Partnership for South Hampshire Level 1 Strategic Flood Risk Assessment

PART 10 – New Forest District Council and New Forest National Park Authority

Final Report (Version 2)

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Delivering a better world

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	November 2023	Version 1: Draft for review by New Forest DC, New Forest NPA, and Environment Agency	EC	Emily Craven	Associate Director
2	February 2024	Version 2: Updated following stakeholder comments.	EC	Emily Craven	Associate Director

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Acronymns

Acronym	Definition
AEP	Annual exceedance probability
BGS	British Geological Survey
CFMP	Catchment flood management plan
CMP	Catchment management plan
DWMP	Drainage and wastewater management plan
FCERM	Flood and coastal erosion risk management
FRA	Flood Risk Assessment
FSA	Flood storage area
GIS	Geographical Information System
GWMP	Groundwater management plan
HCC	Hampshire County Council
LFRMS	Local flood risk management strategy
LLFA	Lead local flood authority
LPA	Local planning authority
NPA	National Park 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
WLMP	Water Level Management Plan
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 (NPA).

1.1.2 This document provides an update to the 2018 SFRA[1] and therefore retains and builds on relevant information from within that report. It should be read in conjunction with SFRA Part 1. Together with Part 1, this document forms the updated SFRA for New Forest District Council (DC) and New Forest NPA.

1.1.3 Recommendations are made throughout this report for New Forest DC and New Forest NPA to consider when developing their local plans, drafting strategic polices, and establishing requirements for development management.

Table 1-1 SFRA User Guide

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

LPA SPECIFIC REPORTS	CONTENT
PART 2 TEST VALLEY **PART 3 WINCHESTER CITY** **PART 4 HAVANT** **PART 5 PORTSMOUTH CITY** **PART 6 GOSPORT** **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 impacts of development and land use change 5 Current control, mitigation, and management measures 6 Opportunities to reduce the causes and impacts of flooding 7 Recommendations of how to address flood risk in development

[1] JBA Consulting, October 2018, New Forest District Council and New Forest National Park Authority Strategic Flood Risk Assessment

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 New Forest DC and New Forest National Park Authority.

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.

2.1.2 This area is covered by the North Solent SMP[2] (Selsey Bill to Hurst Spit) and the Poole and Christchurch Bays SMP[3] (Hurst Spit to Durlston Head). The policies for the New Forest DC and NPA administrative areas 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)
Poole and Christchurch Bays SMP		
A.1	Hurst Spit	Hold The Line in the short, medium and long term. Maintain through beach management, maintenance of rock revetment to the west and in front of Hurst Castle. Let North Point develop naturally with management plan for sediment recycling.
A.2	Milford Seafront	Hold The Line in the short term. Managed Realignment in the medium and long term. Explore options for continuous beach between Hurst Spit and Rook Cliff.
A.3	Rook Cliff	Hold The Line in the short, medium and long term. Local realignment controlled by hard points.
A.4	Cliff Road	Managed Realignment in the short, medium and long term. Maintain road and property but with future need for realignment.
B.1	Hordle Cliff to Barton	No Active Intervention. Allow natural rollback.
B.2	Barton-on-Sea Marine Drive East	Managed Realignment in the short, medium and long term. Maintain defence and improve drainage. The crest of cliff will continue to set back.
B.3	Barton-on-Sea Marine Drive and Marine Drive West	Managed Realignment in the short, medium and long term. Initially maintain areas with defence and drainage, allowing this to adapt to provide transitional defence to Naish Cliff.
B.4	Naish Cliff	Managed Realignment in the short, medium and long term. Limited intervention with recharge to allow adaptation of use.
North Solent SMP		
5C13	Lower Test Valley	No Active Intervention in the short, medium and long term.
5C14	Redbridge to Calshot Spit	Hold The Line in the short, medium and long term.
5C15	Calshot Spit	Hold The Line in the short and medium term. No Active Intervention in the long term.
5C16	Calshot Spit to Inchmery	No Active Intervention in the short, medium and long term.
5C17	Inchmery to Salternshill	No Active Intervention in the short, medium and long term.
5C18	Salternshill to Park Shore	Hold The Line in the short, medium and long term but no public funding available.
5C19	Park Shore to Sowley	Hold The Line in the short, medium and long term. More detailed studies are required for management of defences in the long term.

[2] North Solent Shoreline Management Plan, 2010 https://www.northsolentsmp.co.uk/
[3] Poole and Christchurch Bays Shoreline Management Plan, 2011 https://twobays.net/smp2.htm

5C20	Sowley to Elmer's Court	No Active Intervention in the short, medium and long term.
5C21	Elmer's Court to Lymington Yacht Haven	Hold The Line in the short, medium and long term. Regulated Tidal Exchange at the Lymington Reedbeds in the short term.
5C22	Lymington Yacht Haven to Saltgrass Lane	Hold The Line in the short, medium and long term.
5F01	Hurst Spit	Hold The Line in the short, medium and long term.

Christchurch Bay and Harbour FCERM Strategy

2.1.3 The Christchurch Bay and Harbour FCERM Strategy[4] stretches from Hengistbury Head to the western end of Hurst Spit. It is being developed by Bournemouth Christchurch and Poole Council, New Forest District Council, and the Environment Agency, and is expected to be presented for adoption in 2024.

2.1.4 The proposed leading options for each Options Development Unit (ODU) have been consulted on and are being developed into the preferred options. The ODUs in the New Forest DC and NPA study area are summarised in Table 2-2.

Table 2-2 Christchurch Bay and Harbour FCERM ODUs in New Forest

Strategic Management Zones	Description of main risks	Leading options
SMZ4 Naish Cliff and Barton on Sea, includes ODU 14	The main risk facing this area is from erosion. ODU 14 is characterised by steep topography and an active cliff face that is environmentally designated as a Site of Special Scientific Interest (SSSI). The cliff in this area is a complex cliff and when undefended it erodes from the combined influence of sea erosion of the cliff toe and groundwater induced instability. Considering affordability constraints, and environmental designations along the cliff, it is unlikely to be possible to completely stop cliff erosion in this location.	The National Economic and Local Aspirational Options will lead to continued cliff erosion, but this will be in a controlled manner aiming to minimise property loss where possible. Some property loss may still occur (but considerably less than the Do Nothing scenario).
SMZ5 Taddiford, includes ODU15 Barton on Sea to Hordle Cliff	The area is currently undefended with no defences in front of the cliff. The beach provides the only protection to the cliff toe from erosion and also provides a recreational / amenity benefit. A permissive path exists along the cliff top (part of European long-distance path, route E9). There is no risk from tidal flooding in this location and the main source of risk is from erosion. However, relative to other parts of the frontage the erosion risk to properties is very low with minimal properties at risk (there are therefore no economic damages in this unit). The full length of this zone is fronted by a marine Special Protection Area designation and the cliffs are part of the Site of Special Scientific Interest (SSSI).	The proposed National Economic Leading Option for this unit is to Do Nothing. This is in line with SMP policy and due to there being minimal properties at risk there is no justification to construct new defences. There is potential to place additional beach material in this unit as part of a wider beach nourishment scheme and due to the longshore transport direction being from west to east, this would provide benefit to SMZ 6 to the east.
SMZ6 Milford on Sea, includes ODU16 (Cliff Road), OCU17 (Rook Cliff) and ODU18 (Milford on Sea frontage).	The cliff elevation reduces from west to east in this zone. There is a risk of coastal erosion in this location and there is also localised flood risk at the eastern end of ODU 18 where the cliff elevation is reduced. Here wave overtopping can occur from the open coast, and there is also a risk of tidal inundation and fluvial flooding from the Sturt Pond and Danes Stream area. A key issue for this frontage is the management of beach levels. There has been a recent trend of beach erosion that has increased the pressure on the defences at the back of the beach. Here a beach is required to protect the toe of the existing seawall and in the past low beach levels have contributed to seawall failures.	The leading options focus on upgrading or refurbishing the existing defences in the first 20 years and undertaking much larger scale beach nourishment schemes.

[4] Christchurch Bay and Harbour FCERM Strategy https://twobays.net/project/christchurch-fcerm-strategy/

Hurst Spit to Lymington Strategy

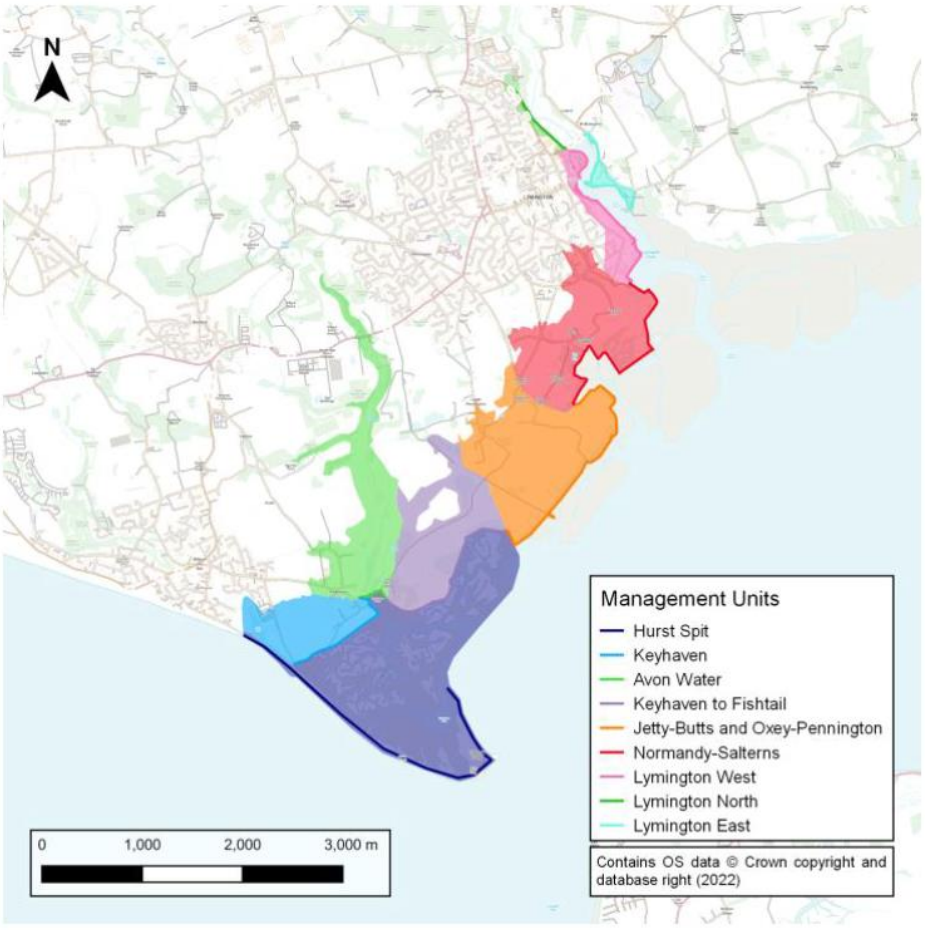
2.1.5 The Hurst Spit to Lymington Strategy[5] starts at the western end of Hurst Spit, covers Keyhaven and Pennington Marshes and extends to the east bank of the Lymington River. It is being developed by the Environment Agency, New Forest District Council, Hampshire County Council and Natural England. It is anticipated this strategy will be completed and adopted in 2024.

