AECOM

Partnership for South Hampshire Strategic Flood Risk Assessment

PART 6 – Gosport Borough Council

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Quality information

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Revision History

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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
HCC	Hampshire County Council
LFRMS	Local flood risk management strategy
LLFA	Lead local flood authority
LPA	Local planning authority
NPPF	National planning policy framework
PFRA	Preliminary Flood Risk Assessment
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 Strategic Flood Risk Assessment (SFRA). The PfSH 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 SFRA for Gosport Borough Council (BC).

1.1.3 Recommendations are made throughout this report for Gosport BC to consider when developing their Local Plan, drafting strategic polices and establishing requirements for development management.

Table 1-1 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 descr bes 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 Assessing sources of flood risk and expected effects of climate change 4 Assessing the cumulative impact 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 Gosport 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, Advance the Line, Managed Realignment, No Active Intervention.

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 Gosport 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)
5A23	A27 to Fleetlands (MOD boundary)	Hold the line in the short, medium and long term.
5A24	Fleetlands to Quay Lane	Hold the line in the short, medium and long term.
5A25	Quay Lane (MOD boundary) to Portsmouth Harbour entrance (west)	Hold the line in the short, medium and long term.
5B01	Portsmouth Harbour entrance to Gi kicker Point	Hold the line in the short, medium and long term.
5B02	Gilkicker Point to Meon Road, Titchfield Haven	Hold the line in the short, medium and long term.

River Hamble to Portchester FCERM Strategy

2.1.3 A strategy for managing the 58km stretch of coastline between Portchester Castle (in Portsmouth Harbour) to Burridge on the east back of the River Hamble has been developed by Coastal Partners on behalf of Gosport and Fareham Borough Councils[2].

2.1.4 This Strategy builds on the North Solent SMP to define the flooding and erosion risks and identify preferred options for managing those risks over a 100-year appraisal period and define an implementation plan.

2.1.5 The following Strategic Management Zones (SMZ) are within Gosport BC:

- SMZ2 Fareham and Gosport: Preferred Option: Sustain a minimum 1 in 100 year standard of protection against flooding (phased).
- SMZ3 Lee-on-the-Solent and Stokes Bay: Preferred Option: Maintain scheduled maintenance and beach recycling to maintain beaches and prevent erosion, accepting that the standard of protection will fall in the longer term.

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.

[1] North Solent Shoreline Management Plan, 2010 https://www.northsolentsmp.co.uk/
[2] Coastal Partners, March 2016, River Hamble to Portchester Coastal Flood and Erosion Risk Management Strategy. https://coastalpartners.org.uk/project/river-hamble-to-portchester-strategy/

2.2.2 The Gosport BC administrative area is covered by the South East Hampshire CFMP[3]. The policies for the sub-areas within Gosport are summarised in Table 2-2 and Figure 2-1.

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. Develop emergency response plan to mitigate flood risk in Portsmouth and Gosport.

Map of the policies in the South East Hampshire catchment.

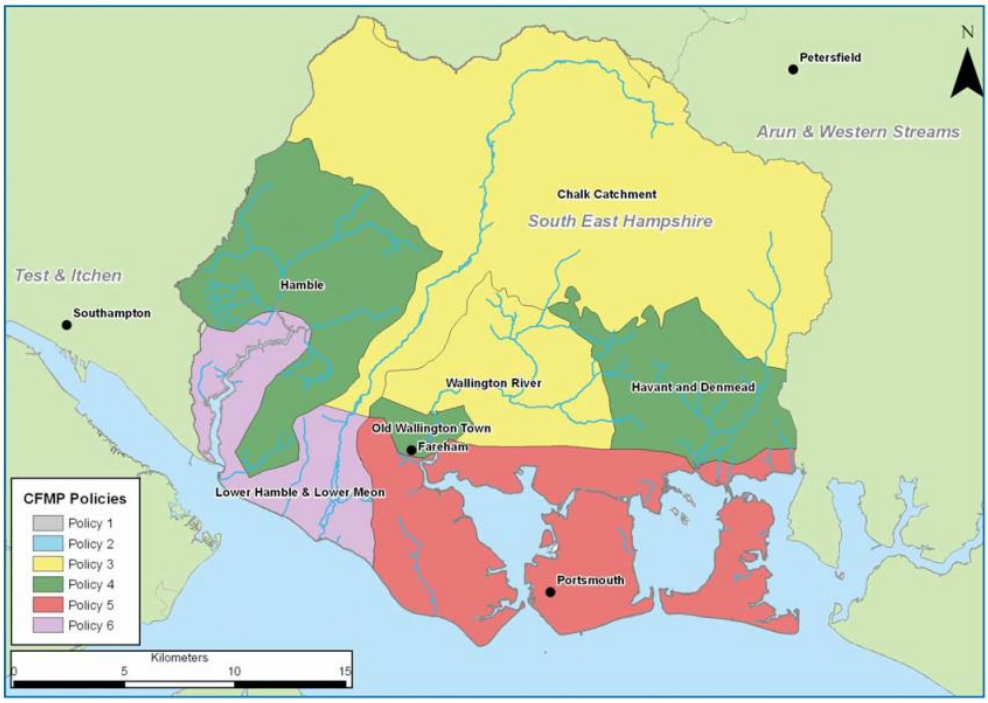

Figure 2-1 Map of the policies in South East Hampshire catchment, CFMP 2009

2.3 Lead Local Flood Authority

2.3.1 Hampshire County Council (HCC) are the Lead Local Flood Authority (LLFA) for the Gosport BC administrative area. HCC have a number of 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

