for groundwater flooding to occur at the surface.

3.4.4 'Areas Susceptible to Groundwater Flooding' is a national dataset produced by the Environment Agency which shows the proportion of 1km squares where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring but provides a useful tool to identify where further studies may be useful. This dataset is mapped in Appendix A Figure 4.

Historic flooding

3.4.5 Two groundwater flooding incidents recorded within the Havant administrative area. One incident took place in Widley, corresponding to an area with potential for groundwater flooding of property situated below ground level within the 'Susceptibility to Groundwater Flooding' map. The other incident took place in Havant town, corresponding to an area with potential for groundwater flooding to occur at the surface. These flooding incidents affected a small number of properties.

3.4.6 The CMP for River Meon and Wallington notes that groundwater flooding occurs throughout Purbrook, although it is particularly severe in the central western area.

Future flood risk

3.4.7 Most climate change models indicate we are likely to experience drier summers, albeit with more intense rainfall when it occurs, and wetter winters. As groundwater flooding occurs primarily as a response to extended periods of rain during late autumn and early winter, there may be an increased risk of groundwater flooding arising from these changing rainfall patterns. However the complex relationship between rainfall, recharge, groundwater storage and flow make the response to climate change uncertain.

3.5 Surface water and sewer flooding

Flood mapping

3.5.1 The Risk of Flooding from Surface Water (RoFSW) dataset is presented in Appendix A Figure 3. This map shows the surface water flood risk on Hayling Island to be relatively low, with a few medium and higher risk areas around development. On the other hand, the Havant administrative area mainland is

more densely developed and the risk is significantly higher. The highest risk areas include Waterlooville, Havant town, and around the Hermitage Stream, Lavant and River Ems.

Historic flooding

3.5.2 Sewer flooding is defined by Southern Water as incidents caused by an escape of water and sewage from a public sewer due to a blockage, sewer collapse, rising main burst, equipment failure or from too much water entering the system. Sewer flooding does **not** include extreme storms with a probability of occurring of less than once in 20 years. In their Drainage and Wastewater Management Plans, Southern Water have recorded incidents of internal and external flooding between 2018-2020 within Budds Farm.

3.5.3 Records of flooding recorded by Southern Water (included in Appendix A Figure 2) show eight events to have taken place to the south of Hayling Island, and more than 50 events on the mainland. Most of these events are centred around Havant town and Emsworth, with another cluster to the northwest.

3.5.4 Recorded highway flooding data was provided by HCC for use in this SFRA. This data shows 53 recorded events distributed throughout the administrative area, with a notable 0.36km^2 area of flooding to the east of the B2149 in West Leigh. Many of these recorded events extend beyond the areas highlighted to be at risk in the RoFSW map.

3.5.5 The CMP for River Meon and Wallington notes that surface water flooding occurs in Purbrook, along London Road and Ladybridge Road, south from Ladybridge Road to Serpentine Road and onto Valley Close, and along Shaftesbury Avenue. There is a risk of surface water flooding in North Waterlooville, particularly impacting the residential areas surrounding Sunnymead Drive, Milton Road, Hart Plain Avenue and Hambledon Road in the north.

3.5.6 The CMP for Lavant highlights that the risk of surface water flooding is moderate to high (1% to over 3.3% AEP) throughout Havant East, particularly impacting built up areas throughout Havant town centre and adjacent to the unnamed watercourse. Receptors at risk include businesses and residential properties, a railway line, Elmleigh Hospital, Bosmere Junior School, and Havant Bus station. Road networks at risk include the B2149, A27 and minor roads including New Lane. In Emsworth, road networks at risk include the A27, A259, B2148, B2147, and minor roads including North Street, Queen Street and Southleigh Road. An overland flow route forms through Waterlooville, with flood depths typically between 300 to 900mm. In concentrated areas, particularly along the B2150 flood depths can exceed 900mm.

Future flood risk

3.5.7 Section 3.2 of Part 1 Main Report describes the impact of climate change on surface water flood risk and summarises the peak rainfall intensity climate change allowances for the study area which range from 20% - 45% depending on the specific location and epoch under consideration.

3.5.1 The RoFSW does not include specific scenarios to determine the impact of climate change on the risk of surface water flooding and it is not within the scope of this SFRA to undertake such modelling. However a range of three annual probability events have been modelled, 3.3%, 1% and 0.1%, and therefore it is possible to use with caution the 0.1% outline as a substitute dataset to provide an indication of the implications of climate change on surface water flood risk in the future.

3.5.2 Given the historic records of flooding from surface water and sewer systems, coupled with the predictions for rising sea levels and greater rainfall intensity, it is likely that the frequency and severity of flooding from these sources will increase in the future.

3.6 Reservoir flooding

3.6.1 There is relatively little risk of flooding from reservoirs in the study area.

3.6.2 Appendix A Figure 6 shows the potential extent of flooding in the unlikely event of a failure of a large reservoir when river levels are normal and when rivers are in flood. The mapping identifies an area at risk of reservoir flooding in the west of the study area in the upper reaches of the Potwell Tributary catchment between Aldermoor Road and Ladybridge Road downstream of a small water body to the

south of Purbrook Junior and Infant School. This flooding relates to Southwick Park Lake in Southwick northeast of the Havant BC area.

3.6.3 Planning permission has been granted for an additional reservoir at Havant Thicket just north of the Havant BC area. The reservoir will have sloping embankments on three sides and will include a wetland area to the north for birds and wildlife. Given that the development of the reservoir is now underway, a future SFRA would need to assess the flood risk posed by this reservoir to the Havant administrative area.

4. Cumulative impact of development and land use change

4.1 Cumulative impact assessment

4.1.1 The NPPF states that strategic policies should be informed by a strategic flood risk assessment, and should consider cumulative impacts in, or affecting, local areas susceptible to flooding (paragraph 166).

4.1.2 When allocating land for development consideration should be given to the potential cumulative impact on flood risk with a catchment. Development increases the impermeable area within a catchment, which, if not effectively managed, can cause increased rates and volumes of surface water runoff and changes to floodplain storage, thereby resulting in increased flood risk further downstream. Whilst individual development with appropriate site mitigation measures should not result in measurable local effects with respect to hydrology and flood risk, the cumulative effect of multiple development may be more severe at downstream locations in the catchment. Locations where there are existing flood risk issues will be particularly sensitive to cumulative effects.

4.1.3 As described in SFRA Part 1 Section 3.7, as part of this SFRA an assessment of the study area has been undertaken to identify those catchments where there is greater potential for cumulative effects on flood risk. For each catchment, consideration has been made of the:

i. The size and nature (rural or urban) of the catchment,

ii. The risk of flooding in the catchment from rivers, surface water and groundwater, based upon data from the Hampshire Catchment Prioritisation Tool, and

iii. The scale of potential future development in the catchment, based upon a review of potential development sites and growth locations provided by the LPA.

4.1.4 Appendix A Figure 7 shows the outputs for Havant. A red, amber, green rating has been used to highlight those catchments where there is a higher, medium, and lower potential for cumulative effects on flood risk. This figure shows that there is higher potential for cumulative impact on flood risk towards the north west in the Hermitage stream catchment, where most existing development is found. In the Ems catchment and within Hayling Island, the potential is considered medium.

4.1.5 **Recommendation:** In those areas with a medium and higher potential for cumulative impact on flood risk it is recommended that Havant BC consider area specific policies or guidance for new development to help reduce the cumulative impact, and where possible, identify opportunities for new development to provide cumulative betterment with respect to flood risk. This may be achieved through implementing the types of measures described in Section 6.

4.1.6 HCC have identified a number of such measures in their CMPs for prioritised areas of the Lavant catchment and Meon and Wallington catchment (i.e. Purbrook, Leigh Park, Havant, Emsworth, Eastoke Waterlooville and North Waterlooville). In these areas, HCC will:

- Where land drainage incidents and excessive culverting are a concern, HCC will implement a more stringent approval process for all Ordinary Watercourse consent applications.
- HCC will make it best practice that a 50% betterment of surface water run-off rates is demonstrated for the surface water management features of any proposed development.
- HCC will liaise with the LPAs to limit permitted development rights in residential areas regarding the paving or covering of permeable surfaces with impermeable.
- Where significant greenfield development is due to take place, where surface water management is a cause of significant concern, HCC will make it best practise for LPAs to request hydraulic modelling of surface water exceedance flows movement and management on the new development.
- Where significant development is due to take place, HCC will ensure that the LPA only approve new developments that sufficiently demonstrate that a rigorous maintenance regime will be implemented for their surface water management systems.

4.2 Cross boundary considerations

4.2.1 Two water bodies within the Havant Borough cross borders between different administrative areas, and other water bodies come close to the border. It is important to consider how actions in one administrative area may impact upon another area. The cross boundary flows to consider within Havant include:

- The source of the Lavant is within the Chichester DC administrative area,
- The source of the Ems is within the Chichester DC administrative area, from where it flows through Chichester and along the Havant-Chichester border,
- The source of the Potwell Tributary is on the border of the Havant Borough; this river flows through the Winchester administrative area and joins with the Wallington which discharges into Portsmouth Harbour in Fareham BC,

4.2.2 Where there are cross boundary flows, communication between LPAs is vital to ensure action in one does not negatively impact upon another.

5. Current control, mitigation and management measures

5.1 Defences

5.1.1 Data provided by the Environment Agency from their Asset Information Management System (AIMS) is included in Appendix A Figure 2. This data is the best available for the SFRA at the time of preparation but is not a complete dataset of the flood defences present in the study area. Additional data may be available from the Local Authority. The National Coastal Erosion Risk Mapping (NCERM) is presented in Appendix B Figure 1 and provides a useful indication of the type of frontage, e.g., embankment, gabions, natural, revetment, seawall, timber structure, other etc. The Environment Agency plan to publish new national risk information for coastal erosion in late 2024 (NCERM2).

5.1.2 The mapping in Appendix A Figure 2 shows that the majority of Hermitage Stream, the Lavant and the Ems are lined by high ground on both sides of the watercourse. There are short stretches of embankments in Bedhampton along Hermitage Stream and in Emsworth along the Ems. The Lavant and Brockhampton Stream have several sections of river walls in Havant.

5.1.3 The defences along the Hermitage Stream are recorded to have a design standard of protection (SOP) of approximately 20% AEP (1 in 5 year), increasing to 1% AEP (1 in 100 year) in Bedhampton. Along the Lavant the average reported design SOP is 2.5% AEP (1 in 40 year) and 20% AEP along the Ems.

5.1.4 The coast around Langstone and Chichester Harbour is mostly lined by high ground. However, in Langstone Harbour the Farlington Marshes are surrounded by an embankment and the Southmoor Nature Reserve is protected by stretches of walls and embankments, all with reported design SOP of 4% AEP (1 in 25 year). The coast at Emsworth and Warblington is lined by stretches of wall, and there is a beach and promenade by Langstone Bridge. The coast at Broadmarsh is lined with engineered high ground, all with a reported design SOP of 0% AEP (1 in 0 years). At Langstone, defences comprise mixture of concrete wall, concrete block revetment and masonry quay wall. Current defences are in poor condition, and some are reaching the end of their life.

5.1.5 Hayling Island is defended by stretches of high ground and embankments. The design SOP is reported to range between 0.5% to 4% AEP, with the highest SOP around the northern and south-eastern edge. There are sections of beach and barrier beaches along the west edge, southwest point and southeast point of the Island. There are also several sections of wall protecting the south-eastern edge, with reported design SOP of up to 0.5% AEP. Many of the defences around Hayling Island are in poor condition, as shown in the Defence Condition Assessment carried out for the Hayling Island Coastal Management Strategy.