2.1.6 Nine strategic management units have been defined for the area as shown in Figure 2-1. The purpose of the Strategy is to identify options to manage erosion and coastal flood risk which are sustainable in the long term. It will outline a programme of future projects whilst also providing the high-level justification for that future work.

2.1.7 As the defences are likely to require work at different points in time, a strategy will allow a phased approach to deliver suitable work. It will also highlight when investment is required to help draw in the significant external funding required at the appropriate time.

2.1.8 This strategy will look forward to the next 100 years and appropriately explore what an adaptive coastline could and should look like.

Figure 2-1 Hurst Spit to Lymington Strategy Management Units



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

[5] Hurst Spit to Lymington Strategy https://consult.environment-agency.gov.uk/solent-and-south-downs/hurst-spit-to-lymington-project/

the Environment Agency. The CFMP considers all types of inland flooding, from rivers, groundwater, surface water and tidal flooding. Shoreline Management Plans (SMPs) consider flooding directly from the sea (coastal flooding).

2.2.2 The New Forest administrative area is covered by the New Forest CFMP[6], the Test and Itchen CFMP[7], the Dorset Stour CFMP[8] and the Hampshire Avon CFMP[9]. The policies for the sub-areas within New Forest are summarised in Table 2-3, Table 2-4, Table 2-5, Table 2-6, and Figure 2-2, Figure 2-3, Figure 2-4, and Figure 2-5.

Table 2-3 New Forest CFMP Policies

Sub-area & Preferred Policy	Summary of proposed actions
Milton/Milford Policy 4 "Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change".	Review the Pennington and Keyhaven Water Level Management Plan to identify water level management that meets the need of flood risk management and the enhancement of wetland habitat. Investigate opportunities to work with developers to implement local drainage improvements as part of a strategic solution or obtain contributions to wider flood mitigation schemes. Implement Sustainable Drainage Systems (SuDS).
Lyndhurst Policy 3 "Areas of low to moderate flood risk where we are generally managing existing flood risk effectively".	Make links with upstream attenuation on the New Forest.
Brockenhurst Policy 4 "Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change".	Seek to extend floodplain storage creating wetland habitat and providing ecological enhancements such as improving the condition of the Lymington River SSSI. Make links with upstream attenuation on the New Forest, ensuring there is no net loss of habitat.
Lymington Policy 4 "Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change".	Develop the Lymington Water Level Management Plan to identify water level management that meets the need of flood risk management and the enhancement of wetland habitat.
Hythe / Fawley Policy 4 "Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change".	Direct new development away from higher risk areas and ensure stormwater is effectively managed. Seek opportunities to minimise catchment runoff and use developer contributions to mitigate flood risk both now and in the future. Work in partnership with New Forest District Council and the Partnership for Urban South Hampshire to encourage local planning authorities to avoid inappropriate development in the floodplain, and to influence local development frameworks to effectively manage flood risk.
Totton Policy 4 "Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change".	Work in partnership with New Forest District Council and the Partnership for Urban South Hampshire to encourage local planning authorities to avoid inappropriate development in the floodplain, and to influence local development frameworks to effectively manage flood risk. Develop a collaborative Surface Water Management Plan with New Forest District Council, Partnership for Urban South Hampshire and Southern Water Undertake flood forecasting modelling on Bartley Water to increase lead times and improve the flood warning service.
New Forest Policy 6 "Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits".	Identify water level management that meets the need of flood risk management and the enhancement of wetland habitat. Create wetland habitat in partnership with Forestry Commission, Natural England and landowners, considering joint flood risk management benefits. Monitor existing initiatives with methods including hydrological monitoring and habitat surveys to ensure they inform the habitat creation action and help to minimise flood risk to communities within the New Forest and downstream. Develop a land management plan and explore the potential for land use and management practices.

[6] Environment Agency, December 2009, New Forrest Catchment Flood Management Plan, Summary Report https://www.gov.uk/government/publications/new-forest-catchment-flood-management-plan
[7] Environment Agency, December 2009, Test and Itchen Catchment Flood Management Plan, Summary Report https://www.gov.uk/government/publications/test-and-itchen-catchment-flood-management-plan
[8] [8] Environment Agency, December 2009, Dorset Stour Catchment Flood Management Plan, Summary Report https://www.gov.uk/government/publications/dorset-stour-catchment-flood-management-plan
[9] Environment Agency, June 2012, Hampshire Avon Catchment Flood Management Plan, Summary Report https://www.gov.uk/government/publications/hampshire-avon-catchment-flood-management-plan

Map of the policies in the New Forest catchment.

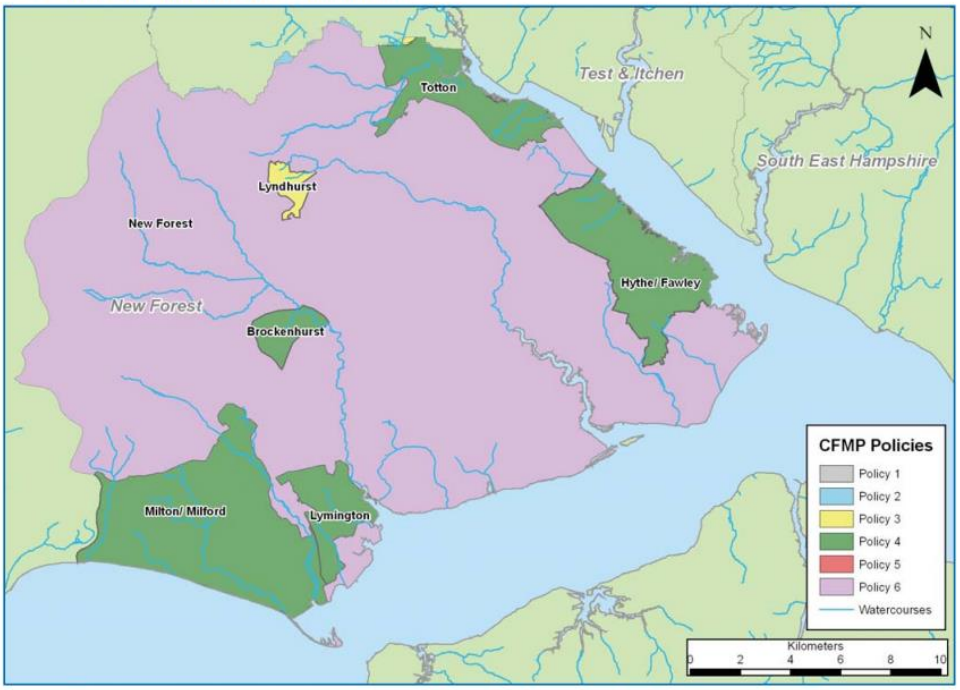


Figure 2-2 Map of the policies in New Forest catchment, CFMP 2009

Table 2-4 Test and Itchen CFMP Policies

Sub-area & Preferred Policy	Summary of proposed actions
Coastal urban Policy 5 “Areas of moderate to high flood risk where we can generally take further action to reduce flood risk”.	Improve surface water management to reduce the risk both now and in the future. Work with local planning authorities to ensure that urban development does not increase flood risk. Work towards long term reduction of flood risk and the re-creation of river corridors through sustainable land use management. Consider redevelopment of more open river corridors through the coastal urban sub-area.
Clay Catchment Policy 2 “Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions”.	Continue to protect the locations currently at risk within the sub-area but alter maintenance regimes to re-allocate resources to areas with greater risk. Implement the River Test Water Level Management Plan to identify and agree water level management that reduces flood risk and enhances wetland habitat. Consider reducing both maintenance and the number of assets within the system (though System Asset Management Plans (SAMPs)).

Map of the policies in the Test and Itchen catchment.

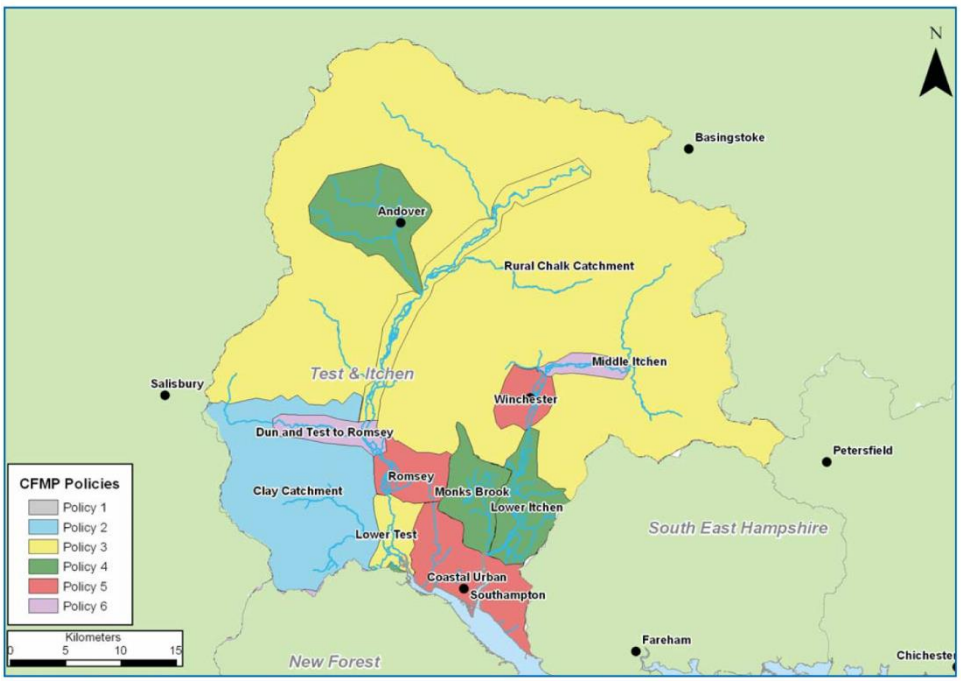


Figure 2-3 Map of the policies in Test and Itchen catchment, CFMP 2009

Table 2-5 Dorset Stour CFMP Policies

Sub-area & Preferred Policy	Summary of proposed actions
St Leonards, Verwood, Moors and Dorset Heaths Policy 6 "Take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits".	Develop a Moors and Heaths Strategy to investigate locations for flood attenuation and wetland creation. Encourage change of land use and its management to increase water retention in the sub catchment. Encourage the use of SuDS. Ensure no increase in runoff from new developments and seek opportunities to reduce runoff. Develop a Surface Water Management Plan for Verwood, Ferndown, and St Leonards. Install rainfall and river flow monitoring equipment.