[3] 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

from past and potential flood events. The PFRA[4] 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 in excess of 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 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 Borough of Gosport. More detailed assessments will be carried out in the areas identified, incorporating local knowledge and information on areas that have experienced flooding previously. This information will inform the developing Flood Risk Management Strategy and will in turn be used to help determine where further assessment is required. This process may also lead to other areas, not identified by the Environment Agency but for which substantial local information is available to justify the level of local flood risk, being included in these investigations.

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)[5]. The priority of HCC 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[6] 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[7]. 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

[4] Hampshire County Council, April 2011, Preliminary Flood Risk Assessment
https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/preliminary-flood-risk-assessment
[5] Hampshire County Council, October 2020, Local Flood Risk Management Strategy
https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/local-flood-risk-management-strategy
[6] Atkins, January 2017, Hampshire Catchment Prioritisation Tool.
[7] Hampshire County Council, Catchment Management Plans
https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/catchment-management-plans

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 Catchment Management Plan of relevance to Gosport BC is CMP3 for the River Meon and River Wallington[8]. The priority areas identified in Gosport BC are:

- East Gosport,
- West Gosport, and
- Bridgemary.

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

2.3.12 The CMP for the River Meon and River Wallington identified the southeast section of West Gosport, together with the entirety of East Gosport as being at high risk of groundwater flooding. Within the Gosport BC administrative area, the CMP highlights that surface water flooding is concentrated along the River Alver valley, the B3333, Forton Road, Amberley Road, and Priddy's Hard. Coastal flooding is noted as occurring primarily in the Browndon area, as well as around the centre of Forton Road and the southeast segment of the B3333.

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

Groundwater Management Plan

2.3.14 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 a number of 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.

2.3.15 No areas within the Gosport administrative area were identified as being at high risk from groundwater flooding in the GWMP.

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.

[8] River Meon and River Wallington Draft Catchment Management Plan (CMP) https://documents.hants.gov.uk/flood-water-management/3-HCC-CMP-MeonandWallington.pdf
[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

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.

Drainage and Wastewater Management Plans

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 covers the Gosport 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 Peel Common wastewater system serves the majority of the Gosport BC area. Additional homes and businesses may increase the risks of non-compliance with Dry Weather Flow permits from the Environment Agency. Further investment will be needed in the future to increase the capacity of the treatment works to accommodate flows from new homes and businesses. Future development may also put pressure on achieving favourable conditions in the designated habitat sites in the Solent. Local councils are working with Natural England to find suitable solutions to ensure that development is nutrient neutral. Future investment in the wastewater treatment process is also likely to be required.

2.4.6 The Peel Common system also has a storm overflow that discharge during periods of heavy rainfall. The risks from these discharges is currently very significant and climate change may increase the frequency of discharges unless measures are taken.

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

3. Assessing 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 A narrow band of Whitecliff Sand Member, a highly permeable bedrock, running from Brookers Lane to Priddy's Hard splits the Gosport administrative area in two. Predominantly low permeability bedrock sits north of this band, namely London Clay Formation, whilst moderately permeable bedrock lies south of the band, including Wittering Formation, Selsey Sand Formation and Barton Clay Formation.

3.1.2 Most of the bedrock is overlain by River Terrace Deposits, with some pockets of Alluvium, Beach and Tidal Flat Deposits, Storm Beach Deposits, Raised Marine Deposits, Peat and Head.

3.1.3 The topography of the Borough ranges from sea level to approximately 12m AOD.

Hydrology

3.1.4 Gosport is a small coastal Borough with only one principal watercourse flowing through it, the River Alver (Appendix A Figure 1). The Alver is located within the East Hampshire Rivers Operational Catchment, in East Hampshire Management Catchment, as identified on the Catchment Data Explorer[13]. Table 3-1 provides a description of the Alver and identifies the type of modelling and mapping that is available within the SFRA for the watercourse.

Table 3-1 Watercourses in Gosport BC

East Hampshire Rivers Operational Catchment

Watercourse	***Description***	***SFRA Mapping***
Alver	The watercourse drains the area to the west of Bridgemary, just over the boundary in Fareham BC. It flows south into Gosport and through Alver Valley Country Park, before discharging into the Solent. The length of the watercourse is approximately 6km. The course of the Alver has changed over time due to military requirements and it currently enters the Solent through an outfall at Browndown, rather than near Fort Gilkicker as it once did[14]. The Alver outfall represents the seaward limit of the river. Water levels are maintained via a combination of stop logs, sluice gates and tidal flaps. This also prevents saltwater intrusion from the sea, and as a result, the Alver is a freshwater watercourse with no tidal limit. However there is a tidal influence as the watercourse can become tide locked at high tides. If the defences on the Alver were to fail the river would experience regular inundation from the sea, but the river comes from a very small catchment and flows largely through an unconstrained and undeveloped floodplain, and hence the risk of fluvial flooding to properties is small.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

3.1.5 A number of other small watercourses are present around the edge of the Borough, and discharge to the Solent, such as the watercourse at through Fleetlands, and those draining into Frater Lake and Forton Lake.