5.1.6 A description of the coastal defences is provided in Table 5-1, as summarised in the Portchester to Emsworth Strategy[2] and Hayling Island Coastal Strategy[3]. It should be noted that the Porchester to Emsworth Strategy was published in 2012 and may not reflect the *current* condition and standard of protection for coastal defences.

Table 5-1 Coastal flood defences in Portsmouth

Strategy	Location	Description of Coastal Defences
Portchester to Emsworth	Reach 4 Brockhampton Quay	Mix of concrete block revetment, sheet piling, gabion wall, rock revetment and earth embankment. Condition generally good to fair, but poor and failed in some places.
	Reach 5 Langstone & Southmoor	Mixture of concrete wall, concrete block revetment and masonry quay wall. Langstone: mostly fair condition. Southmoor: poor condition[21].
	Reach 6 Warblington to Conigar Point	Combination of gabion wall concrete masonry seawall and revetment. Fair condition generally however poor for most of Conigar Point.

[21] The seawall at Southmoor was breached in 2020.

	Reach 7 Emsworth	Mixture of stone revetment, concrete seawall, masonry seawalls and embankments. Condition good to fair, poor section at Slipper Mill Pond.
Hayling Island Strategy	5A HI01 Northney Road to Northney Marina	Mix of earth embankment, with sections of concrete wall, rock armour and rubble revetment.
	5A HI02 Northney Farm	Concrete wall, blockwork wall, concrete bagwork, and gabions.
	5A HI03 Gutner Lane to Tournerbury Woods Estate	Mostly earth embankments, with some sheet piling, Armorloc revetment.
	5A HI04 Wilsons of Hayling to East of Sparkes Marina	Natural earth verge. Concrete wall, concrete revetment, Sheet piling. Concrete blockwork.
	5A HI05 Hayling Island Sailing Club to Hayling Golf Club	Undefended sections. Mix of rock revetment, timber revetments, buried seawall, sheet piling, concrete buttress wall, vegetated embankment and rock and timber groynes.
	5A HI06 Langstone Harbour Board to Northshore Road	Concrete quay wall, earth embankment, ad-hoc blockwork.
	5A HI07 CCMA to Billy Trail	Undefended section. Armoloc revetment, earth embankment, timber piles.
	5A HI08 Billy Trail to North Hayling	Armorloc revetment, earth embankment, rubble revetment, gabion mesh, rock revetment, concrete seawall, sheet piling.

5.2 Emsworth Flood Alleviation Schemes

West Brook

5.2.1 In 2010, 24 properties were flooded upstream of a Victorian culvert on the West Brook. The Environment Agency took an opportunity to influence a planning condition for an upstream development in this area to reduce the flood risk. A joint scheme between the developer and Environment Agency was implemented to construct a flood storage pond for surface water drainage, divert the West Brook though the pond, and install an outfall to restrict flow back to the West Brook[22]. The scheme reduces the flood risk to 54 residential properties.

Nore Farm

5.2.2 A flood storage area was located in the arable land and ditches upstream of the A27, to hold back water during times of high rainfall and reduce the flow into the Nore Barn Stream. The purpose was to reduce the probability of flooding to properties on Selangor Avenue.

5.3 Sea Defences, Nore Barn Woods

5.3.1 Over 20 years ago, interlocking concrete block revetments were constructed along the shoreline at Nore Barn Woods by Havant BC. These provided protection to the footpath and ancient woodland behind. These have deteriorated over time and in 2014 a new 83m revetment was constructed to reinstate this protection[23].

5.3.2 Coastal Partners are currently working in partnership with the Friends of Nore Barn Woods charity to extend the revetment by a further 2m to the east. This will provide erosion control to the footpath and woods behind

5.4 Property level protection

5.4.1 Properties adjacent to Emsworth Mill Pond which are at risk of tidal flooding have property level protection (PLP) measures that can be deployed. Satellite imagery shows that there are also properties on Langstone High Street with door boards. Residents are advised to put PLP in place upon receipt of relevant flood warnings, as described in Section 5.6.

[22] Environment Agency South East River Basin District Draft Flood Risk Management Plan 2021 to 2027. https://consult.environment-agency.gov.uk/fcrm/draft-second-cycle-flood-risk-management-plans/supporting_documents/South_East_FRMP_20212027WM.pdf
[23] Coastal Partners Nore Barn Woods – Phase 3. https://coastalpartners.org.uk/project/nore-barn-woods-phase-3/

5.5 South Hayling Beach Management Plan

5.5.1 The Eastoke Peninsula, located along the south east of Hayling Island, is densely populated, low-lying and has a history of serious flood incidents.

5.5.2 During the 1950s and 1960s a concrete wall was constructed from Eastoke Corner to Eastoke Point nature reserve, to maintain the coastline and prevent coastal erosion. This seawall required regular maintenance and, as a result of overtopping of the wall as well as waves at the base of the wall, beach levels began to erode. Following significant storm events in the 1970s and 1980s, a large beach recharge was undertaken, and a shingle beach created with a high crest level in front of the sea wall.

5.5.3 The healthy beach takes the impact of the storm waves and prevents erosion of the buried concrete seawall along the frontage and erosion of the coastline. Annual beach recycling is more cost effective than building a higher concrete seawall or replacing the beach with large rock armour.

5.5.4 Beach Management Plans are produced every 5 years to allow Havant BC to request funding for the works. Beach management activities on Hayling Island are funded by Flood Defence Grant in Aid from the Environment Agency. The South Hayling Beach Management Plan (BMP) was prepared for 2017-2022 (extended to 2024). A further BMP has been approved covering the period 2024-2029[24].

5.5.5 The BMP sets out the requirements for maintenance, monitoring and intervention in order to maintain the beach and structures to ensure they continue to provide an adequate standard of protection along the Eastoke southern frontage. It also includes consideration of the likely options available for carrying out Emergency Works should defences be overtopped, over washed or even breached during a large storm event threatening the low-lying urban area of Eastoke.

5.5.6 The BMP is based on the methods and techniques developed and employed by Havant BC since the initial 1985 Beach Replenishment operation, including beach recycling using land-based plant and beach recharge using dredgers.

5.5.7 Funding has been secured for the period of 2022-2027, to undertake beach management activities to protect the area from a 1 in 200 year return period flood event (0.5% Annual Exceedance Probability). This funding also covers a feasibility study for Eastoke drainage improvement scheme. It is acknowledged that funding has not yet been identified beyond this period, but Havant BC considers it likely that off-site strategic management will continue, given the number of residential properties in the area that benefit from it. The programme has continually been renewed for the last five period as it protects around 1,500 properties.

5.5.8 Although the target standard of protection in 0.5% AEP, the Eastoke Peninsula remains particularly vulnerable to wave overtopping and the shingle beach is inherently more prone to variations in standards of protection following significant movements of the shingle ridge. It should therefore be recognised that, despite the relatively high target SoP, there may be other areas on the Island (and in the wider Borough) where development may be more appropriately located.

5.5.9 The ongoing Eastoke Drainage Study is appraising options to improve the drainage of overtopped seawater from the Eastoke promenade back into the sea during storm events, which could encompass new porous control structures, such a rock revetment/rock groynes at key erosion hotspots along the frontage. An extension of this scheme proposed between 2017-2024 is currently ongoing and is outlined in Section 6.4.

5.6 West Beach Defences

5.6.1 Timber sea defences at West Beach were constructed in 1976 in response to coastal erosion. The structures have become worn by the action of the waves and shingle abrasion. The revetment suffered severe storm damage in 2012 and 2014, and irreparable damage in 2019/2020 resulting in the removal of 140m of the revetment due to the considerable health and safety risk they posed.

[24] South Hayling Beach Management Plan https://coastalpartners.org.uk/project/south-hayling-beach-management-plan/

5.6.2 In line with the policies recommended within the overarching North Solent Shoreline Management Plan and Hayling Island Coastal Management Strategy, coastal defence structures at this location are not to be replaced at the current time.

5.7 Flood Warning Service

5.7.1 The Environment Agency provides a free Flood Warning Service[25] for many areas at risk of flooding from rivers and from elevated groundwater. Three different codes are issued depending on the type of flooding forecasted:

- Flood Alert – Flooding is possible, be prepared.
- Flood Warning – Flooding is expected, immediate action is required.
- Severe Flood Warning – Severe flooding, danger to life.

5.7.2 The Environment Agency's website offers up-to-date flood information, monitoring information of river and sea levels and latest flood risk forecast, as well as a page to sign up to warnings by phone, text, email, or fax[26].

5.7.3 There are 12 Flood Warning Areas in Havant BC which are shown in Appendix A Figure 9 for:

- Leigh Park and Bedhampton on the Hermitage Stream
- Port Solent, Farlington and Brockhampton
- Crosslands Drive and West Leigh, Havant, on the Lavant Stream
- Havant Town Centre on the Lavant Stream
- Westbourne, Lumley and Emsworth on the River Ems
- West Brook at Emsworth
- Langstone and Emsworth
- Ferry Point, The Kench, Sinah Warren and Stoke, West Hayling
- North and East Hayling at Northney, Tye and Selsmore
- South Hayling at Sinah Common, Westfield, Sea View and Mengham
- South Hayling and South Eastoke Seafront
- Eastoke

5.7.4 The Environment Agency publishes 'Water situation: area monthly' reports for England'[27] for each of its areas. These reports identify monthly rainfall, soil moisture deficit, river flows, groundwater levels and reservoir levels. The Environment Agency also publishes 'Groundwater situation'[28] reports which provide the latest update on monitored groundwater levels and whether there are any groundwater alerts or warnings in force. These reports will give an indication as to when groundwater levels may be high and groundwater flooding may be imminent.

5.7.5 The Environment Agency also provide a targeted groundwater flood warning service through issue of groundwater "Flood Alerts" for specific locations and communities. As groundwater flooding rises more slowly than fluvial flooding, there is a lesser requirement for immediate action and there is unlikely to be a danger to life. On this basis the Environment Agency do not issue "Flood Warnings" or "Severe Flood Warnings" for this type of flooding and for groundwater flooding the Environment Agency only issue "Flood Alerts".

[25] Environment Agency, Check for Flooding in England https://check-for-flooding.service.gov.uk/
[26] Environment Agency, 2022, Sign up for Flood Warnings https://www.gov.uk/sign-up-for-flood-warnings
[27] Water situation: area monthly reports for England 2022 https://www.gov.uk/government/publications/water-situation-local-area-reports
[28] Groundwater: current status and flood risk https://www.gov.uk/government/collections/groundwater-current-status-and-flood-risk

5.8 Residual Risk

5.8.1 The risk of flooding from rivers and the sea can never be fully mitigated, and there will always be a residual risk of flooding that will remain after measures have been implemented to protect an area or a particular site from flooding. This residual risk is associated with several potential risk factors including (but not limited to):

- a flooding event that exceeds that for which the flood risk management measures have been designed e.g. flood levels above the designed finished floor levels,
- the structural deterioration of flood defence structures (including informal structures acting as a flood defence) over time, and/or
- general uncertainties inherent in the prediction of flooding.

5.8.2 As part of the updated coastal modelling undertaken to inform this SFRA, scenarios have been undertaken to assess the residual risk of flooding. This includes model simulations without the inclusion of flood defences (the 'undefended' scenario) as well as the modelling of breach in flood defences in various locations.

5.8.3 Maps of the 'undefended' model scenarios are presented in Appendix B Figures 8, 9, 15 and 16.

5.8.4 In Havant, breaches have been modelled at the following locations. Details of the modelling approach are included in Part 1 Main Report Appendix B, and results provided to Havant BC as GIS layers:

- NOR1 Shoreline north of Northney village (North Hayling).
- STO1 Stoke (eastern shore of Langstone Harbour).
- MEN1 Mengham Salterns (western side of Chichester Harbour).
- MAR1 Marina, Hayling Island
- EAS3 Eastern end of Eastoke beach near Southwood Road (Hayling Island).
- EAS2 Eastoke beach near Bembridge Drive.
- EAS1 Eastoke beach near Bound Lane (Hayling Island).