Map of the policies in the Dorset Stour catchment

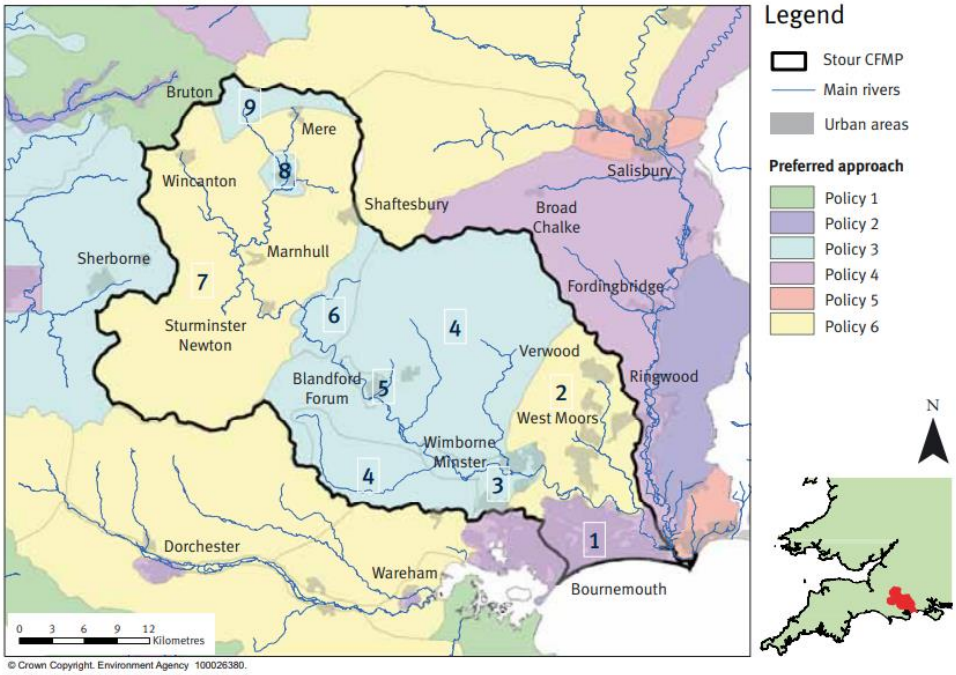


Figure 2-4 Map of the policies in Dorset Stour catchment, CFMP 2009

Table 2-6 Hampshire Avon CFMP Policies

Sub-area & Preferred Policy	Summary of proposed actions
Lower Avon Policy 4 "Already managing the flood risk effectivity but may need to take further actions to keep pace with climate change".	Investigate flood risk in Breamore, Ringwood, Woodgreen and Rockbourne, and urban drainage flood risk in Britford and implement appropriate flood risk mitigation measures where feasible. Identify and survey infrastructure at risk and take measures to increase flood resilience.
New Forest Streams Policy 2 "Can generally reduce existing flood risk management actions.	Extend hydrometric monitoring to improve flood warning for the New Forest Streams and use awareness campaigns to increase the uptake of the flood warning service. Where river restoration is planned, investigate options for maximising potential for reductions in downstream flood risk, as part of restoring natural floodplains.
Christchurch Policy 5 "Can generally take further action to reduce flood risk".	Investigate flood risk in Christchurch and develop a strategy to reduce risk, ideally looking at the combined risk from the Avon, Stour, the harbour tributaries and the sea, and urban drainage. Investigate impact of sea level rise and increased risk from storm surge to Christchurch Harbour. Identify and survey infrastructure at risk and take measures to increase flood resilience, including awareness campaigns.

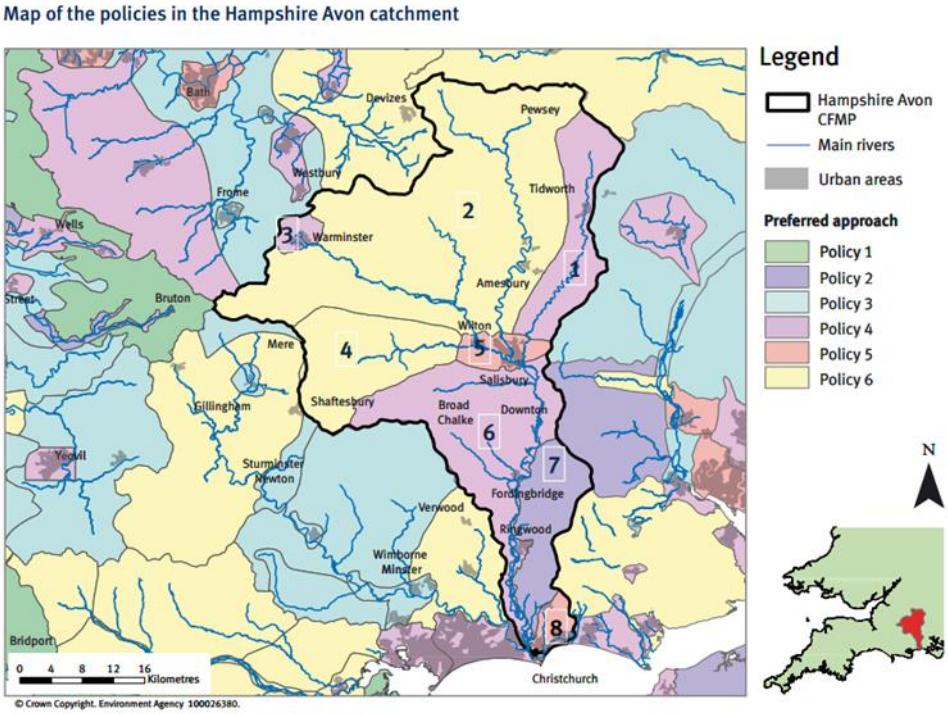


Figure 2-5 Map of the policies in Hampshire Avon catchment, CFMP 2012

2.3 Lead Local Flood Authority

2.3.1 Hampshire County Council (HCC) is the Lead Local Flood Authority (LLFA) for the majority of the New Forest DC and NPA administrative area. Wiltshire Council (WC) is the LLFA for a small area to the north of the New Forest National Park. HCC and WCC have a number of plans in place to assess and manage flood risk in the study area:

- Preliminary Flood Risk Assessment (PFRA)
- Surface Water Management Plan (SWMP)
- Groundwater Management Plan (GWMP)
- Local Flood Risk Management Strategy (LFRMS)
- Catchment Management Plans (CMP)

Preliminary Flood Risk Assessment

2.3.2 Under the 2009 Flood Risk Regulations, HCC and WC are required to prepare Preliminary Flood Risk Assessments (PFRAs) for their areas, which compiles high level information on significant local flood risk from past and potential flood events[10],[11]. PFRAs help to identify areas that should be prioritised for Surface Water Management Plans, which will in turn inform 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 or Wiltshire, and therefore the PFRAs focus on identifying local flood risk areas within the region.

2.3.4 Over 16,000 properties in Wiltshire are at risk of surface water flooding during an extreme event. The WC PFRA lists the top ten communities where over half of these at risk properties are located, but none are located within the New Forest administrative area.

2.3.5 The HCC PFRA identifies eight areas within Hampshire that are considered to have substantial potential flood risk, however none are located within the New Forest administrative area. 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 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

2.3.6 As LLFAs, HCC and WC are required to investigate and manage flood risk from non-main river sources within the administrative area and develop Local Flood Risk Management Strategies (LFRMSs) for the areas[12],[13].

2.3.7 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.

2.3.8 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.

[10] Hampshire County Council, April 2011, Preliminary Flood Risk Assessment https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/preliminary-flood-risk-assessment
[11] Wiltshire Council, May 2011, Preliminary Flood Risk Assessment https://cms.wiltshire.gov.uk/documents/s17582/
[12] Hampshire County Council, October 2020, Local Flood Risk Management Strategy https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/local-flood-risk-management-strategy
[13] Wiltshire Council, April 2015, Local Flood Risk Management Strategy https://www.wiltshire.gov.uk/civil-emergencies-drainage

2.3.9 In 2017, Atkins developed a Geographical Information System (GIS) tool[14] for Hampshire County Council 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.

2.3.10 Wiltshire Council's LFRMS seeks to improve knowledge regarding flood risk, protection from flooding, resilience to flooding, the environment, and communications about flooding issues. The Council will do this by:

- Working with other organisations and recording and analysing flooding incidents to gain a better understanding of flood risk in Wiltshire and potential means of mitigation and flood protection,
- Considering a wide range of approaches from an early stage to focus on the places with greatest flood risk,
- Retaining membership of the Local Resilience Forum, encouraging town and parish councils to prepare emergency plans, and encouraging residents, communities, and businesses to make use of the Environment Agency's flood warning service,
- Renewing and maintaining existing drainage assets, and requiring new developments to make use of sustainable drainage systems where possible, and,
- Using Area Boards, Operational Flood Working Groups, Parish Newsletters, the Council's website, press radio, television, and social media for communication purposes as appropriate, and engaging stakeholders in the development of proposals where communities are at serious risk of flooding (including other risk management authorities, the public, businesses, town and parish councils and local community groups).

Catchment Management Plans

2.3.11 Following the approach set out in their LFRMS, HCC have developed Catchment Management Plans (CMP) for 18 catchments that cover Hampshire[15]. The purpose of the CMPs is to identify areas within each catchment that are at high risk of flooding and that have experienced flooding in the past, identify the causes and mechanisms of flooding and support the introduction of a stepped approach to interventions and measures that will reduce the risk now and in the future.

2.3.12 The CMPs set out policies and action plans for local flood risk management. The CMPs of relevance to the New Forest study area and the priority areas identified in each are:

- CMP5 Test (Lower) – priority areas Totton, Totton south east, Hythe, Cadnam, Ower.
- CMP14 Avon – priority area Ringwood.
- CMP15 Avon Water – priority areas New Milton South, Lymington West and South.
- CMP17 Lymington – priority areas Lymington East and North, Brockenhurst.

2.3.13 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[16] highlights a number of areas potentially at risk from surface water (and other forms of) flooding, none of which are within the New Forest administrative area.