[13] Environment Agency Catchment Data Explorer. https://environment.data.gov.uk/catchment-planning
[14] Gosport Borough Council, 2020, Water Management. https://www.gosport.gov.uk/media/2913/13-Water-Management/pdf/13.Water_Management.pdf?m=637455393857570000

3.2 Flooding from the sea

3.2.1 The risk of flooding from the sea is the main source of flood risk to the area. The Borough has 10km of open coastal frontage and 23km of frontage onto Portsmouth Harbour. 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. The key parts of the Borough which are currently at risk of flooding from the sea are frontages around Haslar Creek, Forton Lake, Stokes Bay and areas fronting the western side of Portsmouth Harbour. A large area in the south of the Borough is identified as Flood Zone 3 as well as a band along the Haslar Peninsular, Alverstoke, Seafield, the northern part of Gosport, Forton and land to the east of Fleetlands.

Historic flooding

3.2.5 Recorded Flood Outlines published by the Environment Agency, as shown in Appendix A, Figure 2, show six flooding incidents within Gosport of unknown source and unknown date. Four of these events took place close to the south east coast are most likely attributed to coastal flooding. Three out of the four events were located within Flood Zones 2 and 3.

3.2.6 The CMP for Meon and Wallington identifies that coastal flooding occurs Forton Road and along the south east of the B3333.

Coastal modelling

3.2.7 As part of this SFRA update, coastal modelling has been updated, to determine the impact of predicted tidal flooding. 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

3.2.8 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 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.

3.2.9 The PPG states that 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. Within these mapped extents, existing infrastructure or solid buildings that resist water ingress are not providing a flood storage function and the definition of Flood Zone 3b may therefore not apply.

3.2.10 The tidal inundation model for Gosport has been simulated for the 3.3% AEP tidal event, including the presence of existing defences to determine areas that could inform the definition of Flood Zone 3b by Gosport BC. Appendix A Figure 1 shows the extent of flooding during this scenario, which affects an area north of Bedenham, the eastern frontage along Forton and Gosport and a larger extent from Stoke

Lake into Alverstoke. It is noted that flood defence improvement works are planned for Forton Lake and Alverstoke which will protect these areas during the 3.3% AEP event (refer to Section 6.1).

3.2.11 **Recommendation:** It is recommended that Gosport BC use the 3.3% AEP (1 in 30 year) tidal flood extent as a starting point to consider how they wish to define tidal Flood Zone 3b Functional Floodplain associated with the sea in this area.

Future flood risk

3.2.12 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[15] states that LPAs should assess both the higher central (70th percentile) and the upper end (95th percentile) allowances for SFRAs.

Defended Model Scenarios

3.2.13 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.

3.2.14 **Present Day Flood Risk:** Appendix B Figures 3 and 10 show that for the 0.5% AEP event for the year 2022, flooding impacts the immediate tidal frontage along the south of the Borough with hazard ratings of Low. Alverstoke is shown to be at risk, with hazard rating of Significant. The frontage in Gosport and Forton are shown to be at risk of flooding, and land to the north of Bedenham is shown to be at Significant hazard.

3.2.15 There are two main access routes for the Haslar Peninsular, which are Fort Road / Stokes Bay Road or Clayhall Road / Anglesey Road. During the 0.5% AEP event for present day (2022), with the existing flood defences in place, the western part of Stokes Bay Road are shown to have Low to Moderate hazard rating; Anglesey Road has Significant hazard rating.

3.2.16 **'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 slightly, and access routes to Haslar Peninsular are at Significant hazard. By 2122, flooding extends significantly further inland and flood depths and hazard ratings increase. Along the southern part of the Borough flooding inundates the lower parts of the River Alver, with Extreme hazard rating along the B3333 Privett Road. Flooding extends northwards with Extreme hazard rating along Stokes Bay Road. Flooding is shown to impact Seafield, Newtown, Gosport and flooding extends along the A32 through Brockhurst.

3.2.17 **'Upper End' Climate Change Allowance:** Appendix B Figures 6 and 13 show the 0.5% AEP event for 2122 (upper end allowance) and Figures 7 and 14 show the 0.1% AEP event for 2122 (upper end allowance).

Undefended Model Scenarios

3.2.18 Model scenarios have also been undertaken without defences, in order to understand how the Flood Zones may alter in the future. Appendix A 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). These flood extents are also included on Appendix B Figure 2 as an indication of 'future flood zones'.

3.2.19 These figures show that the areas of Flood Zone 2 and 3 increase markedly throughout the borough, especially in the south of the Borough and the Alver floodplain. Access routes to the Haslar Peninsular are within the flood zones, with areas that are not shown to be within the flood zones left as 'dry islands.

3.3 River flooding

3.3.1 The River Alver is the only Main River in Gosport. Appendix A Figure 1 shows Flood Zones 2 and 3 for the River Alver, most of which do not encroach on any development, except for a very small area around Rowner, and an area south of the B3333 Privett Road.