5.8.5 The modelling of flood flows and flood levels is not an exact science, therefore there are inherent uncertainties in the prediction of flood levels used in the assessment of flood risk. Whilst the NPPF Flood Zones provide a relatively robust depiction of flood risk for specific conditions all modelling requires the making of core assumptions and the use of empirical estimations relating to (for example) rainfall distribution and catchment response.

5.8.6 Steps should be taken to manage these residual risks using flood warning and evacuation procedures, as described in Section 7.

6. Opportunities to reduce the causes and impacts of flooding

The NPPF appreciates that it may not always be possible to avoid locating development in areas at risk of flooding. This Section identifies opportunities to reduce the causes and impacts of flooding. These measures should be considered both at a strategic scale, when planning development across the LPA, as well as at a site specific level.

6.1 Flood and Coastal Erosion Risk Management (FCERM) schemes

6.1.1 The Environment Agency manage an investment programme to reduce flood risk and coastal erosion in England. The current 6 year flood and coastal erosion risk management investment programme runs from 1 April 2021 to 31 March 2027. The programme of FCERM schemes[29] identifies the following in Havant BC:

- South Hayling Island Beach Management Plan (2017-2022) including Eastoke Drainage Study.
- South Hayling Island Beach Management Plan (2024-2029)
- Langstone FCERM Scheme.
- Broadmarsh Landfill Revetment
- Chichester Harbour Investment and Adaptation Plan
- Eastoke FCERM Scheme

South Hayling Island Beach Management Plan (2024-2029) including Eastoke Drainage Study

6.1.2 The continuation of the BMP[30] aims to work with neighbours by providing a framework through planning to streamline wider recycling operations and movement of material. The objectives of the BMP are to:

- Reduce the risk of coastal erosion by providing protection against breaching of the defences and a reduction in coastal flooding,
- Reduce the risk of flooding from extreme surges,
- Continue working with natural coastal processes.
- Limit the impact of the scheme on people and property,
- Provide a scheme which is adaptable to sea level rise and climate change, and
- Maintain the amenity benefit of the beach over the whole frontage for both the local population and the holidaymakers who visit the area.
- To assist with the development of a Flood and Coastal Erosion Risk Management Scheme for Eastoke (as recommended in the draft Hayling Island Strategy), to appraise coastal management options over the next 50-100 years.

Langstone Coastal Defence Scheme

6.1.3 Current defences in Langstone are in poor condition and some are reaching the end of their life. Over the next 100 years, more than 120 homes in Langstone are at risk of tidal flooding in an extreme event.

[29] Programme of flood and coastal erosion risk management (FCERM) schemes https://www.gov.uk/government/publications/programme-of-flood-and-coastal-erosion-risk-management-schemes
[30] East Solent Coastal Partnership South Hayling Island Beach Management Plan https://coastalpartners.org.uk/project/south-hayling-beach-management-plan/

6.1.4 A Flood and Coastal Erosion Risk Management (FCERM) Scheme is being developed at Langstone[31]. This is the latest phase of project development, which builds on recommendations of the North Solent Shoreline Management Plan (2010) and the Portchester to Emsworth FCERM Strategy (2012).

6.1.5 The aim of the Scheme is to develop coastal management options to reduce the flood and erosion risk to the community, important heritage assets and the A3023, the only road crossing to Hayling Island.

6.1.6 The options appraisal phase has now led to the development of leading options for defences. These options have now undergone detailed design, ready for presentation to the Community. The design includes a sheet piled wall at Frontage 2 (Hayling Billy Trail South) which will tie into existing higher levels on the A3023 and a dwarf sheet piled concrete flood wall at Frontage 3 (Car Park at the Ship Inn) which will tie in with the A3023 on the eastern side. The scheme will only be able to progress subject to securing the necessary funding.

Broadmarsh Landfill Revetment

6.1.7 Havant BC undertook revetment repairs along the foreshore at Broadmarsh Coastal Park in October 2023.

6.1.8 The works involve replacing a section of the current revetment at high risk with a rock revetment, as well as some patch repairs to existing concrete. These repairs are being undertaken to prevent exposure of historic coastal landfill; avoiding severe consequences to the protected SSSI, SPA, and SAC areas in Langstone Harbour.

Chichester Harbour Investment and Adaptation Plan

6.1.9 To enable the rejuvenation of the harbour and localised environments HBC has endorsed and is seeking funding to undertake the proposed Chichester Harbour Environment and Investment Adaption Plan. The plan will set out a plan for the future management of Chichester harbour focussing on environmental improvements and reversing the damage that historic sea defences and inappropriate coastal management is having on the harbour environment.

6.2 Safeguard land for defence improvements

6.2.1 As detailed in Section 2, the Shoreline Management Plan policy for the majority of the coastline in Havant is to hold the line in the short, medium, and long term. The Portchester to Emsworth FCERM Strategy (2012) and Hayling Island Coastal Strategy (2023) develop this policy and identifies the preferred strategic options along the coastal frontages (described as Option Development Units (ODU)).

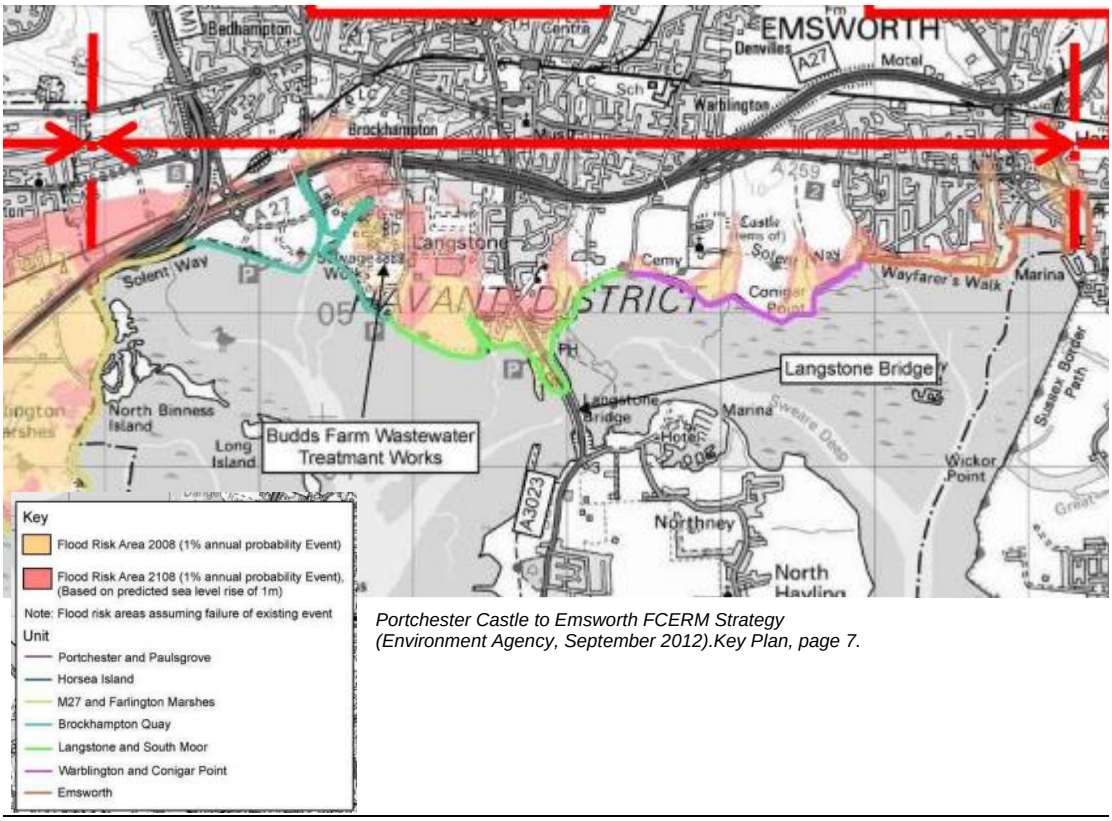
6.2.2 It is vital that Havant BC safeguard land within each of these ODUs in accordance with the strategies for implementation of these measures over the coming years.

6.2.3 Furthermore, as development comes forward on individual sites, opportunities should be taken for the direct provision of FCERM infrastructure. On some sites, it may be possible to design control measures that can ensure site safety whilst also reducing the risk of existing or future flooding to existing development.

Table 6-1 Land to safeguard for flood defences and land raising

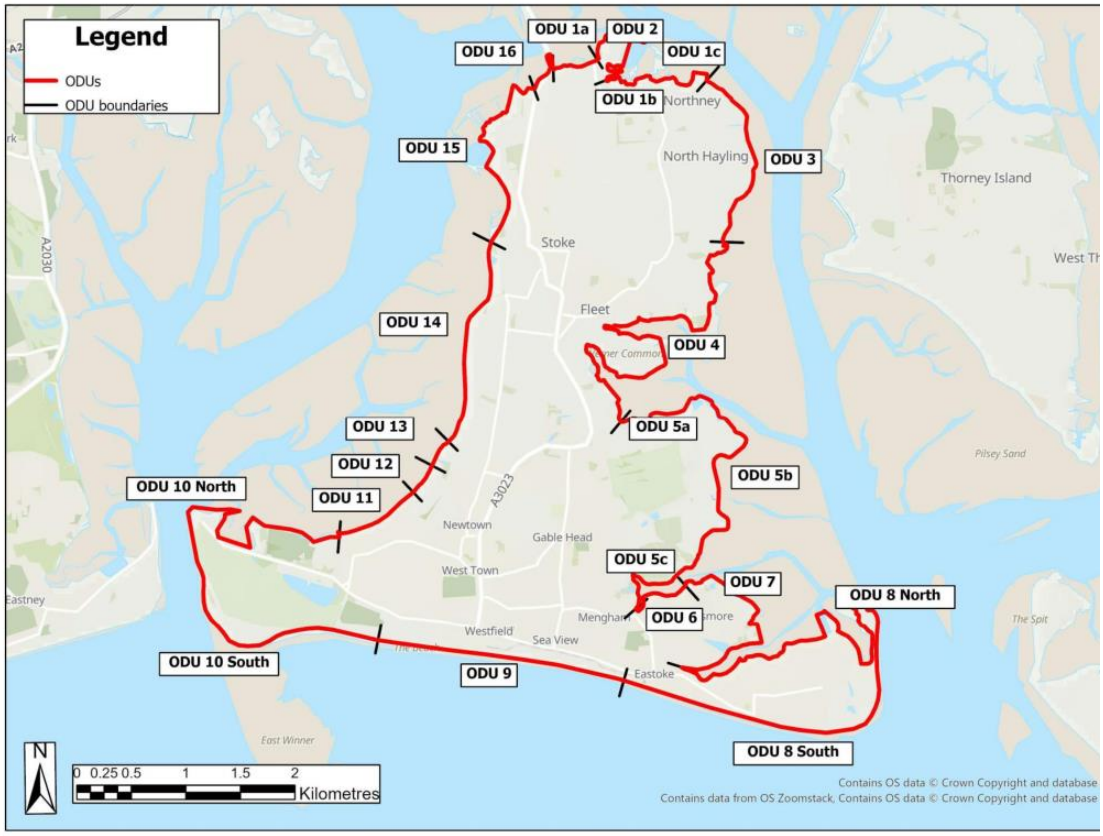
- **Reach 4: Brockhampton Quay:** Safeguard land to enable raising of embankment at Budds Farm WTW and capital maintenance of seawalls at landfill sites, as well as future raising and maintenance.
- **Reach 5: Langstone & Southmoor:** Safeguard land to enable raising of defences (embankments and walls) and future raising and maintenance at Langstone. Managed realignment at Langstone Mill Pond.
- **Reach 6: Warblington to Conigar:** Natural realignment.
- **Reach 7: Emsworth:** Safeguard land to enable raising of defences (embankments and walls) and future raising and maintenance.