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

[14] Atkins, January 2017, Hampshire Catchment Prioritisation Tool.
[15] Hampshire County Council, Catchment Management Plans https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/catchment-management-plans
[16] 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

Groundwater Management Plan / Strategy

2.3.15 Hampshire has an established risk from groundwater flooding, with over 400 properties flooded and significant disruption and damage to infrastructure occurring during the winter of 2000/2001. The Groundwater Management Plan (GWMP)[17] 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.

2.3.16 No areas within the New Forest administrative area were identified as being at high risk from groundwater flooding in the Hampshire GWMP.

2.3.17 Wiltshire also has an established risk from groundwater flooding, with a significant number of flood incidents attributed to this type of flooding. The Groundwater Management Strategy (GWMS)[18] identifies eight areas that have previously suffered from groundwater flooding and may have further future implications, none of which are located within the New Forest administrative area.

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[19] is a report written by members of the Green Halo Partnership, Future South, and the Southern Policy Centre. It sets out a possible way forward, embracing ideas and partners from within and beyond the immediate PfSH area. The Greenprint is a model for policy making which could reflect commitment to a green recovery, shaping plans and programmes across sectors to deliver a world class economy in a world class environment.

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

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 The majority of the study area is covered by Southern Water's New Forest Catchment DWMP and Test and Itchen Catchment DWMP[20]. The western part of the study area, within the Avon catchment, is covered by the Wessex Water DWMP[21].

2.4.5 The Southern Water DMMPs for New Forest and Test and Itchen highlight that storm overflows and nutrients are the main concerns in the river basin. New development is planned in Slowhill Copse Marchwood, Pennington and Ashlett Creek Fawley as well as areas of the National Park served by Water Recycling Centres in Sway and Lyndhurst. Additional homes and businesses will increase the risks of non-compliance with Dry Weather Flow (DWF) permits from the Environment Agency in a

[17] Hampshire County Council, October 2013, Hampshire Groundwater Management Plan https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/strategies/groundwater-management-plan
[18] Wiltshire Council, October 2014, Wiltshire Council Groundwater Management Strategy https://cms.wiltshire.gov.uk/ecsddisplayclassic.aspx?name=sd3537&id=3537&rpid=0&sch=doc&cat=14102&path=14020%2C14068%2C14102&libraryview=icons
[19] Partnership for South Hampshire, September 2020, A Greenprint for South Hampshire: The Opportunities Ahead https://www.push.gov.uk/wp-content/uploads/2021/01/Item-7-Greenprint-for-South-Hampshire.pdf
[20] Southern Water, Drainage and Wastewater Management Plans https://www.southernwater.co.uk/dwmp
[21] Wessex Water, Drainage and Wastewater Management Plan https://corporate.wessexwater.co.uk/our-future/our-plans/drainage-and-wastewater-management-plan

number of the wastewater systems, including Slowhill Copse Marchwood, Brockenhurst and Flexford Lane Sway. This means further investment will be needed in the future to increase the capacity of treatment works to accommodate the new homes and businesses.

2.4.6 New development in the New Forest might also put additional pressure on internationally designated habitat sites such as the Solent and Dorset Coast, so solutions will need to be found to ensure that development is nutrient neutral.

2.4.7 The Wessex Water DWMP highlights that one of the main issues to affect the Hampshire Avon catchment is the impact of nutrients on its chalk streams and associated habitats. Nutrients come from Wessex Water assets as well as diffuse sources such as agriculture and urban runoff and can cause eutrophication (where the nutrients cause excessive growth of plant life) in rivers and wetlands. Wessex Water operate storm overflows in the catchment, many at water recycling centres. Some of these operate for extended periods of time as a result of groundwater infiltration into the system. Wessex Water have an Infiltration Reduction Programme which sets out a programme of monitoring and renovating or sealing affected sewers to reduce groundwater ingress.

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 The highest point in the New Forest is Pipers Wait near Normansland, which is located at ~130 metres Above Ordnance Datum (mAOD). High ground extends north to North Charford and south to Stoney Cross and across Bratley Plain. The study area is drained to the south by three main rivers, Lymington River, Beaulieu River and Avon Water and the topography slopes down along the valleys of these watercourses to levels of <10mAOD.

3.1.2 The majority of the bedrock in the administrative area is classified as a Secondary A aquifer which is associated with areas of clay, silt, and sand geology. A Principal aquifer is located in the north-west which is associated with chalk geology. An unproductive bedrock stratum is found in the north-west which is associated with London Clay. Within the centre of the study area lies a further unproductive stratum.

3.1.3 The superficial deposits in the area are primarily classified as Secondary A aquifers associated with areas of sand and gravel. Several Secondary B aquifers are located throughout the study area which are predominately associated with silt geology in the area.

Hydrology

3.1.1 The New Forest administrative covers eight operational catchments as identified in the Catchment Data Explorer[22]; Test Lower and Southampton Streams, New Forest – Lymington and Beaulieu, New Forest – Bartley Water, Langdown Stream, New Forest – Hatchet Sowley, Becton Bunny, Hampshire Avon, and Stour Dorset.

3.1.2 The New Forest catchment covers most of the administrative area and is largely rural, with the main urban areas confined to the waterside communities bordering Southampton Water and along the south west coastal zone. The numerous small streams, ponds, lakes, coastal mudflats, and salt marshes within the New Forest catchment provide rare habitats for wildlife which support many designated conservation sites. Whilst groundwater generally provides good quality baseflow, the network of rivers and ponds are primarily fed by rainfall. The rivers within the New Forest catchment have been managed and engineered over the years. Several rivers have tidal controls, whilst others are ponded and more have been dredged and straightened for land drainage and agriculture.

3.1.3 The Hampshire Avon catchment covers the western part of the New Forest administrative area and hosts one main river system: the Hampshire Avon River System. 205km of this river system is designated as Sites of Special Scientific Interest (SSSI). Although predominantly a chalk river, some of the headwaters are fed by the Upper Greensand (UGS), with clay in its western headwaters, grading to sand and gravels at the lower end.

3.1.4 The Stour Dorset Catchment only covers a very small portion of the New Forest administrative area to the very west, where the Crane is located.

3.1.5 The principal watercourses and catchments in the study area are shown in Appendix A Figure 1. Table 3-1 provides a description of the watercourses and their study area and identifies the type of modelling and mapping that is available within the SFRA for each watercourse.

[22] Environment Agency Catchment Data Explorer. https://environment.data.gov.uk/catchment-planning/

Table 3-1 Watercourses in New Forest DC and New Forest National Park Authority

Test Lower and Southampton Streams Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Blackwater	45km river with several branches, split into the Blackwater in its upper reaches, and the Blackwater (Test and Itchen) in its lower reaches. Rises east of Redlynch (Wiltshire) and flows east into Test Valley, and then turns south, passing under the M27 and past Broadlands Lake and the Testwood Lakes reservoirs, before joining the Lower Test between Totton and Redbridge. Only small parts of the southern branches lay within the New Forest administrative area (most of the river is located within the Test Valley).	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Cadnam River	16.5km river which flows from south east of Bramble Hill, through mainly wooded areas and fields as well as several villages, and into the Blackwater at Bushylease Farm.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

New Forest - Lymington and Beaulieu Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Lymington River	22km river with which flows from west of New Park Manor where it is fed by the Black Water, Highland Water and Ober Water, splits in two north east of Brockenhurst, travels south through Brockenhurst, Boldre and several wooded areas and fields, and discharges into Lymington Pier east of Lymington.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Black Water	8.5km river which flows from South Oakley Inclosure, south east through a number of other Inclosures and fields, and meets Highland Water west of New Park Manor, before flowing into the Lymington River.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Highland Water	14.5km river with two branches which flow through wooded areas from north of Oknell Inclosure and from north east of Allum Green, before meeting with Black Water west of New Park Manor and flowing into the Lymington River.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Beaulieu	31km river with several branches which flow from Lyndhurst, through several wooded areas and fields, and into Beaulieu River.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Beaulieu Abbey Stream	2.5km stream which flows from east of Hartford House, south west through Hartford Heath and int Beaulieu River.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Ober Water	14.5km river which flows from north east of Ridley Wood, through several wooded areas and fields as well as the outskirts of Burley, and into the Lymington River	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Avon Water	25km river with two branches which flows from Burbush Hill, south east through several villages, fields and wooded areas, around the outskirts of Hurdle, Everton and Pennington, and into Keyhaven Marsh at Keyhaven.	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines (between the A35 and A337) – Appendix A Figure 12. GIS Floodplain Analysis – Appendix A Figure 11.
Danes Stream	16km river with two branches which flow from north of Tiptoe Road and from north west of Ashley, south east through Ashley, New Milton, Milford on Sea and several	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines (between Ashley and Hordle) – Appendix A Figure 12.

	wooded areas, and into Keyhaven Mash west of Keyhaven.	GIS Floodplain Analysis – Appendix A Figure 11.
Penerley Trib	6km river which flows from Stockley Inclosure, north east through several other Inclosures and woods, and into the Beaulieu north east of Penerley Farm House.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

New Forest – Bartley Water Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Bartley Water	23km river with two branches which flows from east of Fox Hill, east through several fields and wooded areas, around the outskirts of Ashurst and West Totton and Rushington, and into Southampton Water at Brokenford.	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines (from Leominstead Lake to Fletchwood Lane) – Appendix A Figure 12. GIS Floodplain Analysis – Appendix A Figure 11.
Fletchwood Trib	6.5km river which flows from Shave Wood, east through Bartley and several villages and fields, and into Bartley Water at Great Fletchwood Farm.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

Langdown Stream Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Langdown Stream	2km river which flows from Dibden Purlieu, north east through Langdown and into Southampton Water.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

New Forest – Hatchet Sowley Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Sowley Stream (western arm also called Crockford Stream)	11km river with two branches which flow from east of Heywood Farm and from west of East Boldre, south through several wooded areas and fields into Sowley Pond, which discharges into the Solent via Sowley Marshes.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Sowley Pond	A lake which discharges the Sowley Stream into the Solent via Sowley Marshes.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Hatchet Stream	8km river which flows from north west of East Boldre, east though Hatchet Pond, and south east around East Boldre and through several wooded areas and fields, into Beaulieu River.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Hatchet Pond	A lake to the north west of East Boldre which the Hatchet Stream flows through.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Dark Water	9km river which flows from west of Hardley, south around the outskirts of Hardley, Holbury, Blackfield and Langley, through several fields and wooded areas, and into the Solent west of Stone Point.	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines (from Holbury to Langley) – Appendix A Figure 12. GIS Floodplain Analysis – Appendix A Figure 11.