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

Flood Zone 3b Functional floodplain

3.3.2 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.

3.3.3 As recorded in SFRA Part 1, there were no hydraulic models for the watercourses in Gosport, and therefore modelling of the 3.3% AEP flood event is not available. 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'[16] 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 any of the LPA'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

3.3.4 Recorded Flood Outlines published by the Environment Agency, as shown in Appendix A, Figure 2, show six flooding incidents within Gosport of unknown source and unknown date. Two of these events occurred relatively inland and are therefore most likely attributed to surface water or fluvial flooding: one event took place to the north of the region, close to Gosport Leisure Centre (not within the mapped Flood Zones 2 and 3), and one to the south west along Privett Road (extending out of the mapped Flood Zones 2 and 3).

Future flood risk

3.3.5 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.

As recorded within SFRA Part 1, there were no *fluvial* hydraulic models within the Gosport BC administrative area that could be re-run to simulate the impacts of climate change, and therefore GIS Floodplain Analysis has been undertaken to identify those areas of floodplain that could be sensitive to increases in flood levels. 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 floodplain of the Alver is relatively well defined with very minimal impact likely to result from increases in flood levels.

3.3.6 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.

3.4 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

[16] Defra, Environment Agency, Updated September 2020. https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment

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. The map shows a section towards the north of the Gosport administrative area where no potential for groundwater flooding has been identified, and a section just south of this considered to have limited potential for groundwater flooding to occur. Small areas of no and limited potential for groundwater flooding are also found scattered across the administrative area, however the majority of the area has either potential for groundwater flooding of property situated below ground level or potential for groundwater flooding to occur at the surface.

3.4.3 '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

3.4.4 Although the mapping indicates most of the Gosport administrative area has potential for groundwater flooding to occur no observed incidences of groundwater flooding have been recorded in Gosport.

Future flood risk

3.4.5 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. The mapping shows the natural drainage of the River Alver catchment and surface water flow paths are visible along its tributaries. The risk of surface water flooding is also identified along the main routes towards Gosport town; along the Brockhurst Road and Forton Road corridor, and along Privett Road, Foster Road and South Street. There is some risk of surface water ponding identified in Alverstoke.

Historic Flooding

3.5.2 Recorded highway flooding data was provided by HCC for use in this SFRA. This data shows 39 recorded events distributed throughout the administrative area, with a large proportion to the west around Hardway and Gosport. Most of these locations correlate well with locations shown to be at risk in the RoFSW mapping, although the historic events generally extend beyond the areas highlighted to be at risk in the RoFSW mapping.

3.5.3 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 the Drainage and Wastewater Management Plan, Southern Water have recorded incidents of internal and external flooding between 2018-2020 within the Peel Common catchment which covers Gosport.

3.5.4 Figures 2 and 3 include locations of historic flood events recorded by Southern Water in the region. The records show more than 30 events to have taken place across Gosport, with the majority to the north and west.

Future flood risk

3.5.1 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.

3.5.2 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.

3.5.3 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 Alverstoke Creek has been identified as a Reservoir Act registered impoundment with the potential to cause flooding within the Gosport administrative area.

3.6.2 Appendix A Figure 6 shows the potential extent of flooding in the unlikely event of a failure of this water body. The mapping shows that most of the flooding is maintained within the watercourse and harbour, however a small area does extend into Haslar Marine Technology Park.

4. Assessing the 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 160).

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 Gosport. 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 high potential for cumulative impact of development on flood risk is found towards the east coast, whilst the potential is considered medium in the Alver catchment towards the west.

4.1.5 **Recommendation:** In those areas with a medium and higher potential for cumulative impact on flood risk, it is recommended that Gosport 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.

4.2 Cross boundary considerations

4.2.1 Given the majority of the Borough is bounded by Portsmouth Harbour and the Solent, there are limited cross boundary issues. To the north and west, the Borough is bounded by Fareham BC. The upper parts of the River Alver follow the Fareham and Gosport boundary, and therefore changes to surface water runoff flows in this area have the potential to impact both areas.

4.2.2 Where there are cross boundary flows, communication between LPAs is of high importance 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.

5.1.2 The mapping shows that the Alver is lined by high ground on either side of the watercourse. Upstream of the Alver the design standard of protection (SOP) is reported to be 2% AEP (1 in 50 year) and it decreases to 4% AEP (1 in 25 year) as it flows through Alver Valley Country Park and to 10% AEP (1 in 10 year) as it reaches the Solent.

5.1.3 The coastline around Browndown is protected by dunes with a reported design SOP of 1% AEP (1 in 100 year).

5.1.4 Details of planned schemes to maintain and improve defences are provided in Section 6.

5.2 Flood Warning Service

5.2.1 The Environment Agency provides a free Flood Warning Service[17] for many areas at risk of flooding from rivers and as a result of 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.

5.2.2 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[18].

5.2.3 There are 2 Flood Warning Areas in Gosport BC which are shown in Appendix A Figure 9 and are as follows:

- Gosport
- Browndown on the River Alver

5.2.4 The Environment Agency publishes 'Water situation: area monthly' reports for England'[19] 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'[20] 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.