[31] Coastal Partners Website, Langstone Coastal Defence Scheme https://coastalpartners.org.uk/project/langstone-coastal-defence-scheme/



Portchester Castle to Emsworth FCERM Strategy (Environment Agency, September 2012).Key Plan, page 7.

- **ODU1 Langstone Bridge to Northney Farm:** Safeguard land to construct new defences along the road and along existing alignment and raise over time to keep pace with climate change.
- **ODU2 Northney Marina**: Private maintenance or replacement of defences by landowners.
- **ODU3 Northney Farm to Chichester Road:** Safeguard land to construct new defences and set back where appropriate.
- **ODU4 Chichester Road to Mill Rythe Junior School:** Private maintenance or replacement of defences by landowners.
- **ODU5 Mill Rythe Junior School to Salterns Lane:** Safeguard land to construct new defences and create a more sustainable alignment.
- **ODU6 Salterns Lane to Wilsons Boat Yard:** Private maintenance of defences by landowners in short term. Safeguard land for the construction and maintenance of new defences in the long term.
- **ODU7 Wilsons Boat Yard to Fishery Creek:** Safeguard land to construct new defences and raise over time to keep pace with climate change.
- **ODU8 Eastoke:** Safeguard land for continued beach management. Safeguard land to construct new defences (flood walls and set back floodwalls) and raise over time to keep pace with climate change.
- **ODU9 Eastoke Corner to Inn on the Beach:** Safeguard land for continued beach management, new rock groynes and new defences to maintain the Inn on the Beach.
- **ODU10 Inn on the Beach to North Shore Road:** Private maintenance or replacement of defences by landowners. Safeguard land to allow the coast to evolve naturally.
- **ODU11 North Shore Road:** Safeguard land to construct new defences in stages and raise over time to keep pace with climate change.
- **ODU12 North Shore Road to Newtown:** Safeguard land to allow the coast to evolve naturally, no active management.
- **ODU13 Newtown:** Safeguard land to construct new defences and raise over time to keep pace with climate change.
- **ODU14 Newtown to Stoke:** Make space for nature. Consider realignment of Hayling Billy Trail to maintain access.
- **ODU15 Stoke to Langstone Bridge Carpark:** Safeguard land to construct new defences with new alignment and raise over time to keep pace with climate change.
- **ODU16 Langstone Bridge Carpark to Langstone Bridge:** Safeguard land to construct new defences and raise over time to keep pace with climate change to maintain the viability of the A3023.



Extract from Hayling Island Coastal Strategy (Option Development Units, page 26)

6.2.4 The Environment Agency typically seek a 16 metre set back from tidal flood defences for maintenance purposes. Under the Environmental Permitting (England and Wales) Regulations (2016)[32], an environmental permit is required for any activity within 16m of a sea defence structure, or within 16m of the bank of a tidal main river.

6.2.5 **Policy Recommendation:** Safeguard land for flood defence maintenance and future upgrades within Reach 1 – 3 and ODU1-16. Safeguard an adequate undeveloped buffer strip alongside tidal flood defence structures to allow future management and maintenance of flood defence structures. Developers and applicants should engage effectively to ensure an appropriate buffer is provided. Each case will be assessed on its own merits taking into consideration site characteristics and the management measures in place. Any development adjacent to the coastal frontage should facilitate the delivery of improvements to and maintenance of flood defences, through site design and financial contribution.

6.3 Maintenance of watercourses and flood defences

Main River

6.3.1 The Environment Agency is likely to seek an 8 metre wide undeveloped buffer strip alongside main fluvial rivers and 16m alongside tidal main rivers for maintenance purposes and would also ask developers to explore opportunities for riverside restoration as part of any development.

6.3.2 Under the Environmental Permitting (England and Wales) Regulations (2016)[33], an environmental permit is required if works are to be carried out:

[32] The Environmental Permitting (England and Wales) Regulations 2016 http://www.legislation.gov.uk/uksi/2016/1154/contents/made
[33] The Environmental Permitting (England and Wales) Regulations 2016 http://www.legislation.gov.uk/uksi/2016/1154/contents/made

- on or near a main river
- on or near a flood defence structure, or
- in a floodplain.

6.3.3 Since requirements of the consenting process in relation to flood risk, biodiversity and pollution may result in changes to development proposals or construction methods, the Environment Agency aims to advise on such issues as part of its statutory consultee role in the planning process. Should proposed works not require planning permission the Environment Agency can be consulted regarding permission to do work on or near a river, or a flood or sea defence by contacting enquiries@environment-agency.gov.uk.

6.3.4 **Policy Recommendation:** Safeguard an 8 metre (or 16 metre) wide undeveloped buffer strip alongside fluvial (or tidal) Main Rivers or flood defence structures and prioritise riverside restoration.

Ordinary watercourse

6.3.5 Ordinary watercourses are watercourses that are not part of a main river and include streams, ditches, drains, cuts, culverts, dykes, sluices, sewers (other than public sewers) and passages, through which water flows.

6.3.6 As the LLFA, HCC is responsible for the consenting of works to ordinary watercourses and has powers to enforce un-consented and non-compliant works. This includes any works (including temporary) that place or alter a structure within an ordinary watercourse or affect the flow or storage of water within an ordinary watercourse. HCC will seek a 5 metre wide undeveloped buffer strip to be retained alongside ordinary watercourses. Enquiries and applications for ordinary watercourse consent can be submitted to HCC on their website[34].

6.3.7 HCC intends to work with riparian owners (those living adjacent to an ordinary watercourse) who are responsible for maintaining ordinary watercourses to ensure that the effectiveness of the existing ditches is improved and ensure that future maintenance is undertaken at appropriate intervals. HCC have prepared a Flood Risk Management Guidance for Landowners document which provides information on the rights and responsibilities of riparian owners[35].

6.3.8 The CMPs note that in prioritised area, where land drainage incidents and excessive culverting are a cause for significant concern, HCC will implement a more stringent approval process for all Ordinary Watercourse Consent applications. Each application will be considered on a site-by-site basis where further information and additional requirements may be requested by HCC to ensure there will be no increase in flood risk.

6.3.9 **Policy Recommendation:** Safeguard an undeveloped buffer strip alongside ordinary watercourses for maintenance purposes. Developers should prioritise riverside restoration as part of development adjacent to ordinary watercourses.

6.4 River restoration

6.4.1 During the last century, many rivers were modified using hard engineering techniques to often straighten or canalise them. The disadvantages of these techniques have now become apparent which include the damage to the environment and ecosystems as well as an increase in flooding.

6.4.2 River restoration contributes to flood risk management by supporting the natural capacity of rivers to retain water. By re-connecting brooks, streams and rivers to floodplains, former meanders, and other natural storage areas, and enhancing the quality and capacity of wetlands, river restoration increases natural storage capacity and reduces flood risk. Excess water is stored in a timely and natural manner in areas where values such as attractive landscape and biodiversity are improved and opportunities for recreation can be enhanced.

[34] Hampshire County Council, Making changes to a watercourse https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/changewatercourse
[35] Hampshire County Council, 2020, Flood Risk Management Guidance for Landowners https://documents.hants.gov.uk/flood-water-management/HCCFloodRiskManagement-Landowners.pdf

6.4.3 Returning rivers to a more natural state can often include the removal of structures such as weirs or culverts which can have multiple benefits for biodiversity in addition to improving the flow regime[36]. Further guidance on river restoration is available from the Environment Agency[37].

Hermitage and Lavant Streams

6.4.4 The policy within the CFMP for the Havant and Denmead sub-area, summarised in Section 2.1, involves undertaking the 'Hermitage and Lavant streams restoration project', considering options to naturalise river corridors through Havant.

6.4.5 The Hermitage Stream Restoration Project is a project being coordinated by Havant Borough Council, the Environment Agency, Hampshire Wildlife Trust, Groundwork Solent and Hampshire County Council (for the Park School section). The aim of the project is to restore five reaches of the canalised Hermitage Stream to a more natural setting. These improvements are planned for the land adjacent to the stream as well as the channel itself. These are mostly in the Leigh Park area, with a small section in Havant and Bedhampton.

6.4.6 Similar work to replace some of the steep concrete riverbanks with gently sloping banks with waterside vegetation and natural gravel riverbed between Barncroft Way and Middle Park Way was awarded the Millennium Marque for environmental excellence in October 2000. Public access to the riverside open spaces was also improved by the provision of new footpaths/cycleways with tree and shrub planting between Middle Park Way and Park House Farm Way.

Urban areas

6.4.7 The policies within the CFMP strongly encourage improvement of channel capacity and conveyance through urban areas such as Havant. This may involve de-culverting sections and removing the constraints imposed by the urban environment to enable more adaptive response to changes in water levels.

6.4.8 **Policy Recommendation:** Where development is planned in urban areas, opportunities for de-culverting watercourse sections should be sought to bolster local channel capacity and conveyance. This policy is most relevant for culverted sections of the Nore Barn Stream and West Brook in Emsworth, the Brookside Road Stream in Bedhampton, the Potwell Tributary in Purbrook, the Hermitage and Lavant Streams in Havant, and the Brockhampton Stream in Brockhampton.

6.5 Flood storage

6.5.1 Flood Storage Areas (FSAs) are natural or man-made areas that temporarily fill with water during periods of high river level, retaining a volume of water which is released back into the watercourse after the peak river flows have passed. There are two main reasons for providing temporary detention of floodwater:

- To compensate for the effects of catchment urbanisation, and
- To reduce flows passed downriver and mitigate downstream flooding.

6.5.2 Providing flood storage within a development area or further upstream of a development can manage and control the risk of flooding. In some cases, it can provide sufficient flood protection on its own; in other cases it may be chosen in conjunction with other measures. The advantage of flood storage is that the flood alleviation benefit generally extends further downstream, whereas other methods tend to benefit only the local area and may increase the flood risk downstream.

6.5.3 Further guidance on Flood Storage is provided within Chapter 10 of the Environment Agency's Fluvial Design Guide[38].

[36] European Centre for River Restoration https://www.ecrr.org/River-Restoration/Flood-risk-management/Healthy-Catchments-managing-for-flood-risk-WFD/Environmental-improvements-case-studies/Remove-culverts
[37] Environment Agency, Fluvial Design Guidance Chapter 8 https://assets.publishing.service.gov.uk/media/60549ae1e90e0724c0df4619/FDG_chapter_8_-_Works_in_the_river_channel.pdf
[38] Environment Agency, Fluvial Design Guidance Chapter 10 https://assets.publishing.service.gov.uk/media/60549b7a8fa8f545cf209a29/FDG_chapter_10_-_Flood_storage_works.pdf

Southleigh

6.5.4 Southleigh was the most significant site allocated in the Havant Local Plan 2036, which was withdrawn in 2022. If the site is reallocated in a future plan for residential development, significant infrastructure improvements will need to be delivered to make the new community sustainable and to mitigate negative effects on existing communities. Land on this site should be safeguarded for flood alleviation for the Nore Barn Stream.

6.5.5 **Policy Recommendation:** In partnership with relevant risk management authorities (for example Environment Agency, Hampshire County Council and land owners) identify and appraise the options for creating flood storage areas along the West Brook and River Ems in the Emsworth area.

Floodplain compensation

6.5.6 Where proposed development results in a change in building footprint, land raising or other structures such as bunds, the developer must ensure that it does not impact upon the ability of the floodplain to store water and should seek opportunities to provide betterment with respect to floodplain storage.