Becton Bunny Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Becton Bunny	2.5km river which flows south east through Old Milton and Barton on Sea Golf Course and into the sea. The **Walkford Brook** is also located in the same catchment on the catchment data explorer, located to the west of New Milton.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11. Modelled Climate Change Outlines (from Holbury to Langley) – Appendix A Figure 12.

Hampshire Avon Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Hampshire Avon	203km river with several branches and tributaries which flows from south east of Marlborough in Wiltshire, south through Salisbury and several towns, villages, fields and wooded areas, and discharges into Christchurch Harbour to the north west of Stanpit Marsh. The Hampshire Avon is divided into six sections, with the Lower section flowing through the New Forest administrative area from south of Downton into Christchurch Harbour.	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines through Fordingbridge – Appendix A Figure 12. GIS Floodplain Analysis – Appendix A Figure 11.
Ashford Water (Allen River)	12km river which flows from Martin, south east along the direction of Martin Drove End road, through Damerham and several fields and wooded areas, and into the Hampshire Avon (Lower) at Fordingbridge.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Sweatfords Water	9km river which flows from north east of Rockbourne, along the direction of Rockbourne road, through Rockbourne and south east though several wooded areas and trees, and into the Hampshire Avon (Lower) at Fordingbridge.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Sleep Brook	3.5km river which flows from south of Alderholt, south and east through wooded areas, and into the Hampshire Avon (Lower) south of Harbridge Farm.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Ditchend Brook	9.5km river which flows from Deadman Hill, south west through several fields, wooded areas and villages, and into the Hampshire Avon (Lower) south of Fordingbridge.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Huckles Brook	12km river which flows from east of Eyeworth Wood, through several fields, wooded areas and Inclosures, and into the Hampshire Avon (Lower) west of South Gorley.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Dockens Water	16km river which flows from north of Fritham, south west through several fields and wooded areas, through Blashford Nature Reserve and into the Hampshire Avon (Lower) north of Ringwood.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Linford Brook	9km river which flows from east of Pinnick Wood, south west through several fields and wooded areas, through Blashford Nature Reserve and into the Hampshire Avon (Lower) north of Ringwood.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.
Bisterne Stream	6.5km river which flows from south of Hightown, south west though several fields and wooded areas, and into the Hampshire Avon (Lower) north east of Bournemouth Airport.	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines through Ringwood – Appendix A Figure 12. GIS Floodplain Analysis – Appendix A Figure 11.
Ripley Brook	16.5km river which flows south west through Kingston Common National Nature Reserve, through several fields and	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

	wooded areas, and into the Hampshire Avon (Lower) at Sopley.	
Clockhouse Stream	6km river which flows from west of Bransgore, south west though several fields, through Burton, and into Christchurch Harbour north east of Christchurch.	Flood Zones – Appendix A Figure 1. Modelled Climate Change Outlines through Bransgore – Appendix A Figure 12. GIS Floodplain Analysis – Appendix A Figure 11.
Mude	3km river which flows from north of Somerford, south through several fields, through Somerford and Mudeford, and into Christchurch Harbour.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

Stour Dorset Operational Catchment

Watercourse	*Description*	*SFRA Mapping*
Crane	31.5km river which flows from west of Blackbush Plantation, south east through several villages, fields, and wooded areas, around the outskirts of Verwood and into the Moors east of Tricketts Cross. Only a small part of this River Catchment to the east of Verwood is located within the New Forest administrative area.	Flood Zones – Appendix A Figure 1. GIS Floodplain Analysis – Appendix A Figure 11.

3.2 Flooding from the Sea

3.2.1 The New Forest District and National Park are bound by the Tidal River Test, Southampton Water, The Solent, and Christchurch Bay. As such the coastline is potentially at risk of tidal and coastal flooding.

3.2.2 Tidal flooding is caused by extreme tide levels exceeding ground and/or defence levels. Tidal flooding can develop through a combination of factors coinciding, including spring (high) tides, strong coastal winds, and low atmospheric pressure.

3.2.3 The study area also has numerous river networks which ultimately discharge into the sea. With a combination of high tides and high river levels, there is elevated potential for river or surface water flooding where rivers in flood or surface water outfalls are unable to discharge into the sea due to high tides.

3.2.4 In coastal locations, the risk of flooding is linked to the stability of the coastline. If the coast is eroding, then the potential effect is that tidal flood defences near to the sea will be lost and flood risk will increase. To maintain an appropriate standard of safety from flooding it is sometimes necessary to implement works to slow down or stop the rate of coastal erosion and so maintain the integrity of the tidal defences. The Poole and Christchurch Bays SMP covering Naish Cliff to Hurst Spit and the North Solent SMP covering Hurst Spit to Lower Test Valley describe the arrangements and strategy for managing coastal erosion.

3.2.5 Coastal erosion is a prominent process along much of the study area's coastline. According to the Poole and Christchurch Bays SMP and North Solent SMP much of the coastline is protected from flooding and/or erosion with structures and/or beach management. The defences form a very important aspect of the control on the physical coastline. The Poole and Christchurch Bays SMP and North Solent SMP state that along much of shoreline lie areas of International and European importance which requires protection from coastal erosion.

Flood Map for Planning

3.2.6 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). Appendix A Figure 1 shows Flood Zones 2 and 3 for the study area. This section describes the risk of flooding from the sea. The risk from rivers is covered in Section 3.3.

3.2.7 Areas of Flood Zone 3a, high probability of flooding from the sea, are shown from Milford-on-Sea to Lymington, and from Thorns Beach to Needs Ore where the River Beaulieu meets The Solent. Areas of Flood Zone 3a associated with Southampton Water are identified from Calshot to Hythe, at Marchwood and at Totton.

3.2.8 Appendix A Figure 1 identifies those areas that have a reduced risk of tidal flooding due to the presence of defences. This includes areas to the south of Keyhaven and Lymington. Flood defences are further described in Section 5.1 and Appendix A Figure 2.

Historic flooding

3.2.9 Recorded Flood Outlines published by the Environment Agency, as seen in Appendix A Figure 2, show a large number of flood events recorded to the south east of Lymington, extending onto several developments. Nine of these events occurred between 1982 and 2000, but most of them occurred at unknown dates. Flood defences are now present in this area. Although the date of installation is unknown, it is likely the majority, if not all, events occurred before the defences were present, and flooding is less likely to be an issue here during the present day.

3.2.10 A number of tidal events have also been recorded to the north of Beaulieu around the Beaulieu River, and along the eastern coast around Hythe, Marchwood and Totton from Southampton Water. Most of these events took place in December 1999 or March 2008, and the extents cover a small number of properties and roads.

3.2.11 In December 1989, there were reports of significant heavy rain and tidal induced flooding in Keyhaven and King's Saltern Road, Bath Road and Waterloo Road, Lymington.

3.2.12 In 1996 the 1.5m shingle bank at Hurst Spit was hit by major storms and coastal protection works were carried out.

3.2.13 During Winter 2013-2014, there were prolonged and severe storms along the southern coast of England. The beaches along the south coast had less than a week's recovery before the next storm, and hence each storm was working on progressively weakened beaches. Erosion rates, greater than 25 times the annual average, were observed at numerous sites. Some sites which had generally been accreting of 10 years experienced large scale erosion. The Environment Agency records also indicate that during this time, the River Avon flooded which affected areas of land from Downton to Sopley.

3.2.14 Heavy rain and storms in October 2023 ahead of Storm Ciaran led to flooding of Lymington Quay.

Coastal Modelling

3.2.15 As part of this SFRA update, coastal modelling outputs have been mapped to show the impact of predicted tidal / coastal flooding. The Environment Agency provided outputs from the following models:

- Southampton Water Coastal Modelling Study[23]
- New Forest Coastal Modelling Study (from Milford-on-Sea to Lymington)[24]

3.2.16 No changes were required for the New Forest Coastal Model to inform the SFRA. For the Southampton Water model, it was necessary to update the tidal boundaries are re-run these for new epochs to tie in with the new plan periods for the LPAs. Further details of the updates are included in SFRA Part 1 Appendix B2. 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

3.2.17 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.

[23] JBA Consulting, 2014, Southampton Water Coastal Modelling Study.
[24] JBA Consulting, 2022, New Forest Coastal Modelling Study.

3.2.18 The PPG states that the identification of Functional Floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. With this caveat, 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.

3.2.19 Coastal modelling of the 3.3% AEP event (from the Southampton Water model and the Milford to Lymington model) has been used to identify areas at more frequent risk of flooding from the sea. (It is noted that this modelled scenario just applies the still water level and does not account for wave action). These areas are shown in Appendix A Figure 13 and include:

- East of Totton
- Frontage at Fawley and Hillhead
- Hurst Road, Milford-on-Sea
- Saltgrass Lane, Keyhaven
- Lymington frontage including the boatyard frontage off Bath Road, part of Quay Road, part of Undershore Road and Lymington Ferry Terminal and Car Park.

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

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

3.2.22 Appendix A Figure 13 should be used to identify areas which may be at risk of frequent tidal flooding.

3.2.23 In locations where there is existing development and the SMP policy is to hold or advance the line, New Forest DC and NPA may consider it appropriate to consider redevelopment due to wider sustainability objectives. Should development be considered in these areas, it will need to pass the Sequential Test and the Exception Test where applicable. A site specific FRA will need to demonstrate that the development will be safe for its lifetime, and not increase flood risk elsewhere. It is considered that this can be implemented through the Flood Zone 3a designation, and it is not considered sustainable to apply the planning requirements of a Flood Zone 3b designation.

3.2.24 For some of the tidal frontage in New Forest, the SMP policies indicate no future maintenance or improvements to defences. New Forest DC should consider using the 3.3% AEP flood extent to define Coastal Change Management Areas (CCMA) to ensure prospective developers are made aware of the potential risks and inappropriate development is avoided. This includes the Lower Test Valley, Calshot to Salternshill, and Milford to Naish Cliff. It should be noted that parts of these areas lie within the National Park and are therefore under the NPA's separate planning jurisdiction. (It is noted that a CCMA is already in place for Barton-on-Sea to Milford-on-Sea).

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

Future flood risk

3.2.26 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. For Southampton Water, this modelling was undertaken for the years 2055 and 2122, presented in Appendix B1. For the New Forest Coastal Model (Milford to Lymington), the years 2050 and 2120 have been modelled, presented in Appendix B2. The Environment Agency's guidance on the application of climate change allowances[25] states that LPAs should assess both the higher central (70th percentile) and the upper end (95th percentile) allowances for SFRAs.

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

3.2.27 Maps showing the maximum flood depths and maximum hazard ratings for some of the key defended and undefended model scenarios are presented in Appendix B1 (Southampton Water) and B2 (Milford to Lymington) of this Report.