5.2.5 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".

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

5.3 Residual Risk

5.3.1 The risk of flooding 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 a number of 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.

5.3.2 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.

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

5.3.4 In Gosport, 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 Gosport BC as GIS layers:

- BLO1 South of Fort Blockhouse, Gosport.
- BLO2 Fort Blockhouse, Gosport.
- HAS1 Haslar sea wall (south of Dolphin Way).

5.3.5 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 Flood Map for Planning Flood Zones and coastal modelling outputs 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.

5.3.6 Steps should be taken to manage these residual risks through the use of 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 programme of FCERM schemes[21] identifies two proposed schemes within the next 6 years in the Gosport administrative area at Forton Lake and Alverstoke. Further schemes are also under development by Coastal Partners for Seafield, Hill Head to Portsmouth Harbour, and Stokes Bay.

Forton Lake (Gosport) Coastal Flood and Erosion Risk Management Scheme

6.1.2 Forton Lake was highlighted as one of three priority areas for a coastal defence scheme in the River Hamble to Portchester Strategy[22]. The aim is to introduce defences with a design standard of 1 in 100 year and provide protection for around 230 properties. The works include a new L-shaped concrete wall, as well as road raising, removable flood equipment and repairs to existing defences. The design life of the scheme is until 2060.

Alverstoke Flood & Coastal Erosion Risk Management Scheme

6.1.3 Alverstoke was also identified as a coastal defence scheme priority area in the River Hamble to Portchester Strategy, as the current defences only provide a standard of protection of 1 in 20 years[23]. The scheme aims to increase this to 1 in 100 years to better defend around 130 houses from flooding and sea level rise. The works include a new reinforced wall on top of the existing defences and a flood gate across Little Anglesey Road. The design life of the scheme is until 2060. The scheme has been paused due to funding constraints.

Seafield Scheme

6.1.4 Following the River Hamble to Portchester Strategy, Seafield was highlighted as a priority area for a flood scheme. An outline design has been developed for a flood wall for the western defences and a revetment for the eastern and northern defences. The defences are designed to protect against a 1 in 100 year until 2060. The next phase of this scheme is to determine the project construction and delivery costs to inform funding decisions.

Hill Head to Portsmouth Harbour Entrance Bay Beach Management Plan (BMP)

6.1.5 The BMP[24] covers the 10km stretch of coastline from Hill Head to the western tip of Portsmouth Harbour Entrance, and includes Hill Head, Stokes Bay, and Lee-on-the-Solent, all of which have received smaller interventions in response to erosion issues previously. Coastal Partners will analyse the coastal processes over the BMP frontage and wider area through reference to 14 years of survey data. The BMP study will seek to integrate wider initiatives such as regeneration, tourism, and recreation into the operational phase of the BMP. To convert the findings of the study into operational management of the beach, the BMP will have to secure relevant funding.

Stokes Bay

6.1.6 A large section of Stokes Bay seawall sustained damage during storm Eunice in February 2022 and immediate work was undertaken to address the damage and make the area safe. A replacement sea defence is proposed for the short term including design and detailing of the promenade, car park and

[21] 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
[22] Coastal Partners Forton Scheme. https://coastalpartners.org.uk/project/forton-scheme
[23] Coastal Partners Alverstoke Coastal Defence Scheme. https://coastalpartners.org.uk/project/alverstoke-coastal-defence-scheme-152
[24] Hill Head to Portsmouth Harbour Entrance BMP Study https://coastalpartners.org.uk/project/hill-head-to-portsmouth-harbour-30/

amenity area reinstatements, drainage reinstatement to Alverbank East Car Park and safety improvement works.

6.1.7 In the light of high costs for ongoing maintenance and the limited lifetime of the replacement works, a longer term solution is sought for Stokes Bay. Coastal Partners have scoped the requirement for a Stokes Bay Option Appraisal and Outline Design Study and been successful in bidding for a grant from the Southern Regional Flood and Coastal Committee to progress these studies over 2 years, starting in 2021/22. The project has been paused so that Gosport BC and HCC can hold discussions to ascertain the most appropriate way forward.

6.2 Emergency planning

6.2.1 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.

6.2.2 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.

6.2.3 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 a flood warning and evacuation plan is prepared for sites at risk of flooding.

6.2.4 Gosport BC is designated as a coast protection authority, and therefore possesses the duties and powers as specified under the Coast Protection Act 1949[25].

6.2.5 The Hampshire County Multi Agency Flood Response Plan[26] is relevant to the Gosport BC administrative area.

6.2.6 **Recommendation:** Gosport BC should review the flood risk information within this SFRA with their emergency planning team. Proposals for development that are likely to increase the number of people living or working in areas of flood risk require particularly careful consideration, as they could increase the scale of any evacuation required. The tidal modelling shows that access routes in the south of the Borough are at risk of flooding with hazard ratings of Moderate and Significant during the design event (0.5% AEP) for the year 2055, increasing to Significant and Extreme during the design flood event (0.5% AEP) for the year 2122. (It is noted that the risk to access along Anglesey Road may change when the flood defence schemes at Alverstoke are completed). **It is therefore essential that Gosport BC, in consultation with the Environment Agency and Emergency Planning, establish whether the safety of the site occupants can be satisfactorily managed.**

6.2.7 Further discussion of safe access is included in Section 7.6.

6.3 Maintenance of watercourses

Main River

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

6.3.2 Under the Environmental Permitting (England and Wales) Regulations (2016)[27], an environmental permit is required if works are to be carried out:

[25] 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
[26] Gosport Borough Council, Flooding https://www.gosport.gov.uk/flooding
[27] 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 wide undeveloped buffer strip alongside fluvial Main Rivers or flood defence structures and prioritise riverside restoration. Safeguard a 16 metre wide undeveloped buffer strip alongside tidal flood defence structures.