6.5.7 Similarly, where ground levels are elevated to raise the development out of the floodplain, compensatory floodplain storage within areas that currently lie outside the floodplain must be provided to ensure that the total volume of the floodplain storage is not reduced.

6.5.8 Floodplain compensation must be provided on a level for level, volume for volume basis on land which does not already flood and is within the site boundary. Where land is not within the site boundary, it must be in the immediate vicinity, in the applicant's ownership and linked to the site. Floodplain compensation must be considered in the context of the 1% AEP flood level including an appropriate allowance for climate change. When designing a scheme flood water must be able to flow in and out and must not pond. An FRA must demonstrate that there is no loss of flood storage capacity and include details of an appropriate maintenance regime to ensure mitigation continues to function for the life of the development. Guidance on how to address floodplain compensation is provided in Appendix A3 of the CIRIA Publication C624[39].

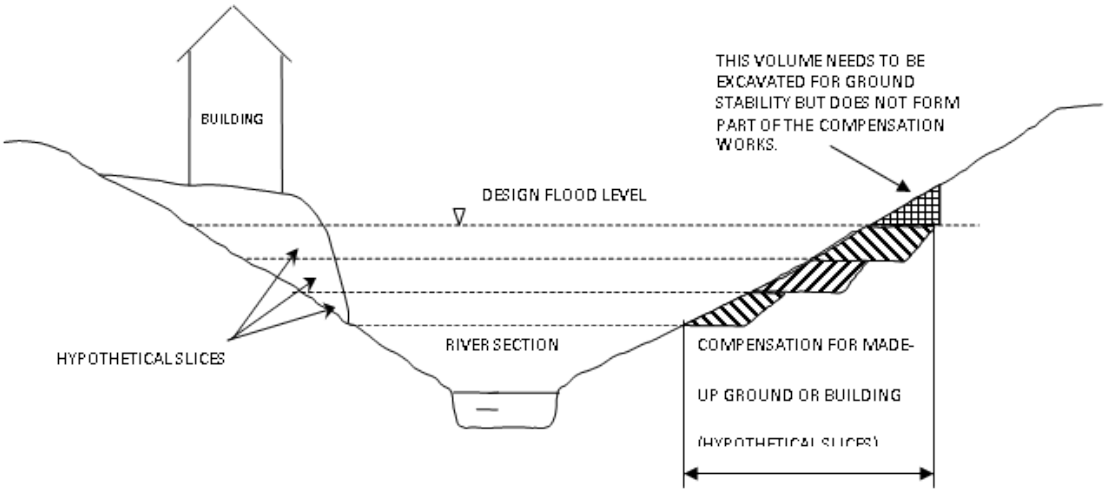


Figure 6-1 Example of Floodplain Compensation Storage (Environment Agency 2009)

6.5.9 The requirement for no loss of floodplain storage means that it is not possible to modify ground levels on sites which lie completely within the floodplain (when viewed in isolation), as there is no land available for lowering to bring it into the floodplain. It is possible to provide off-site compensation within the local area e.g. on a neighbouring or adjacent site, or indirect compensation, by lowering land already within the floodplain, however, this would be subject to detailed investigations and agreement with the Environment Agency to demonstrate (using an appropriate flood model where necessary) that the proposals would improve and not worsen the existing flooding situation or could be used in combination with other measures to limit the impact on floodplain storage.

6.5.10 Where car parks are specified as areas for the temporary storage of surface water and fluvial floodwaters, flood depths should not exceed 300mm given that vehicles may be moved by water of

[39] CIRIA (2004) CIRIA Report 624: Development and Flood Risk - Guidance for the Construction Industry

greater depths. Where greater depths are expected, car parks should be designed to prevent the vehicles from floating out of the car park. Signs should be in place to notify drivers of the susceptibility of flooding and flood warning should be available to provide sufficient time for car owners to move their vehicles if necessary.

6.5.11 **Policy recommendation:** Where proposed development results in a change in building footprint, land raising, or other structures, that impact upon the ability of the floodplain to store water, floodplain compensation must be provided on a level for level, volume for volume basis on land which does not already flood and is within the site boundary.

6.6 Working with natural processes

6.6.1 Natural flood management involves techniques that aim to work with natural hydrological and morphological processes, features, and characteristics to manage the sources and pathways of flood waters. Techniques include the restoration, enhancement and alteration of natural features and characteristics, but exclude traditional flood defence engineering that works against or disrupts these natural processes.

6.6.2 Appendix A Figure 8 provides information from the Environment Agency's 'Working with Natural Processes – Evidence Directory'[40] about where these measures could be applied. This map shows that although there are a lot of existing woodland constraints within the Havant administrative area, there are still a wide range of opportunities to implement natural processes to alleviate flooding. There are many potential opportunities for riparian woodland planting and wider catchment woodland across administrative area, as well as some opportunities for floodplain woodland planting and floodplain reconnection scattered around. Further information about these datasets is included in SFRA Report Part 1. Riparian woodland planting also holds the potential to confer environmental benefits such as improved water quality, Biodiversity Net Gain, wildlife corridors, and carbon sequestration, in unison with natural flood management.

6.6.3 **Policy Recommendation:** Seek opportunities to implement natural flood management techniques in the administrative area such as the planting of riparian woodland and wider catchment woodland, to attenuate surface water runoff and groundwater recharge, both in, and preferably upstream of areas that contain vulnerable receptors at risk of groundwater, surface water, or fluvial flooding.

Green Infrastructure

6.6.4 Green Infrastructure (GI) is a strategically planned and managed network of natural and semi-natural green (land) and blue (water) spaces that intersperse and connect urban centres, suburbs and rural fringe, consisting of:

- Open spaces e.g. parks, woodland, nature reserves and lakes,
- Linkages e.g. river corridors, canals, pathways, cycle routes and greenways,
- Networks of 'urban green' e.g. private gardens, street trees, verges and green roofs.

6.6.5 The identification and planning of GI are critical to sustainable growth and flood risk management. GI can provide a wide range of ecosystem services, including climate mitigation and adaptation, and is central to climate change action. GI also provides additional green spaces for storm flows, freeing up water storage capacity in existing infrastructure and reducing the risk of damage to urban property, particularly in city centres and vulnerable urban regeneration areas. Additionally, GI can improve accessibility to waterways and water quality, supporting regeneration and improving opportunity for leisure, economic activity and biodiversity.

6.6.6 South Hampshire currently benefits from a strategic GI network that includes rivers, country parks, the coast, large tracts of woodland and an extensive public rights of way network. May local areas also benefit from smaller scale GI features. Maximising the potential of GI across South Hampshire is a critical environmental priority for PfSH, and hence a GI Strategy and associated GI Implementation Plan

[40] Working with Natural Processes – Evidence Directory
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/681411/Working_with_natural_processes_evidence_directory.pdf

have been developed to provide an ambitious long term framework for GI and set out the strategic GI projects for South Hampshire into the future[41].

6.6.7 **Policy Recommendation:** In partnership with relevant risk management authorities (for example Environment Agency, Hampshire County Council and land owners), extend and enhance existing GI within the borough through the implementation of floodplain and riparian woodland planting schemes in order to attenuate surface water runoff and groundwater recharge, both in, and preferably upstream, of areas that contain vulnerable receptors at risk of groundwater, surface water, and fluvial flooding. As a result of the heavily urbanised nature of the Havant BC, there are very limited opportunities to manage flood risk through floodplain and riparian woodland planting, the only exception to this being the possibility for riparian woodland planting in the Emsworth area.

Nutrient Neutral Development

6.6.8 The water quality of the coast can be affected by excessive levels of nutrients. High levels of nitrogen and phosphorus in water environments can cause eutrophication, reducing available oxygen and harming aquatic insects, fish and wildlife as a whole. The nutrient inputs are largely from a combination of agricultural sources and from public and private wastewater systems. Areas of special interest within the Borough which need to be protected from these effects include:

- Solent Maritime Special Area of Conservation (SAC)
- Chichester and Langstone Harbour Special Protection Area (SPA)
- The Ramsar designation for Chichester and Langstone Harbours

6.6.9 In order for development to be permitted by Havant BC, new housing schemes and other proposals which include a net gain in overnight accommodation, or development which has a high volume of water use, will need to prevent any increase in nutrients into the harbour in order for them to be 'nutrient neutral' if they would otherwise lead to a likely significant impact on a European site. Mitigation of the increased nutrient load generated by new residential developments is generally achieved through the creation of new wetlands which strip nutrients from the wastewater, or natural buffer zones. Natural buffer zones increase the area of permeable surfaces, thereby increasing infiltration rates and reducing surface runoff. Reduced surface runoff reduces the probability of localised surface water flooding in urbanised areas, as well as the release of water during storm events into proximal catchments. The creation of new wetlands can reduce the probability and severity of flooding downstream, by bolstering the water storage capacity of floodplains.

6.6.10 Havant BC have developed a bespoke solution to offset nutrients from new development[42]. An agricultural site on the coast at Warblington has been decommissioned from intensive agricultural use and converted to a nature reserve. Applicable new developments within the Borough pay a contribution towards offset mitigation offered, reflecting the additional nitrate loads they produce. Naturalisation of the site will create meadowlands which will improve water quality and diversify insect, plant and animal life.

6.6.11 **Policy Recommendation:** Supplement the offsetting of nutrients from new development at the Warblington site with the creation of natural buffer zones in areas of the borough that are at greatest risk of surface water flooding.

6.7 Surface water management

6.7.1 Development should be designed so that there is no increase in flood risk elsewhere and the development will be safe from surface water flooding. This must be the case during the 3.33% AEP and 1% AEP rainfall event including the relevant allowances for climate change (described in Part 1 Main Report Table 3-4) based on the lifetime of the development:

- For development with a lifetime beyond 2100, use the upper end allowances for the 2070s epoch.

[41] Partnership for South Hampshire, 2019, Green Infrastructure, Flooding and Water Management https://www.push.gov.uk/work/planning-and-infrastructure/green-infrastructure-flooding-water-management/
[42] Havant Nutrient Neutrality https://www.havant.gov.uk/nutrient-neutrality-what-developers-need-know

- For development with a lifetime of between 2061 and 2100 use the central allowance for the 2070s epoch.
- For development with a lifetime up to 2060 use the central allowance for the 2050s epoch.

6.7.2 HCC will support only those developments which offer surface water management systems that ensure all runoff is restricted to greenfield runoff rates if the development area is in a greenfield site; or restricted to pre-existing runoff rates, with preference to greenfield runoff rates if reasonably practicable if the development area is in a brownfield site; all in accordance with best practice and industry standards (i.e., the SuDS Manual C753) for water quality and quantity.

6.7.3 The CMPs set out additional expectations for priority areas such as Purbrook, Leigh Park, Havant, Emsworth, Eastoke, and Waterlooville. Where significant brownfield development is due to take place, HCC will make it best practice that a 50% betterment of surface water runoff rates is provided. Where significant greenfield development is proposed, HCC will make it best practice for LPAs to request hydraulic modelling of surface water exceedance flows. This will ensure developers are responsible for ensuring their developments do not flood on areas of previously undeveloped land and will help avoid surface water ponding of vulnerable areas during an exceedance event.

Sustainable Drainage Systems

6.7.4 Sustainable drainage systems (or SuDS) are designed to control surface water run off close to where it falls, combining a mixture of built and nature-based techniques to mimic natural drainage as closely as possible, and accounting for the predicted impacts of climate change.

6.7.5 Suitable surface water management measures should be incorporated into new development designs, to reduce and manage surface water flood risk to, and posed by, the proposed development. This should ideally be achieved by incorporating Sustainable Drainage Systems (SuDS). Consideration of sustainable drainage systems early in the design process for development, including at the pre-application or master-planning stages, can lead to better integration, multi-functional benefits and reduced land-take.