Defended Model Scenarios

Present Day Flood Risk

3.2.28 Appendix B1 Figures 3 and 10 show that for the 0.5% AEP event for the year 2022, flooding from Southampton Water affects a small area in Totton near the station, Down's Park Crecent in Eling, Cracknore Hard Lane in Marchwood Shore Road in Hythe, and the immediate frontage near Ower and Calshot.

3.2.29 In Milford and Lymington, Appendix B2 Figures 3 and 7 show that for the 0.5% AEP event for the year 2020, flooding occurs in Milford affecting Hurst Road and Island View Close, Saltgrass Lane and Lower Pennington Lane. Hazard ratings of Low to Moderate impact the boatyard, Undershore Road and the Ferry Terminal car park in Lymington.

3.2.30 **'Higher Central' Climate Change Allowance:** Appendix B1 Figures 4 and 11 show the 0.5% AEP event for the year 2055 (Higher Central) for Southampton Water, and Appendix B1 Figures 5 and 12 show the 0.5% AEP event for the year 2122 (Higher Central). By 2122, flooding extents increase in Totton and Brokenford, and the southern part of Eling. Flood extents increase impacting larger parts of Marchwood, Hythe, and the frontage near Calshot.

3.2.31 Appendix B2 Figures 4 and 8 show the show the 0.5% AEP event for the year 2050 (Higher Central) for Milford to Lymington, and Appendix B2 Figures 5 and 9 show the show the 0.5% AEP event for the year 2120 (Higher Central). By 2120, hazard ratings of Moderate to Significant cover a large part of Milford including B3058 Park Lane. Keyhaven is at risk of flooding with Significant to Extreme hazard rating including access routes along Keyhaven Road. Flooding affects the area to the south of Lymington town, including Normandy Farm south to Lower Pennington. Flooding extends inland to the south of Lymington, impacting land and properties along Stanley Road, Waterford Lane, Brook Road, Broad Lane, King's Saltern Road, Bath Road and north to Mill Lane, Waterloo Road, B3054 Marsh Lane. On the east bank of the Lymington River, flood hazard ratings of Extreme and Significant are noted along Undershore Road and the Ferry Terminal.

3.2.32 **'Upper End' Climate Change Allowance:** Appendix B1 Figures 6 and 13 show the 0.5% AEP event for 2122 (Upper End) for Southampton Water and Figures 7 and 14 show the 0.1% AEP event for 2122 (Upper End). Flood extents extend to cover an extensive part of A36 Commercial Road in Totton, the A35 Marchwood Bypass, and properties in Brokenford and Eling. Hazard ratings of Significant are present along the frontage at Marchwood, Hythe, Ashlett and Calshot.

3.2.33 Appendix B2 Figures 6 and 10 show the 0.5% AEP event for 2120 (Upper End) for Milford to Lymington. Flooding is shown to extend further inland throughout Milford, Keyhaven and into Lymington.

Undefended Model Scenarios

3.2.34 Model scenarios have also been undertaken without defences, to understand how the Flood Zones may alter in the future.

3.2.35 For Southampton Water, Appendix B1 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 B1 Figure 2 as an indication of 'future flood zones' associated with flooding from the sea. This shows that areas of Flood Zone 2 and 3 increase around Totton, Eling and Brokenford. Notable increases in the Flood Zones are also shown at Marchwood, to the north west of Hythe and at Calshot.

3.2.36 For Milford to Lymington, Appendix B2 Figures 11 and 12 show the undefended 0.5% AEP event for 2120 (Upper End). These flood extents are also included on Appendix B2 Figure 2 as an indication of 'future flood zones' associated with flooding from the sea. This shows that the areas of Flood Zone 2 and 3 increase in Milford, Keyhaven and along the southern edge of Lymington.

3.3 River flooding

Flood Map for Planning

3.3.1 Appendix A Figure 1 shows Flood Zones 2 and 3 for the principal watercourses within the study area, (in addition to the tidal flooding described in the previous section). Flood risk is found around most of the main river systems detailed in Section 3.1, with the largest extents found around the Hampshire Avon, Blackwater, Beaulieu, and Lymington River. The Flood Zones cover a number of developments and roads, most notably in Totton from the Blackwater and in Brockenhurst from the Lymington River.

3.3.2 Several areas around the Hampshire Avon in Ringwood and Fordingbridge have been recognised as having a reduced risk of flooding as a result of defences. More information on flood defences can be found in Section 5.1 and Appendix A Figure 2.

Flood Zone 3b Functional floodplain

3.3.3 Flood Zone 3b 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).

3.3.4 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. 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.

3.3.5 SFRA Part 1 Table 3-3 identifies which watercourses have detailed modelling available to inform designations of Flood Zone 3b functional floodplain. In some cases, the 3.3% AEP (1 in 30 year) extent is available; where it is not available an alternative AEP event has been selected instead. Within the New Forest DC and NPA administrative area, modelling of available flood extents can be seen in Appendix A Figure 1, using the following information:

- Hampshire Avon, Fordingbridge, 1 in 20 year (5% AEP) flood extent.
- Bartley Water, 1 in 30 year (3.3% AEP) flood extent.
- Dark Water, 1 in 30 year (3.3% AEP) flood extent.
- Hampshire Avon, Ringwood 1 in 50 year (2% AEP) flood extent.
- Ringwood Ordinary Watercourse, 1 in 20 year (5% AEP) flood extent.
- Avon Water, 1 in 30 year (3.3% AEP) flood extent.
- Walkford Brook, 1 in 30 year (3.3% AEP) flood extent.
- Bransgore, 1 in 20 year (5% AEP) flood extent.
- Calmore Model, 1 in 20 year (5% AEP) flood extent.
- River Mude, 1 in 20 year (5% AEP) flood extent.

3.3.6 **Where modelled information for the 3.3% AEP event or similar is not available to identify the functional floodplain, the extent of Flood Zone 3a should be used as a surrogate for Flood Zone 3b to ensure the risk is not underestimated.** The Environment Agency guidance 'How to prepare a Strategic Flood Risk Assessment'[26] 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.

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

Historic flooding

3.3.7 Although New Forest District and National Park is largely rural there are a sizable number of urban areas where the watercourses above have the potential to come out of bank and cause flooding to property. Risks are most significant in the following urban locations:

- Fordingbridge,
- Brockenhurst,
- Milford-on-Sea,
- Lymington,
- Hythe,
- Marchwood, and
- Totton.

3.3.8 The Hampshire Avon CFMP additionally states that prolonged deep flooding can have a negative impact on the Avon Valley Site of Special Scientific Interest and several Scheduled Monuments are at risk of flooding.

3.3.9 Recorded Flood Outlines published by the Environment Agency, as seen in Appendix A Figure 2, show a significant amount of past flooding around the Hampshire Avon. Most of this flooding occurred in 1982, with other events also taking place in 1959, 2013, 2014, and three unknown dates. The flooding generally stayed clear of development but has reached a small number of properties near Fordingbridge and Ringwood.

3.3.10 A historic event has also been recorded to the south of the Hampshire Avon near Sopley in 1979, due to the capacity of the Stour, which meets the Hampshire Avon at Christchurch Harbour, being exceeded with no raised defences. Historic flooding has additionally taken place along the Lymington, affecting numerous properties and roads within Brockenhurst in 1966, 1990, 2000, and many unrecorded dates.

3.3.11 Other historic flood events have been recorded across the administrative area, with most clustered around the north east close to Bartley, and some extents coming into contact with properties and roads.

3.3.12 On 24th December 1999, very heavy rain caused many dwellings to flood. Deep flooding of parts of Lymington occurred when a surge tide trapped fluvial flood flows in the Lymington River. This caused river floodwater to discharge over the railway line and into residential and commercial development. The Environment Agency reported that the Beaulieu River, Bartley Water, Cadman River and Lymington River flooded at this time. This caused flooding in Beaulieu, Eling, Cadnam and Lymington.

3.3.13 On 30th October 2000, the Environment Agency reported that the Cadnam River, Bartley Water and the Pollardsmoor Drain caused flooding at Cadnam, Marchwood, Hounsdown, Ashurst and Copythorne.

3.3.14 In December 2000, river flooding affected properties in Fordingbridge and Ringwood after a period of heavy rainfall on an elevated water table.

3.3.15 In July 2012, water levels rose over the railway line between Brockenhurst and Sway.

3.3.16 In February 2014, extensive flooding occurred in the Fordingbridge area. New Forest DC, along with Hampshire County Council, and the police and fire services, diverted the flow of water back to the River Avon. The situation was still quite severe and required a long period of monitoring, but it did have the effect of reducing water levels significantly around the schools and properties in Pennys Lane/Crescent.

3.3.17 There have been reports of significant flooding from the Lymington River in the village of Brockenhurst in recent years, including January 2024 and December 2023. In 2024, the main A road through the village was closed along with Waters Green and Balmer Lawn Road.

Future flood risk

3.3.18 Climate change is expected to increase the frequency, extent, and impact of flooding, reflected in peak river flows. Wetter winters and more intense rainfall may increase fluvial flooding and surface water

runoff and there may be increased storm intensity in summer. Rising river levels may also increase flood risk.

3.3.19 As detailed in Table 3-1, where available, hydraulic models have been run for the 1% AEP flood event for the central and higher central climate change allowances to provide an indication of the future flood risk. The maps in Appendix A Figure 12 show the risk of flooding from the following watercourses in the future as a result of climate change:

- The Avon Water between the A35 and A337
- The Danes Stream between Ashley and Hordle
- Bartley Water from Leominstead Lake to Fletchwood Lane
- The Dark Water from Holbury to Langley
- The Hampshire Avon through Fordingbridge
- The Bisterne Stream through Ringwood
- The Clockhouse Stream through Bransgore

3.3.20 The results of the hydraulic modelling studies for the main rivers suggest that climate change will not markedly increase the extent of river flooding within most areas. However, it is important to note that these areas, as well as those areas that are 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 the measures are implemented during the development management process to carefully mitigate the potential impact that climate change may have upon the risk of flooding to a property.

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

3.3.22 Where detailed hydraulic models are not available, 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 see Section 3.1 of the Main Report. The results of the analysis are presented in Appendix A Figure 11 and show that the floodplains associated with many of the rivers within the New Forest could be sensitive to increases in water levels. Those areas that are particularly sensitive are detailed below:

- Hampshire Avon and its tributaries:
  - Breamore
  - Fordingbridge
  - Along the length of the Bisterne Stream from Poulner to Lower Bisterne
  - The upstream extent of the Clockhouse Stream around Ripley, Bransgore and Lower Waterditch.
- Avon Water
  - Between Holmsley and Wilverley
  - Between Boundway Hill and Sway
- Lymington River / Highland Water / Black Water
  - Burley Lodge
  - From south west of Allum Green to Brockenhurst

  - Lymington
  - Pennington and Lower Pennington
- Beaulieu
  - The upstream extent of the watercourse from Lyndhurst to Ipley Cross
- Bartley Water
  - Between Newtown and Ashurst
  - Totton
- Cadnam River
  - Cadnam
- Southampton Water
  - Dibden
  - Marchwood
  - Totten

3.3.23 Should development be proposed in these areas, hydraulic modelling may be required to map the future risk of flooding more accurately and provide information on anticipated flood levels and hazard ratings.