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[28].

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[29].

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 any 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.

[28] Hampshire County Council, Making changes to a watercourse https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/changewatercourse
[29] 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[30]. Further guidance on river restoration is available from the Environment Agency[31].

6.4.4 **Policy Recommendation:** Where development is planned in urban areas, opportunities for de-culverting watercourse sections should be sought in order to bolster local channel capacity and conveyance. (Given that Flood Zones 2 and 3 for the River Alver (Gosport BC area's sole significant watercourse) are largely undeveloped, there are negligible opportunities to confer flood risk benefits through the restoration of fluvial floodplain processes and features within the Gosport BC area).

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[32].

6.5.4 **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 River Alver in the southwest of the Gosport BC area.

Floodplain compensation

6.5.5 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.

6.5.6 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.

6.5.7 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[33].

[30] 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
[31] Environment Agency, Fluvial Design Guidance Chapter 8
https://assets.publishing.service.gov.uk/media/60549ae1e90e0724c0df4619/FDG_chapter_8_-_Works_in_the_river_channel.pdf
[32] Environment Agency, Fluvial Design Guidance Chapter 10
https://assets.publishing.service.gov.uk/media/60549b7a8fa8f545cf209a29/FDG_chapter_10_-_Flood_storage_works.pdf
[33] CIRIA (2004) CIRIA Report 624: Development and Flood Risk - Guidance for the Construction Industry

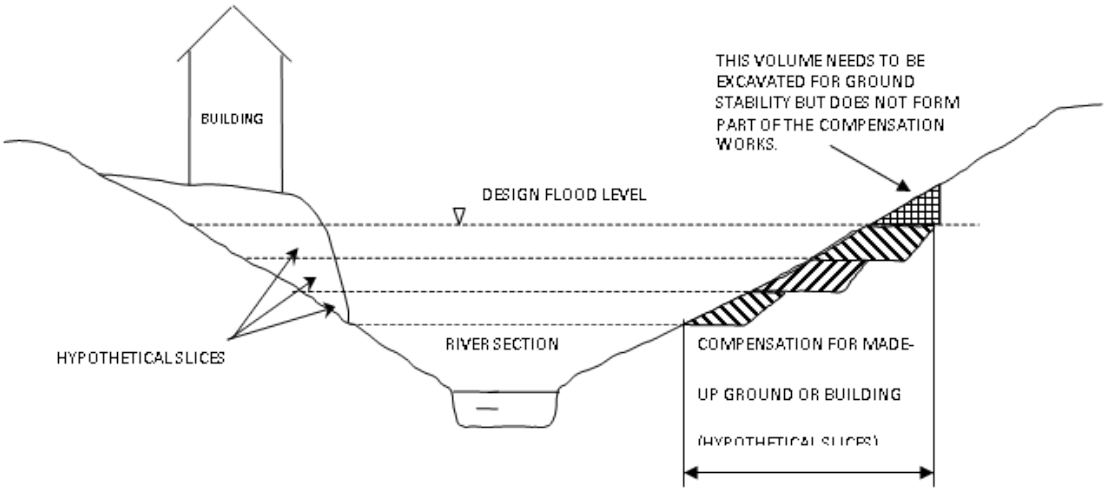

Figure 6-1 Example of Floodplain Compensation Storage (Environment Agency 2009)

6.5.8 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.

6.5.9 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 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.

6.5.10 **Policy recommendation:** Where proposed development results in a change in building footprint, land raising, or other structures, that impact upon the ability of the fluvial 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'[34] about where these measures could be applied. This map shows that although there are a lot of existing woodland constraints within the Gosport administrative area, there are still a wide range of opportunities to implement natural processes to alleviate flooding. There are several potential opportunities for riparian woodland planting and floodplain reconnection potential around the northern and western boundaries, as well as some opportunities for wider catchment woodland along the northern and eastern boundaries, and a small area recognised for floodplain woodland planting potential to the south west. Further information about these datasets is included in SFRA Report Part 1. Riparian woodland planting also holds the potential to confer environmental

[34] 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

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, 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, or fluvial flooding. There may be potential for riparian woodland on the floodplain of the River Alver and on the shoreline at Fleetlands.

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 is 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 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[35].

6.6.7 **Policy Recommendation:** In partnership with relevant risk management authorities (for example Environment Agency, Hampshire County Council and land owners), maximise the flood attenuation benefits conferred by the GI features associated with the Alver Valley Country Park, through the enlargement of existing, and creation of new riparian woodland areas on the floodplain of the River Alver.