6.7.6 SuDS are typically softer engineering solutions inspired by natural drainage processes such as ponds and swales which manage water as close to its source as possible. Wherever possible, a SuDS technique should seek to contribute to each of the four following goals:

- Reduce flood risk (to the site and neighbouring areas),
- Improve water quality,
- Provide biodiversity, wildlife benefits and,
- Provide amenity and landscape benefits.

6.7.7 Generally the aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable:

1. Rainwater harvesting / recycling.
2. Discharge into the ground (infiltration),
3. Discharge to a surface water body,
4. Discharge to a surface water sewer, highway drain, or another drainage system, and
5. Discharge to a combined sewer.

6.7.8 SuDS techniques can be used to reduce the rate and volume and improve the water quality of surface water discharges from sites to the receiving environment (i.e. natural watercourse or public sewer etc.). The SuDS Manual[43] identifies several processes that can be used to manage and control runoff from developed areas. Each option can provide opportunities for storm water control, flood risk management, water conservation and groundwater recharge. Refer to the non-technical standards[44] for guidance on the design, maintenance, and operation of SuDS.

[43] CIRIA C697 SuDS Manual. Available from: https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS
[44] Sustainable drainage systems: non-statutory technical standards, 2015
https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards

6.7.9 The NPPF[18] currently states that major developments (10 dwellings or more; or 1,000sqm non-residential floor space) should incorporate SuDS unless there is clear evidence that this would be inappropriate. Schedule 3 of the FWMA is due for implementation in 2024 and requirements for SuDS may therefore change.

6.7.10 HCC have outlined their stance towards SuDS in the Local Flood and Water Management Strategy (2020) document[45], which contains two policies specifically related to SuDS, namely that post development no greater volume of surface water leaves the site and/or no surface water leaves the site at a faster rate than occurred predevelopment, and that HCC will encourage LPAs to ensure that a formal adoption process and robust maintenance regime for SuDS is secured through the granting of the planning permission (e.g. Section 106 agreements where necessary). Although not a specific policy, the document also indicates that ideally all new developments, both major and minor, should utilise SuDS where applicable.

6.7.11 At present, HCC as LLFA is a statutory consultee for matters relating to surface water management in new development. Schedule 3 of the FWMA places a duty on the local authority, likely to be the LLFA, to become a SuDS Approval Body (SAB). Schedule 3 will remove the automatic right to connect surface water to the public sewer network and will require all new development over a prescribed threshold (to be confirmed by secondary legislation) to use SuDS to manage surface water. In addition to the normal planning application process, developers will have to submit a SuDS application to the SAB, demonstrating compliance with National Standards. The SAB will approve applications and then adopt the SuDS for the lifetime of the development, with responsibility for maintenance.

6.7.12 At the time of writing Schedule 3 has not been enacted. However, the Jenkins Review[46] published in January 2023, made recommendations that Schedule 3 be enacted by Defra. The current indication by Defra is that Schedule 3 is likely to be enacted during 2024.

6.7.13 **Policy Recommendation:** Strengthen the existing surface water management requirements for proposed developments in parts of the Havant BC area that are at the greatest risk of surface water flooding, such as Wecock (Loveden Road to Hambledon Road), Havant (Lavant and Hermitage Streams), Emsworth, and Purbrook (Potwell Tributary).

Limiting urban creep

6.7.14 **Recommendation:** In residential parts of the priority areas (Purbrook, Leigh Park, Havant, Emsworth, Eastoke Waterlooville and South Waterlooville), limit permitted development rights regarding the paving or covering of permeable surfaces with impermeable surfacing, (in accordance with Policy 11 in the CMPs for Meon and Wallington and Lavant).

6.8 Flow routing

6.8.1 Redevelopment in areas at risk of flooding from surface water, river flooding or groundwater flooding has the potential to affect flood routing and increase flood risk elsewhere. For example, redevelopment may give rise to backwater effects or divert floodwaters on to other properties.

6.8.2 Consideration should be given to configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties. Consideration should be given to the use of fences and landscaping walls to prevent causing obstruction to flow routes and increasing the risk of flooding to the site or neighbouring areas.

6.8.3 Opportunities should be sought within site design to make space for water, such as:

- Removing boundary walls or replacing with other boundary treatments such as hedges, fences (with gaps).
- Considering alternatives to solid wooden gates or ensuring that there is a gap beneath the gates to allow the passage of floodwater.

[45] Hampshire County Council Local Flood and Water Management Strategy https://documents.hants.gov.uk/flood-water-management/local-flood-water-management-strategy.pdf
[46] Defra, Updated July 2021, Surface water and drainage: a review of responsibilities https://www.gov.uk/government/publications/surface-water-and-drainage-review-of-responsibilities

- Create under-croft car parks or consider reducing ground floor footprint and creating an open area under the building to allow flood water storage.
- Where proposals entail floodable garages or outbuildings, consider designing a proportion of the external walls to be committed to free flow of floodwater.

6.8.4 **Policy Recommendation:** All new development should not adversely affect flood routing which could increase flood risk elsewhere. Opportunities should be sought within the site design to make space for water.

6.9 Risk of groundwater flooding

6.9.1 **Policy Recommendation:** New development should not result in an increased risk of groundwater flooding elsewhere. Where development is proposed that involves works below ground and/or changes to drainage, a Hydrogeological Risk Assessment (HRA) should be undertaken to determine the potential impact on groundwater and identify proposed mitigation measures.

6.9.2 The geology underlying Havant creates pathways for groundwater to flow through the subsurface and the potential for groundwater flooding to occur. Additional subsurface development or additional infiltration has the potential to modify groundwater flows, leading to potential flooding elsewhere and/or impacting on groundwater abstractions downstream.

6.9.3 In areas at risk of groundwater flooding, development proposals should be assessed to identify:

i. the depth and geometry of the penetration of works into the sub-surface from the construction of the proposed development (for example piled foundations, basements, excavation for services). These features can disrupt groundwater flow, alter groundwater levels and therefore increase the risk of groundwater flooding at or around the site.

ii. any changes in drainage, for example impermeable surfaces or infiltration/SuDS systems which could alter groundwater flow patterns and the elevation of the water table.

6.9.4 If the FRA identifies works below ground and/or changes in drainage a Hydrogeological Risk Assessment (HRA) (sometimes called a Basement Impact Assessment) will be required. The scope and detail required for the HRA will vary depending on the scale of sub-surface construction proposed and the local geological and hydrogeological conditions.

6.9.5 The HRA should be used to determine the geological and hydrogeological setting and whether sub-surface development will reach the water table. The water table will move up and down depending on rainfall; the assessment should consider the highest level. If the development does extend down to the water table, it may disrupt groundwater flow in the aquifer by creating a barrier and increase the risk of flooding. The HRA should identify the impact and any required mitigation measures.

6.9.6 In some settings there may be an aquifer at depth and, depending on the proposed depth of the development, this may also have to be assessed. A site specific ground investigation (GI) with trial pits and boreholes should be obtained to inform the FRA and HRA if there is uncertainty over the geological or hydrogeological conditions at any proposed development site.

6.9.7 The HRA should also identify changes in drainage as these may create additional inflows to ground which can also exacerbate groundwater flood risk.

6.10 Consulting with Water Companies

6.10.1 Southern Water are responsible for maintaining surface, foul and combined public sewers to ensure effective drainage of the area. If flows are proposed to enter public sewers, as part of their pre-application service, Southern Water will assess whether the public system has the capacity to accept the flows or provide a solution that identifies necessary mitigation if not.

6.10.2 As summarised in Section 2.4, there is a pressing need to reduce the volume of rainwater entering the sewer system, to enable capacity for wastewater processing and reduce discharges from storm overflows.

6.10.3 **Recommendation:** As part of their site allocation process, Havant BC should consult with Southern Water to determine any areas with sewer capacity issues. New development provides an opportunity to reduce the causes and impacts of flooding associated with sewer systems and local surface water runoff.

6.11 Emergency planning

6.11.1 Emergency planning can help manage flood related incidents. In the UK, emergency planning is performed under the direction of the 2004 Civil Contingencies Act (CCA), and seeks to prevent, or if not mitigate, the risk to life, property, business, infrastructure and the environment.

6.11.2 Flood risk emergency planning involves developing and maintaining arrangements to reduce, control or mitigate the impact and consequences of flooding and to improve the ability of people and property to absorb, respond to and recover from flooding. In development planning, a number of these activities are already integrated in national building control and planning policies e.g. the NPPF.

6.11.3 Safety is a key consideration for any new development and includes the likely impacts of climate change and, where there is a residual risk of flooding, the availability of adequate flood warning systems for the development, safe access and egress routes and evacuation procedures. It is a requirement under the NPPF that an Emergency Plan is prepared wherever emergency flood response is an important component of making a development safe.

6.11.4 Havant BC is designated as a coast protection authority, and therefore possesses the duties and powers as specified under the Coast Protection 1949[47].

6.11.5 The following existing plans and arrangements for managing flood emergencies are relevant to the Havant administrative area.

Havant Emergency Response Plan

6.11.6 Havant BC have prepared an Emergency Response Plan[48] which sets out the principles of an effective emergency response and provides a plan to enable the Council to respond to a wide range of emergencies, including a flood event.

Hayling Island Emergency Plan Framework

6.11.7 As Hayling Island is surrounded by the sea with only one fixed access point across Langstone Bridge, additional emergency planning other than that in the Havant Emergency Response Plan is important. Havant BC have prepared the Hayling Island Emergency Plan Framework[49] to provide an initial framework for the planning of responses to emergency situations. This document assesses a range of emergency events that may take place on Hayling Island (including flooding), access routes and actions during these events, and recovery.

6.11.8 **Recommendation:** Havant BC should take account of this updated SFRA in future reviews of their emergency plans and in considering the suitability of further development on Hayling Island, with respect to tidal flood risk. Havant BC need to be satisfied that proposals can be regarded as safe in the event that vehicular access to the mainland is not achievable.

Havant Borough Council Preparing for a Flood

6.11.9 Havant BC have prepared a document that provides local residents with advice on what to do if you live in an area prone to occasional flooding[50]. This includes information on what can be done in advance, who to contact in different flood related situations, and a home emergency plan checklist.

6.11.10 Further flood advice can be found on the Havant BC[51] and HCC[52] websites.

[47] Coast Protection Act 1949 https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/74#:~:text=An%20Act%20to%20amend%20the,the%20Commissioners%20of%20Crown%20Lands%3B
[48] Havant Borough Council, 2021, Emergency Response Plan https://www.havant.gov.uk/emergency-advice
[49] Havant Borough Council, 2021, Hayling Island Emergency Planning Framework https://www.havant.gov.uk/emergency-advice
[50] Havant Borough Council, Preparing for a Flood https://www.havant.gov.uk/protect-your-home-flooding
[51] Havant Borough Council, Emergency Advice https://www.havant.gov.uk/protect-your-home-flooding
[52] Hampshire County Council Flooding Advice https://www.hants.gov.uk/community/emergencyplanning/whattoplanfor/floodingadvice

Emergency planning considerations for reservoirs

6.11.11 The PPG notes that LPAs should consider the potential damage to buildings or loss of life in the event of dam failure, compared to other risks, when considering development downstream of a reservoir. LPAs are also advised to consult with the owners/operators of raised reservoirs, to establish constraints upon safe development.