3.4 Groundwater flooding

Groundwater Susceptibility Mapping

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

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

3.4.2 The remaining areas are not considered to be prone to groundwater flooding. The 'Susceptibility to Groundwater Flooding' should be used, in conjunction with other relevant information, to establish the relative risk of groundwater flooding, and is most suitable for informing land-use planning decisions at the strategic scale. The dataset shouldn't be employed in isolation to inform land-use planning decisions at any scale and shouldn't be utilised for this purpose at the site scale. The map shows much of the New Forest administrative area to have limited or no potential for groundwater flooding to occur, particularly towards the north. Around the river systems and coast however, there is potential for groundwater flooding of property situated below ground level and potential for groundwater flooding to occur at the surface. A large area with potential for groundwater flooding at the surface surrounds most of the Hampshire Avon.

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 Groundwater flooding incidents are recorded to have taken place in Hythe and Totton. These flooding incidents affected several properties. Three of these events corresponded to an area with potential for groundwater flooding to occur at the surface, and one in Totton with the potential for groundwater

flooding of property situated below ground level within the BGS 'Susceptibility to Groundwater Flooding' map.

3.4.5 During the heavy rainfall experienced in Winter 2023-2024, groundwater levels at the Down Barn borehole rose and the villages of Damerham and Martin in Fordingbridge are at risk of flooding.

Future flood risk

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

3.5 Surface water and sewer flooding

Flood mapping

3.5.1 The Risk of Flooding from Surface Water (RoFSW) dataset is presented in Appendix A Figure 3. This map shows the highest risk of surface water flooding is generally found surrounding the main watercourses, especially the Lymington, Ober Water and Bartley Water. The surface water flood risk extents cover many properties and roads across the New Forest administrative area.

Historic flooding

3.5.2 Sewer flooding is defined by Southern Water as incidents caused by an escape of water and sewage from a public sewer due to a blockage, sewer collapse, rising main burst, equipment failure or from too much water entering the system. Sewer flooding does **not** include extreme storms with a probability of occurring of less than once in 20 years. In their Drainage and Wastewater Management Plans, Southern Water have recorded incidents of internal and external flooding between 2018-2020 within Slowhill Copse Marchwood, Pennington and Ashlett Creek Fawley. External flooding has also been recorded within Thorns Beach, Minstead, Lyndhurst, Flexford Lane Sway, Brockenhurst, Boldre, Beaulieu Village, Beaulieu Hummicks and Bank.

3.5.3 Appendix A Figure 2 include locations of historic flood events recorded by Southern Water in the region. Approximately 26 events are identified to have taken place along the eastern border of the administrative area around Hythe and Totton.

3.5.4 Recorded highway flooding data was provided by HCC for use in this SFRA. This data shows 127 recorded events distributed throughout the administrative area, many of which extend beyond the areas highlighted to be at risk in the RoFSW map.

3.5.5 Recorded surface water flooding in Copythorne village is detailed in the Copythorne village – Flood Risk Investigation Report[27]. Surface water flooding was recorded in the winter of 2000/2001 when surface water entered one property internally, two externally and affected parts of Pollards Moor Road after heavy short-duration rainfall events. Highway flooding was also reported in the winter of 2013/2014 in the Pollards Moor Road area.

3.5.6 Specific records of past surface water flooding are summarised in Table 3-2.

Table 3-2 Records of surface water flooding

Date	Description
3 February 1990	Heavy rain.
23 June 1991	Heavy rain.
2 December 1992	Heavy rain.

[27] Copythorne Village – Flood Risk Investigation Report (December 2021)

20-30 December 1993	Heavy rain. Flooding was noted in Milford-on-Sea, Barton-on-Sea, Portmore, Ashley and New Milton.
29 November 2000-30 March 2001	Very high rainfall, with return periods of 1:50 and 1:200, caused widespread flooding in southern England. The Environment Agency has recorded a number of flood events in Hythe, Portmore, Calmore, Sway, Lymington, Pennington, Bartley, Brockenhurst, Totton, Sway, Marchwood and Minstead. Flooding occurred in Copythorne.
7 July 2001	Severe rainfall.
February 2002	Prolonged rainfall.
14 November 2002	Heavy rain.
1-2 January 2003	Heavy rain.
July 2012	Flash flooding following heavy rainfall led to flooding of the railway line between Brockenhurst and Sway.
Winter 2012 - 2013	A very wet summer led to high ground water levels and further winter rain means the water has nowhere to drain. Flooding occured in Ringwood including Kingsbury Lane, and in Bisterne.
Winter 2013 – 2014	Surface water flooding has led to property flooding and damage to vehicles in Ringwood. Crow, Hightown Road and Eastfield Lane were impassable due to high levels of surface water. Highway flooding in Pollards Moor Road.
November 2023	Road closures as a result of flooding including A337 Lyndhurst Road at the junction with Balmer Lawn Road, B3055 Mill Lane, Rhinefield Road and Brookley Road, in Brockenhurst.
January 2024	Heavy rainfall over a 24-hour period. 36.9mm in Totton, 34mm in Lyndhurst 33.8mm in New Milton and 30mm in Brockenhurst. Roads were flooded and cars abandoned. Property flooding occurred in Bransgore. Surface water flooding impacted central Burley as well as at Boldre and Pilley Hill near Lymington.

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.

3.6 Reservoir flooding

3.6.1 A number of Reservoir Act registered impoundments have been identified within the New Forest administrative area. Aucombe Bottom, Shear Water, White Bird Lake, Bitham Lake and Fonthill Lake are located north of the administrative area, Awbridge Danes Lake, Kentford Lakes and Timsbury Lake are located north east of the area in the Test Valley, a large unnamed pond is located east of Harley, Hatchet Pond and Mill Dam are located to the south east around the Beaulieu, Sowley Pond is located east of East End, several ponds are located around Keyhaven towards the mouth of the Hampshire Avon, and Longham Lakes are located in Longham to the west of the administrative area

3.6.2 Appendix A Figure 6 shows the potential extent of flooding in the unlikely event of a failure of these water bodies when river levels are normal and when rivers are in flood. The mapping shows that the areas at risk include a small area around the north of the Hampshire Avon in Archfield, a strip along the eastern boarder around Totton, a small area around Paultons Park, an area east of Hardley, a small area in Lower Centerton around Bartley Water, areas around the Beaulieu, Hatchet Stream, Sowley Stream, and Danes Stream, and a relatively large area around the Hampshire Avon in Ringwood.

3.7 Summary

Table 3-3 provides a summary of the flood risk to key towns and villages in the study area.

Table 3-3 Summary of flood risk to key towns and villages

Settlement	Tidal / Fluvial (Appendix A Figure 1, 2, 10, 11, 12)	Surface water (Appendix A Figure 3)	Susceptibility to Groundwater (App A Figure 5)	Reservoir inundation (App A Figure 6)
Fordingbridge	The confluence of the Ashford Water and Sweatford's Water lies in the south of Fordingbridge. The River Avon lies to the east its confluence with Sweatford's Water is situated to the south-east. The Flood Zone mapping shows that regions of the settlement lie in Flood Zone 3b, particularly in the south. However, Flood Zone 3b is largely within undeveloped land. The Environment Agency's historic flood outline dataset shows that there has been a history of fluvial flooding at the settlement. Defences to the south-east of Fordingbridge provide protection to areas of land and properties against a 1% AEP event.	Mapping shows that surface water flood risk generally follows similar paths to the watercourses. Away from the watercourses, surface water flood risk is mainly confined to areas of open space and residential roads, particularly Station Road/ Shaftesbury Street and Bowerwood Road.	Potential at surface	None
Ringwood	The River Avon flows to the west of the settlement, with Foulford Bottom and several unnamed drains located to the east and south-east (considered in more detail in the Level 2 assessment). Flood Zones 2, 3a and 3b surround these watercourses in places, with areas of overland flow expanding as flood water flows out of bank. Several properties in the south-west and east of the settlement lie within Flood Zone 2 or 3a. The Environment Agency's historic flood outline dataset shows that there has been a history of flooding in the far south-west of Ringwood. The Environment Agency's flood defence data indicates that defences to the south-west of Ringwood provide protection against the 1.3% AEP event.	Mapping shows that the surface water flood risk tends to follow the paths of the roads. Surface water tends to pond in residential gardens and areas of open space in Ringwood. Specific roads which are at risk of surface water flooding include the A31, Southampton Road, Gorley Road and Linford Road.	Potential at surface	Inundation from the Blashford Lake reservoir could affect properties the far west of the settlement along West Street.
Bransgore	The Bransgore Drain flows from the north-east of the settlement to the west. Much of the centre of Bransgore lies within Flood Zone 2, 3a or 3b resulting from exceedance of the channel/structure capacity and overland flow spreading in a south-westerly direction. Flooding from a small watercourse originating north of Derritt Lane also contributes to overland flood flows.	Surface water flood risk mapping shows that generally surface water flows along the roads. The roads that are at risk include Burnthouse Lane, Betsy Lane, Burley Road, Ringwood Road and West Road.	Potential at surface	None
New Milton / Barton-on-Sea	Danes Stream passes through the north and centre of New Milton and Becton Bunny passes through the centre and east of Barton-on-Sea. Much of the area surrounding the two watercourses lies within Flood Zone 2, 3a or 3b. Several properties in proximity to the watercourse lie within these Flood Zones. The Environment Agency historic flood outline dataset indicates that fluvial flooding has occurred in the Brook Avenue/ Manor Road/Oakwood Avenue area in New Milton. The data also indicates that fluvial flooding has occurred in the Southern Oaks/Albany Close area and Friars Walk in Baron-on-Sea. Flood defences located along Brook Avenue in New Milton offer protection against the 4% AEP flood event.	Mapping shows that the surface water flood risk tends to follow the watercourses or roads.	Potential below ground.	None
Lymington	The Pennington Lake Stream is located in the west of the settlement and the Pennington/Waterford Stream flows through the centre and to the south-east. The tidally influenced Lymington River lies in the far east of the settlement. Flood Zones 2, 3a and 3b surround the Pennington Lake Stream and Pennington/Waterford Stream. Several properties in proximity to these watercourses lie within these Flood Zones. The land to the east and west of the Lymington River also lies within Flood Zone 2, 3a or 3b.	Surface water flood risk mapping indicates that the surface water tends to follow the path of the watercourses and roads. The risk is prominent in the north-east of Lymington and in the Waterford Lane/Stanley Road area.	Along Lymington River, potential at surface. Inland – limited potential.	None