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)
- Portsmouth Harbour Special Protection Area (SPA)
- Portsmouth Harbour and Solent & Southampton Ramsar wetlands
- Solent and Dorset Coast SPA

6.6.9 In order for development to be permitted by Gosport 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

[35] 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/

neutral' if they would otherwise lead to a likely significant impact on a European site. Applicants will need to submit a 'nutrient budget' relating to their proposal, devised in line with Natural England's methodology. 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 pluvial/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 Gosport BC has entered into legal agreements with three landowners outside of the Borough who are willing to make their land available for nitrate mitigation, and who have received approval from Natural England. These locations include Heaton Farms, Meon Springs (Whitewool Stream Wetland) and Warnford Park Estate). These legal agreements enable applicants bringing forward development within Gosport using sites outside of the Borough for mitigation. Gosport BC is in continuing dialogue with other landowners about the prospect of bringing further mitigation proposals forward[36].

6.6.11 **Policy Recommendation**: Supplement the offsetting of nutrients from new development at the Heaton Farms, Meon Springs, Whitepool Stream Wetland, and Warnford Park Estate sites through the creation of natural buffer zones and wetlands in parts 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.
- 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 East Gosport, West Gosport and Bridgemary. 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 in order to reduce and manage surface water flood risk to, and posed by, the proposed development. This should be achieved by incorporating Sustainable Drainage Systems (SuDS). Consideration of

[36] Gosport BC, March 2022, Position Statement regarding Nutrient Neutrality. https://www.gosport.gov.uk/article/1888/Nutrient-Neutrality#:~:text=Due%20to%20the%20impacts%20of,to%20be%20%27nutrient%20neutral%27.

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:

- Into the ground (infiltration),
- To a surface water body,
- To a surface water sewer, highway drain, or another drainage system, and
- 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[37] 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[38] for guidance on the design, maintenance, and operation of SuDS.

6.7.9 The NPPF[39] 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[40]. The northern third of the Gosport administrative area is underlain by predominantly low permeability bedrock, making the implementation of some SuDS difficult. However their viability should still always be considered.

6.7.10 HCC have outlined their stance towards SuDS in the Local Flood and Water Management Strategy (2020) document[41], 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 When considering planning applications, Gosport BC should seek advice on the management of surface water from the relevant flood risk management bodies, principally HCC. This should ensure that the development's proposed minimum standards of operation are appropriate, and, through the use of planning conditions or planning obligations, that there are clear arrangements for on-going maintenance over the development's lifetime.

[37] CIRIA C697 SuDS Manual. Available from: https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS
[38] Sustainable drainage systems: non-statutory technical standards, 2015 https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards
[39] Ministry of Housing, Communities and Local Government, 2021, National Planning Policy Framework https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf
[40] Schedule 3 of the FWMA is due for implementation in 2024 and requirements for SuDS may therefore change.
[41] Hampshire County Council Local Flood and Water Management Strategy https://documents.hants.gov.uk/flood-water-management/local-flood-water-management-strategy.pdf

6.7.12 Multiple SuDS, including swales, porous paving, an infiltration blanket, and attenuation, were implemented in the Brockhurst Gate Retail Park development in 2019[42]. This has successfully led to reduced immediate impact of storms on sewerage systems, decreasing the flood risk. This project sets an example and shows the possibilities and benefits of SuDS within the Gosport administrative area.

6.7.13 **Policy Recommendation:** Strengthen the existing surface water management requirements for proposed developments in parts of the Gosport BC area that are at the greatest risk of surface water flooding such as Alverstoke (Ashburton Road), Privett (Privett and Foster Roads), Newtown (South Street), Hardway (Grove Road), Camdentown (Forton Road, Brockhurst Road, and The Crossways), and Rowner (Nimrod Drive and Grange Lane).

Limiting urban creep

6.7.14 **Recommendation:** In residential areas limit permitted development rights regarding the paving or covering of permeable surfaces with impermeable surfacing, (in accordance with Policy 11 in the CMP for Meon and Wallington).

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 so as 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 or fencing with gaps (for example post-and-rail or hit-and-miss).
- Considering alternatives to solid wooden gates or ensuring that there is a gap beneath the gates to allow the passage of floodwater.
- 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 and thereby 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 A Flood Risk Assessment (FRA) should be undertaken for all proposed developments. The FRA should 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.

[42] Susdrain, 2020, Brockhurst Gate Retail Park. https://www.susdrain.org/case-studies/case_studies/brockhurst_gate_retail_park_gosport_-_light_case_study.html

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.

6.9.3 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.

6.9.4 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.

6.9.5 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.

6.9.6 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 **Recommendation:** As part of their Sites Allocation process, Gosport 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.

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 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 in order 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 Gosport 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 a compatibility matrix and determines which types of development are appropriate in areas of flood risk[43].

7.3 Flood resilience measures

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

7.3.2 '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[44], which provides advice for both new-build and retrofit. It includes specific guidance for local authority planners.

7.3.3 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:

- 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.

[43] Planning Practice Guidance Flood Risk and Coastal Change https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2

[44] 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

- As a measure to manage residual flood risk from flood risk management infrastructure when avoidance measures have been exhausted.