6.11.12 LPAs should also consider any implications for reservoir safety and reservoir owners and operators caused by new development located downstream of a reservoir, such as the cost of measures to improve the design of the dam to reduce flood risk, the operation of the reservoir, and general maintenance costs, by consulting with reservoir owners and operators on plan and development proposals. Local authorities, as category 1 responders, can access more information about reservoir risk and reservoir owners using the Resilience Direct system. Developers should be expected to cover any additional costs incurred, as required by the National Planning Policy Framework's 'agent of change' policy (paragraph 187). This could be through Community Infrastructure Levy or section 106 obligations for example.

6.11.13 In Havant, the Risk of Flooding from Reservoirs mapping identifies a small area at residual risk of reservoir flooding in the west of the study area in the upper reaches of the Potwell Tributary catchment between Aldermoor Road and Ladybridge Road downstream of a small water body to the south of Purbrook Junior and Infant School.

6.11.14 It is anticipated that the Risk of Flooding from Reservoirs mapping will be updated in due course to provide an assessment of the residual risk of flooding from the new Havant Thicket Reservoir under construction.

7. Recommendations of how to address flood risk in development

*When allocating sites for development, LPAs must apply the Sequential Test to **avoid** flood risk and steer development towards those areas at least risk of flooding. The process for applying the Sequential Test is described in Part 1 Section 4.*

*Following the application of the Sequential Test, it may not always be possible to **avoid** locating development in areas at risk of flooding. This section builds on the findings of the SFRA to provide guidance on the range of measures that could be considered on individual development sites to **mitigate** and **manage** the risk of flooding. These measures should be considered when preparing a site-specific FRA. This section outlines the approach that Havant BC should consider in relation to flood risk planning policy and development management decisions.*

7.1 Sequential approach

7.1.1 **Policy Recommendation:** Apply a sequential approach to site planning.

7.1.2 Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development. Most large development proposals include a variety of land uses of varying vulnerability to flooding. The sequential approach should be applied within development sites to locate the most vulnerable elements of a development in the lowest risk areas (considering all sources of flooding) e.g. residential elements should be restricted to areas at lower probability of flooding whereas parking, open space or proposed landscaped areas can be placed on lower ground with a higher probability of flooding.

7.2 Appropriate types of development

7.2.1 **Policy Recommendation:** Location of development must take into account the vulnerability of users.

7.2.2 Table 4-1 in SFRA Report Part 1 (reproduced from PPG Table 2) provides an incompatibility matrix and determines which types of development are appropriate in areas of flood risk[53].

7.3 Finished floor levels

7.3.1 **Policy Recommendation:** All development within Flood Zones 2 and 3 should set finished floor levels above the design flood level (0.5% AEP) including an appropriate allowance for climate change and freeboard. More Vulnerable and Highly Vulnerable development should apply the upper end climate change allowance. Less Vulnerable development should apply the higher central climate change allowance.

7.3.2 Where developing in Flood Zone 2 and 3 is unavoidable, the recommended method of mitigating flood risk to people, particularly with More Vulnerable (residential) and Highly Vulnerable development types (as outlined in Table 2 of the PPG), is to ensure internal floor levels are raised a freeboard level above the design flood level including an appropriate allowance for climate change. For fluvial flooding, the design flood is the 1% AEP (1 in 100 year) event, and for tidal flooding it is the 0.5% (1 in 200 year) AEP event. Less Vulnerable development should also aim to raise floor levels. Where this is not achievable, flood resilience measures should be incorporated to make up the shortfall (refer to Section 7.8). These measures should be detailed within the FRA.

7.3.3 Guidance document “Accounting for residual uncertainty: an update to the fluvial freeboard guide – technical report”[54] explains how to determine the appropriate residual uncertainty allowances. The process involves identifying sources of uncertainty in the datasets upon which the assessment is based,

[53] Planning Practice Guidance Flood Risk and Coastal Change https://www.gov.uk/guidance/flood-risk-and-coastal-change#table1
[54] Accounting for residual uncertainty: an update to the fluvial freeboard guide https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/accounting-for-residual-uncertainty-an-update-to-the-fluvial-freeboard-guide?web=1&wdLOR=c7DCE6B52-35F0-469F-843D-3238FA827B79

estimating the magnitude of residual uncertainties, and determining the appropriate response. Section 3.2 focuses on applying the process for development planning. The resulting residual uncertainty allowances range from 300mm to 900mm. Most developments should use this guidance document to determine freeboard, the only exceptions to this being minor developments that fall under the standing advice for flood risk.

7.3.4 With reference to the 'Flood risk assessment: standing advice for flood risk'[55], finished floor levels should be a minimum of whichever is higher, 300mm above the general ground level of the site or 600mm above the estimated river or sea flood level.

7.3.5 In certain situations (e.g. for proposed extensions to buildings with a lower floor level or conversion of existing historical structures with limited existing ceiling levels), it could prove impractical to raise the internal ground floor levels to sufficiently meet the general requirements. In these cases, the Environment Agency and/or Havant BC should be approached to discuss options for a reduction in the minimum internal ground floor levels provided flood resistance measures are implemented up to an agreed level.

7.3.6 There are also circumstances where flood resilience measures should be considered first. These are described further below. For both Less and More Vulnerable developments where internal access to higher floors is required, the associated plans showing the access routes and floor levels should be included within any site-specific FRA.

7.4 Protection against groundwater flooding

7.4.1 Although many of the resilience measures implemented for surface water and fluvial flooding are also suited to groundwater flooding, many traditional methods of flood protection, such as sandbags, may not be effective against flooding from groundwater. This is because water can come up through the floor and remain for a long time.

7.4.2 There are differences in impacts related to the long duration of groundwater flooding (weeks compared with days). These include potential structural impacts on foundations and impacts on sub surface drainage (both main sewer systems and local systems such as cess pits and soakaways).

7.4.3 Whilst the duration of groundwater flooding is problematic, as it generally takes some time to build up, there is generally a greater length of time to move valuable items or undertake a planned "evacuation".

7.4.4 *Resistance* measures are intended to limit entry of water to the building. Those that may be effective in a building include:

- Installing waterproof floors and sealing walls (including making good pointing, rendering etc.),
- Sealing (tanking) basements and using sump pumps for clearance if water ingress cannot be prevented,
- Covering susceptible ingress points such as airbricks (e.g. flood proof airbricks are available) and sealing weep holes,
- Installing one-way valves, toilet plugs, and pipe bungs may prevent the entry of water from flooded sewers, and,
- 'Sump and pump' – the use of a drain around a property to intercept rising groundwater and direct it to a sump, from where it is pumped to disposal.

7.4.5 *Recovery* involves modifying the interior of a building, for example by using materials that are less prone to damage by floodwater and / or dry quickly so that the post-flooding clean-up will be easier, cheaper, and quicker. Any surface water / fluvial resilience measure will be equally suitable for groundwater flooding. Typical measures include:

- Mounting electrical sockets, fittings, and equipment at high level above expected flood water,
- Using solid or tile floors rather than fitted carpets,
- Having readily demountable equipment (such as TVs etc.) that can be moved to a safe location,

[55] Preparing a flood risk assessment: standing advice https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

- Raising less easily demountable portable equipment (e.g., kitchen fittings) to high level, and,
- Using plaster and other building materials that are more resilient to long periods under damp conditions.

7.4.6 The Environment Agency provides advice on preparing properties for flooding in the following publications:

- Homeowners Guide to Flood Risk56 – lists various measures that are applicable to flooding in general, and
- Flooding from groundwater[57] - Practical advice to help homeowners reduce the impact of flooding specifically from groundwater.

7.5 Access / escape

7.5.1 Policy recommendation: New development must have safe access / escape during design flood conditions including an allowance for climate change. More Vulnerable and Highly Vulnerable development should apply the upper end climate change allowance. Less Vulnerable development should apply the higher central climate change allowance.

7.5.2 For developments located in areas at risk of tidal or fluvial flooding safe access / escape must be provided for new development as follows in order of preference:

- Safe dry route for people and vehicles.
- Safe dry route for people.
- If a dry route for people is not possible, a route for people where the flood hazard (in terms of depth and velocity of flooding) is low and should not cause risk to people.
- If a dry route for vehicles is not possible, a route for vehicles where the flood hazard (in terms of depth and velocity of flooding) is low to permit access for emergency vehicles. However, the public should not drive vehicles in floodwater.

7.5.3 Where access and escape are important to the overall safety of development in areas of flood risk, the local planning authority, in its emergency planning function, should consult with emergency planning staff and, where appropriate with the emergency services, unless local standards or guidelines have been put in place in lieu of consultation. The Environment Agency will advise LPAs of the flood hazards within and in the immediate vicinity of the development, but it is the role of the LPA in consultation with their emergency planning department and other specialists to make a determination as to the 'safety' of access/egress proposals.

7.5.4 A safe access/escape route should allow occupants to safely enter and exit the buildings and be able to reach land outside the flooded area (e.g. within Flood Zone 1) using public rights of way without the intervention of emergency services or others during design flood conditions, including climate change allowances (i.e. 1% AEP fluvial or 0.5% tidal flood event including an appropriate climate change allowance). Where a dry route is not possible the FRA should provide an assessment of the flood hazard rating along the route and demonstrate that the route is a low hazard (as defined in the FD2320 Flood risk to people calculator[58]). Hazard mapping is provided in Appendix B. The FRA should also provide an assessment of the predicted frequency and duration of flooding across the lifetime of the development. This will enable the LPA, in consultation with their emergency planners, to determine if the development is sustainable as well as safe.

7.5.5 It is important to note that, whilst the centre of Hayling Island is not at risk of flooding from the sea, the only highway link onto Hayling Island (the A3023 across Langstone Bridge) is shown to be at risk of flooding during the design event on both the Hayling Island side and on the mainland. The Hayling Island Coastal Management Strategy's[3] leading option for ODU 16 (Langstone Bridge Carpark to

[56] Homeowners guide to flood resilience. Know Your Flood Risk, July 2018. https://www.floodguidance.co.uk/wp-content/uploads/2018/07/KnowYourFloodRiskGuide_July18.pdf
[57] Environment Agency, 2011, Flooding from groundwater. https://www.gov.uk/government/publications/flooding-from-groundwater
[58] Defra Environment Agency Flood and Coastal Defence R&D Programme, 2004, https://assets.publishing.service.gov.uk/media/602a9348e90e070559970f9d/Operations_and_Maintenance_Concerted_Action_Report_pdf.pdf

Langstone Bridge) is to maintain the viability of the A3203 into the future as sea levels rise by constructing new defences to a 1 in 200 year standard. As set out in Section 6.1, the Langstone Coastal Defence Scheme[31] aims to reduce the impact of flooding to the A3023 at Langstone. Havant BC will need to consider emergency planning arrangements or improvements to the access roads in the area to enable further development on the Island.

7.5.6 In some parts of Hayling Island, access above the design flood level (1% AEP fluvial flood level, or 0.5% AEP tidal flood level) including climate change may not be achievable. It is therefore essential that Havant BC, in its emergency planning function, establish whether the safety of the future occupiers of any development site can be satisfactorily managed, in consultation with the Environment Agency and Emergency Planning,. This will be informed by the type of development, the number of occupants and their vulnerability and the flood hazard along the proposed escape route. For example, this may entail the designation of a safe place of refuge on an upper floor of a building, from which the occupants can be rescued by emergency services. It should be noted that sole reliance on a safe place of refuge is a last resort, and all other possible means to evacuate the site should be considered first. Provision of a safe place of refuge should not guarantee that an application will be granted.

7.5.7 The guidance document 'Flood Risk Emergency Plans for New Development' published by the Environment Agency and ADEPT[59] provides more detail on safe access and escape.

7.6 Place of safety

7.6.1 Policy recommendation: New development must include a place of safety during extreme flood conditions (0.1% AEP) including an allowance for climate change.