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

7.3.5 Where historic buildings are involved, early consultation with Historic England should be undertaken and their guide[45] on flood resilience for historic properties provides additional information.

Flood Resistance 'Water Exclusion Strategy'

7.3.6 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.

7.3.7 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.

7.3.8 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.

7.3.9 There are 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'

7.3.10 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.

7.3.11 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 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.

7.3.12 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.

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

- Design access to all spaces to permit drying and cleaning.
- Raise the level of electrical wiring, appliances and utility metres.

7.3.13 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.

7.4 Finished floor levels

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

7.4.2 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, is to ensure internal floor levels are raised a freeboard level above the design flood level including an propriate 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 7.3). These measures should be detailed within the FRA.

7.4.3 Guidance document "Accounting for residual uncertainty: an update to the fluvial freeboard guide – technical report"[46] 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, 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. The majority of 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.

7.4.4 With reference to the 'Flood risk assessment: standing advice for flood risk'[47], 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.

7.4.5 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 Gosport 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.

7.4.6 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.

7.5 Protection against groundwater flooding

7.5.1 Although many of the measures used to provide resistance and resilience to 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.

[46] 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
[47] Preparing a flood risk assessment: standing advice https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

7.5.2 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).

7.5.3 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".

7.5.4 *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.

7.5.5 *Resilience* 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,
- 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.

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

- Homeowners Guide to Flood Risk[48] – lists various measures that are applicable to flooding in general, and,
- Flooding from groundwater[49] - Practical advice to help homeowners reduce the impact of flooding specifically from groundwater.

7.6 Access / escape

7.6.1 Policy recommendation: New development must have safe access / escape during the design flood (0.5% AEP for tidal flooding) including an appropriate 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.

7.6.2 For developments located in areas at risk of flooding from rivers or the sea, 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.

[48] Homeowners guide to flood resilience. Know Your Flood Risk, July 2018. https://www.floodguidance.co.uk/wp-content/uploads/2018/07/KnowYourFloodRiskGuide_July18.pdf
[49] Environment Agency, 2011, Flooding from groundwater. https://www.gov.uk/government/publications/flooding-from-groundwater

- 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.

7.6.3 Where access and escape are important to the overall safety of development in areas of flood risk, the local planning authority 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.

7.6.4 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 flood event and surface water event or 0.5% AEP tidal 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[50]).

7.6.5 **In the south of Gosport, safe access above the tidal design flood event (0.5% AEP tidal flood level) including climate change may not be achievable. It is therefore essential that Gosport BC, in consultation with the Environment Agency and Emergency Planning, establish whether the safety of the site occupants can be satisfactorily managed.** This will be informed by the type of development, the number of occupants and their vulnerability and the flood hazard along the proposed egress 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 will not guarantee that an application will be granted.

7.6.6 The guidance document 'Flood Risk Emergency Plans for New Development' published by the Environment Agency and ADEPT[51] provides more detail on safe access and escape.

7.7 Places of safety

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

7.7.2 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.

7.7.3 However, places of safety play an important role where, for whatever reason, evacuation in advance of flooding is not achieved. 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.

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

7.8 Emergency Plans

7.8.1 **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

[50] 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
[51] ADEPT, Environment Agency, September 2019, Flood Risk Emergency Plans for New Development https://www.adeptnet.org.uk/floodriskemergencyplan

emergency services is likely to be required where flooding has occurred and prior evacuation has not been possible.

7.8.2 **Policy 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.

7.8.3 The Environment Agency has a tool on their website to create a Personal Flood Plan[52]. 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 householder development (minor development), it is recommended that the use of this tool to create a Personal Flood Plan will be appropriate.

7.8.4 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.).

7.8.5 There is no statutory requirement for the Environment Agency or the emergency services to approve emergency plans. Gosport 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, Gosport BC should consider working with their emergency planning officers to produce 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, explore opportunities for development proposals to address any shortfall in emergency service and infrastructure capacity, and minimise the need for further consultation at planning application stage.

[52] Environment Agency Tool 'Make a Flood Plan'. https://www.gov.uk/government/publications/personal-flood-plan

7.9 Local Design Codes

7.9.1 **Recommendation:** It is recommended that Gosport 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 (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 Hampshire CC in their capacity as the LLFA.

8. Next Steps

8.1 Next steps

8.1.1 Gosport BC should use this SFRA and associated mapping to:

- Aid discussions with emergency planning teams. **Gosport BC should review the flood risk information within this SFRA with their emergency planning team. Proposals for development that are likely to increase the number of people living or working in areas of flood risk require particularly careful consideration, as they could increase the scale of any evacuation required. The tidal modelling shows that access routes in the south of the Borough are at risk of flooding with hazard ratings of Moderate and Significant during the design event (0.5% AEP) for the year 2055, increasing to Significant and Extreme during the design flood event (0.5% AEP) for the year 2122. (It is noted that the risk to access along Anglesey Road may change when the flood defence schemes at Alverstoke are completed).**
- Inform future infrastructure planning and improvements. **For example, road improvements,**
- Develop their Local Plan and associated strategic policies in consultation with the Environment Agency and HCC in their role as the LLFA,
- 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, with particular reference to the provision of appropriate access and egress, and
- 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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