7.6.2 Tidal flooding occurs during exceptionally high tides or storm surges. As a result, there is advance warning of such events. The Environment Agency aim to provide a minimum 6 hours warning time for tidal flooding. As a result, it would be possible to evacuate properties prior to any significant tidal flooding taking place.

7.6.3 However, places of safety play an important role where, for whatever reason, evacuation in advance of flooding is not achieved, or in cases where flooding occurs as a result of a failure (e.g. breach) in the flood defences. Places of safety should be designed to facilitate rescue in case emergency care is needed or if it's unlikely to be safe for occupants/users to wait until flood waters have receded sufficiently.

7.6.4 Places of safety should be provided above the extreme flood level (0.1% AEP for tidal flooding) including an appropriate allowance for climate change.

7.7 Emergency plans

7.7.1 **Evacuation** is where flood alerts and warnings provided by the Environment Agency enable timely actions by residents or occupants to allow them to get to safety unaided, i.e. without the deployment of trained personnel to help people from their homes, businesses, and other premises. **Rescue** by the emergency services is likely to be required where flooding has occurred, and prior evacuation has not been possible.

7.7.2 **Recommendation:** For all developments proposed in Flood Zone 2 or 3, an Emergency Plan should be prepared to demonstrate what actions site users will take before, during and after a flood event to ensure their safety, and to demonstrate that their development will not impact on the ability of the local authority and the emergency services to safeguard the current population. For sites in Flood Zone 1 that are located on 'dry islands', it may also be necessary to prepare an Emergency Plan.

7.7.3 The Environment Agency has a tool on their website to create a Personal Flood Plan[60]. The Plan comprises a checklist of things to do before, during and after a flood and a place to record important contact details. Where proposed development comprises non-residential extension <250m^2 and

[59] ADEPT, Environment Agency, September 2019, Flood Risk Emergency Plans for New Development https://www.adeptnet.org.uk/floodriskemergencyplan
[60] Environment Agency Tool 'Make a Flood Plan'. Available from: https://www.gov.uk/government/publications/personal-flood-plan

householder development (minor development), it is recommended that the use of this tool to create a Personal Flood Plan will be appropriate.

7.7.4 Emergency Plans should include:

- How flood warning is to be provided, such as:
    - Availability of existing flood warning systems,
    - Where available, rate of onset of flooding and available flood warning time, and,
    - How flood warning is given.
- What will be done to protect the development and contents, such as:
    - How easily damaged items (including parked cars) or valuable items (important documents) will be relocated,
    - How services can be switched off (gas, electricity, water supplies),
    - The use of flood protection products (e.g. flood boards, airbrick covers),
    - The availability of staff/occupants/users to respond to a flood warning, including preparing for evacuation, deploying flood barriers across doors etc., and,
    - The time taken to respond to a flood warning.
- Ensuring safe occupancy and access to and from the development, such as:
    - Occupant awareness of the likely frequency and duration of flood events, and the potential need to evacuate,
    - Safe access route to and from the development,
    - If necessary, the ability to maintain key services during an event,
    - Vulnerability of occupants, and whether rescue by emergency services will be necessary and feasible, and,
    - Expected time taken to re-establish normal use following a flood event (clean-up times, time to re-establish services etc.).

7.7.5 There is no statutory requirement for the Environment Agency or the emergency services to approve emergency plans. Havant BC is accountable via planning condition or agreement to ensure that plans are suitable. Should there be an expectation that development will be coming forward in flood risk areas with implications on emergency planning, Havant BC, in its emergency planning function, should consider producing local guidelines setting out requirements for flood warning, evacuation, and places of safety, against which individual planning applications can then be judged. These should avoid additional burdens on emergency services and infrastructure capacity and minimise the need for further consultation at planning application stage.

7.8 Flood resilience measures

7.8.1 **Policy Recommendation:** Where development or redevelopment is proposed in areas at risk of flooding, flood resilience measures should be implemented.

7.8.2 ‘Property Flood Resilience’ is an approach to building design which aims to reduce flood damage and speed recovery and reoccupation following a flood. It uses a combination of flood resistance and recovery measures and is described in the industry-developed CIRIA Property Flood Resilience Code of Practice[61], which provides advice for both new-build and retrofit. It includes specific guidance for local authority planners.

7.8.3 Resistance and recovery measures are unlikely to be suitable as the only mitigation measure to manage flood risk, but they may be suitable in some circumstances, such as:

[61] Kelly, D, Barker, M, Lamond, J, McKeown, S, Blundell, E and Suttie, E (2020) Guidance on the code of practice for property flood resilience, C790B, CIRIA, London (ISBN: 978-0-86017-895-8)
https://www.ciria.org/CIRIA/Resources/Free_publications/CoP_for_PFR_resource.aspx

- Water Compatible and Less Vulnerable uses where temporary disruption is acceptable, and the development remains safe.
- Where the use of an existing building is to be changed and it can be demonstrated that the avoidance measures are not practicable, and the development remains safe.
- As a measure to manage residual flood risk from flood risk management infrastructure when avoidance measures have been exhausted.

7.8.4 Flood Risk Assessments frequently list flood resistance and recovery measures that could be incorporated into developments or redevelopments but stop short of confirming which are viable and/or necessary to manage the risk identified. Where resistance and recovery are important to the overall safety of a development, the Flood Risk Assessment should identify which measures should be deployed and confirm that they are viable for the development in question.

7.8.5 Flood resistance and recovery measures cannot be used to justify development in inappropriate locations.

7.8.6 Where historic buildings are involved, early consultation with Historic England should be undertaken and their guide[62] on flood resilience for historic properties provides additional information.

Flood Resistance 'Water Exclusion Strategy'

7.8.7 Flood resistant construction can prevent entry of water or minimise the amount that may enter a building where there is short duration flooding with water depth up to approximately 0.6 metres, depending on the building's characteristics. Where measures to exclude water in this way are proposed above this level, advice should be sought from a suitably qualified building surveyor, architect or structural engineer.

7.8.8 There is a range of flood resistance and resilience construction techniques that can be implemented in new developments to mitigate potential flood damage. Flood resistance measures, or dry-proofing, stops water entering a building up to a safe structural limit. Resistance measures can be passive, such as flood doors which are normally closed; or active, such as air brick covers or removable flood barriers. Passive measures are to be prioritised over active measures.

7.8.9 This form of construction needs to be used with caution and accompanied by measures that will speed-up flood recovery, as effective flood resistance can be difficult to achieve. Hydrostatic pressures exerted by floodwater can cause long-term structural damage, undermine the foundations of a building or cause leakage through the walls, floor or sub-floor, unless the building is specifically designed to withstand such stresses. In addition, temporary and demountable defences are not appropriate for new-build developments.

7.8.10 There is a range of property flood protection devices available on the market, designed specifically to resist the passage of floodwater. These include removable flood barriers and gates designed to fit openings, vent covers and stoppers designed to fit WCs. These measures can be appropriate for preventing water entry associated with fluvial flooding as well as surface water and sewer flooding. The efficacy of such devices relies on their being deployed before a flood event occurs. It should also be borne in mind that devices such as air vent covers, if left in place by occupants as a precautionary measure, may compromise safe ventilation of the building in accordance with Building Regulations.

Flood Recovery 'Water Entry Strategy'

7.8.11 Flood recoverability measures (or wet-proofing), accept that water will enter the building, but through careful design and changes to the construction will minimise damage and allow faster cleaning, drying, repairing and re-occupancy of the building after a flood. Measures are preferably passive, such as the use of resilient building materials, or active such as moving sensitive equipment or belongings to upper floors when flooding is expected.

7.8.12 Materials should be used which allow the passage of water whilst retaining their structural integrity and they should also have good drying and cleaning properties. Alternatively sacrificial materials can be included for internal and external finishes; for example the use of gypsum plasterboard which can be

[62] Historic England, April 2015, Flooding and Historic Buildings. https://historicengland.org.uk/images-books/publications/flooding-and-historic-buildings-2ednrev/

removed and replaced following a flood event. Flood resilient fittings should be used to at least 0.1m above the design flood level. Recovery measures are either an integral part of the building fabric or are features inside a building that will limit the damage caused by floodwaters.

7.8.13 A variety of flood recovery tools can be implemented, such as:

- Using materials with either, good drying and cleaning properties or, sacrificial materials that can easily be replaced post-flood.
- Design for water to drain away after flooding.
- Design access to all spaces to permit drying and cleaning.
- Raise the level of electrical wiring, appliances and utility metres.

7.8.14 Structures such as (bus, bike) shelters, park benches and refuse bins (and associated storage areas) located in areas with a high flood risk should be flood resilient and be firmly attached to the ground and designed in such a way as to prevent entrainment of debris which in turn could increase flood risk and/or breakaway posing a danger to life during high flows.

7.9 Local Design Codes

7.9.1 **Recommendation:** It is recommended that Havant BC incorporate expectations for future development with respect to flood risk into any emerging local design codes. The local design code would need to accord with the National Model Design Code[63] (parts 1 and 2) requirements on water and drainage and follow the approach to flood risk management set out in PPG paragraphs 003 and 004 (Assess, Avoid, Control, Mitigate, Manage), ensuring all development will be appropriately flood resistant and resilient, with reference to the CIRIA Property Flood Resilience Code of Practice. The local design code should be prepared with input from the Environment Agency and the LLFA Hampshire County Council.

[63] https://www.gov.uk/government/publications/national-model-design-code

8. Next Steps

8.1 Next steps

8.1.1 Havant BC should use this SFRA and mapping to

- Aid discussions with emergency planning teams.
- Inform future infrastructure planning and improvements.
- Develop their Local Plan and associated strategic policies,
- Safeguard land for flood risk management and green infrastructure,
- Carry out the sequential test for potential allocation sites,
- Carry out the sequential test for individual planning applications,
- Make decisions about individual planning applications,
- Decide whether a development can be made safe without increasing flood risk elsewhere,
- Identify the need for local design guidance or codes.

8.1.2 Where development must be allocated in areas at risk of flooding further assessment of the risk of flooding may be required, for example through the preparation of a Level 2 SFRA.

8.2 Future monitoring and update

8.2.1 This SFRA should be reviewed when there are changes to:

- The predicted impacts of climate change on flood risk,
- Detailed flood modelling - such as from the Environment Agency or Lead Local Flood Authority.
- Local Plans, spatial development strategies or relevant local development documents,
- Local flood management schemes,
- Flood Risk Management Plans,
- Shoreline Management Plans,
- Local Flood Risk Management Strategies, and,
- National planning policy or guidance.

8.2.2 The SFRA may also need to be reviewed after a significant flood event.

Appendix A Figures

Appendix B Tidal Flood Risk Mapping

1 Coastal Erosion Risk

2 Future Coastal Flood Zones

Maximum Flood Depth Figures

Defended

3 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2022

4 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2055 (Higher Central)

5 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2122 (Higher Central)

6 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2122 (Upper End)

7 Maximum Flood Depth: Defended 1 in 1000 Year (0.1% AEP) 2122 (Upper End)

Undefended

8 Maximum Flood Depth: Undefended 1 in 200 Year (0.5% AEP) 2122 (Upper End)

9 Maximum Flood Depth: Undefended 1 in 1000 Year (0.1% AEP) 2122 (Upper End)

Maximum Flood Hazard Figures

Defended

10 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2022

11 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2055 (Higher Central)

12 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2122 (Higher Central)

13 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2122 (Upper End)

14 Maximum Flood Hazard: Defended 1 in 1000 Year (0.1% AEP) 2122 (Upper End)

Undefended

15 Maximum Flood Hazard: Undefended 1 in 200 Year (0.5% AEP) 2122 (Upper End)

16 Maximum Flood Hazard: Undefended 1 in 1000 Year (0.1% AEP) 2122 (Upper End)

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