	Within the King's Saltern Road/Bath Road area, much of the land is located within Flood Zone 3a. The Environment Agency historic flood outline data indicates that flooding has occurred in the King's Saltern Road/ Bath Road/Lymington Town Station area. Historical flooding is also noted along Undershore Road. Flood defences along the Lymington River protect against the 4%, 1% and 0.5% flood events. Tidal locking has the potential to increase levels upstream in the Lymington River due to the watercourse not being able to discharge effectively during high tide.			
Brockenhurst	A tributary of the Lymington River flows through the centre of Brockenhurst. The tributaries confluence with the Lymington River lies to the north-east of the settlement. Alongside this watercourse lies Flood Zones 2, 3a and 3b and several properties are included in these areas. The Environment Agency historic flood outline data indicates that there is a history of fluvial flooding at the settlement caused by the Lymington River tributary. Historic flood events are noted in the town during 1966, 1990, 2000.	Mapping shows that the surface water flood risk predominately follows the path of the watercourses and is greatest at the confluence of the tributary and the Lymington River. Surface water is also noted to follow the path of the roads, particularly the B3055.	Limited potential.	None
Blackfield	The Stanswood Stream lies in the north-east of the settlement and the River Darkwater is situated to the south-west. Flood Zones 2, 3a and 3b lie either side of the watercourses. Properties in Valley Close are situated in Flood Zone 2 and 3a.	The surface water flood risk predominately follows the flow of the watercourse. The risk also tends to follow the paths of the roads, with Hampton Lane and Lepe Road at risk. Surface water is noted to pool between Hampton Lane and Tom's Down.	Potential below ground.	None
Holbury	The River Darkwater lies to the west of the settlement. Flood Zones 2, 3a and 3b lie either side of the watercourse. Part of Park Lane and a property lie within Flood Zone 3b.	The surface water flood risk predominately flows along the roads and watercourse.	Limited potential.	None
Hythe	The source of the flood risk in the area is a combination of fluvial and tidal. The Hythe South Watercourse flows through the south of the settlement, with a number of connected drains and culverted watercourses in the area. The Hythe Centre Watercourse flows through the centre of the settlement and is mostly culverted. The North Dibden Stream is situated to the north of Hythe with several connected drains in the area. Southampton Water lies to the east of the settlement. Unnamed tributaries of the River Beaulieu lie in the west of Hythe. Flood Zones 2, 3a and 3b lie either side of the North Dibden Stream and the Hythe South Watercourse. As majority of the Hythe Centre Watercourse is culverted, Flood Zones 2, 3a and 3b lie either side of the watercourse as the culvert ends. As the watercourse flows towards Southampton Water it is no longer surrounded by Flood Zone 3b. Environment Agency data indicates that flooding occurred on South Street in the winter of 2000/2001. The data also shows that flooding occurred along Prospect Place and The Promenade caused by the sea in 2009.	Mapping shows that the surface water flood risk predominately follows the similar path of the roads and watercourses. Roads which are at risk include Southampton Road, South Street and Shore Road.	Along Southampton Water frontage – Potential at surface. Inland – limited potential.	None
Marchwood	The tidally influenced River Test lies to the north-east of the settlement. The tidal Magazine Lane Stream crosses the north of Matchwood, with Cracknore Hard Stream in the south. Flood Zones 2, 3a and 3b lie either site of the Magazine Lane Steam but are predominately located towards the north-west of the watercourse. Flood Zones 2, 3a and 3b are situated in the east of Marchwood which are associated with the Cracknore Hard Stream. The majority of Frobisher Court is situated in Flood Zone 3a although	Surface water flood risk mapping shows that surface water tends to follow a similar flow path to the watercourse and roads. In addition, surface water tends to pool in the Mulberry Road area and the Fifteen Acre Wood area.	Potential at surface	None

	flood zones show the undefended scenario. A large area including fifteen Acre Wood, Gardiner Close and Central Crescent is located with Flood Zones 2, 3a or 3b. Environment Agency historic flood outline data indicates that tidal flooding was experienced in Cracknore Hard Lane and Magazine Lane in 2008 from the Cracknore Hard Stream. The data indicates that flooding occurred on Hythe Road and Long Lane in 2000 although the cause is unknown. Environment Agency flood defence data indicates that defences surrounding Frobisher Court offer protection up to the 0.5% AEP event. However, there remains a residual risk should the defences breach or fail. Tidal locking has the potential to increase levels upstream in the watercourses due to the watercourses not being able to discharge effectively during high tide.			
Totton / Calmore	A number of tidally influenced watercourses flow through and in the vicinity of Totton and Calmore. The River Test lies to the east, with its tributary Calmore Canal passing through Calmore and a further tributary is located in the centre of Totton. Bartley Water and its tributaries pass through the south of Totton. Flood Zones 2, 3a and 3b follow the paths of the watercourses. Many properties in the Calmore/Hammond's Green/Testwood area are situated in Flood Zones 2, 3a or 3b, although flood zones show the undefended scenario. Many properties in the Hawkers Close, Greenfield Avenue and Testwood Lane areas are also located in Flood Zones 2, 3a and 3b. Environment Agency historic flood data indicates that floods have occurred at the Marchwood Road/Burt Lane area, Jacob's Gutter Lane, Calmore Road and the Down's Park/Eling Hill crossroads. Environment Agency Flood defences in the Eling area provide some level of protection up to the 2% AEP event. Defences along the Calmore Canal offer protection against the 4% AEP event.	Mapping indicates that surface water flood risk tends to follow paths of the watercourses and roads. The area between Calmore/Totton/Hammond Green is at particularly high risk.	Potential at surface	Test floodplain, to the east of Totton shown to be at risk of inundation in the event of a breach in combination with flooding from rivers.
Lyndhurst	The Beaulieu River flows through the north of the settlement, with a tributary located to the north of Custards. A number of drains are situated to the south of Lyndhurst. Flood Zones 2, 3a and 3b follow the River Beaulieu and its tributary, resulting in several properties in the Custards area being located within these Flood Zones. The Environment Agency historic flood data indicates that flooding was caused by the River Beaulieu in the Custards area during November 1995.	Mapping indicates that surface water flood risk tends to follow the paths of the watercourses. Areas at higher risk include the Custards, The Meadows area and Gosport Lane.	Limited potential / Potential at surface	None

4. Assessing the cumulative impact of development and land use change

Cumulative impact assessment

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

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

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

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

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

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

4.1.4 Appendix A Figure 7 shows the outputs for New Forest. A red, amber, green rating has been used to highlight those catchments where there is a higher, medium, and lower potential for cumulative effects on flood risk. This figure shows that there is low potential for cumulative impact of development on flood risk across most of the north west, as well a smaller area to the south east around Penerley Trib, Sowley Stream and Dark Water. The remaining area is associated with medium potential.

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

Cross boundary considerations

4.1.6 Several water bodies within the New Forest Dc and NPA study area cross borders between different administrative areas, and other water bodies come close to the border. It is important to consider how actions in one administrative area may impact upon another area. The cross boundary flows to consider within New Forest include:

- The source of the Hampshire Avon is in the Wiltshire administrative area (where it is named the Bourne upstream), from where it flows in and out of the Test Valley, back into Wiltshire, into the New Forest, in and out of Dorset, and finally discharges into Christchurch Harbour within Dorset.
- Ashford Water is almost all located within the New Forest administrative area, but just crosses into the Dorset administrative area south of Sandleheath.
- The source of the Sleep Brook is on the New Forest-Dorset border.
- The Clockhouse Stream discharges into Christchurch Harbour within Dorset.

- The source of the Mude is in the New Forest administrative area, from where it flows south through Dorset and into Christchurch Harbour.
- The Blackwater has several branches, with some rising in Wiltshire and others in New Forest; the branches join into a single stream that flows along the New Forest-Test Valley border.
- The Cadnam River joins the Blackwater along the New Forest-Test Valley border.

4.1.7 Communication with these neighbouring LPAs and LLFAs that cross catchments is important to ensure action in one does not negatively impact upon the other.

5. Current control, mitigation, and management measures

5.1 Defences

5.1.1 Data provided by the Environment Agency from their Asset Information Management System (AIMS) is included in Appendix A Figure 2. This data is the best available for the SFRA but is not a complete dataset of the flood defences present in the study area. The National Coastal Erosion Risk Mapping (NCERM) is presented in Appendix B Figure 2 and provides a useful indication of the type of frontage, e.g., embankment, gabions, natural, revetment, seawall, timber structure, other etc.

5.1.2 The mapping in Appendix A Figure 2 shows high ground lining both sides of the Cadnam River, Highland Water, Black Water, Lymington River, Dark Water and Becton Bunny, most of the Fletchwood Trib, Bartley Water, Beaulieu, Ober Water, Avon Water and Danes Stream, and around some of the Blackwater and Sowley Stream. High ground is also found around some of the smaller watercourses in the area. Embankments are present around parts of the Blackwater, Bartley Water, Cadnam River, Danes Stream, Sowley Pond and some smaller watercourses. Walls have been installed around parts of Bartley Water and Danes Stream.

5.1.3 The standard of protection provided (SoP) by these assets varies, as does the condition. The SoP ranges between 100% (1 in 1 year) and 0.5% (1 in 200 years). The higher return period defences are generally found closer to the coast.

5.1.4 Flood defences are additionally shown around the coast line: there are embankments, walls, and areas of high ground all along the south coast from Keyhaven to the mouth of the Lymington River. Walls are also present where the Dark Water meets the sea, and along the coasts of Hythe and Marchwood.

5.1.5 Most coastal defences have been designed with a SoP of 0.5% (1 in 200 years).

5.1.6 Table 5-1 provides a summary of the key defences across the study area.

Table 5-1 Description of flood defences

Location	Description of Defences
Fordingbridge / Martin / Rockbourne / Woodgreen	In the Bridge Street area of Fordingbridge, several flood walls, embankments and demountable defences are in proximity to the River Avon. Also within Fordingbridge, flood walls are located to the west of West Mills Road and Reeder Close. Embankments are located along the River Avon in Breamore and Brickton, with further embankments situated to the south of Fordingbridge along the Midgham Drain and along the Ashford Water in Martin. The overall condition of the defences in the area. The majority of the defences are in either 'good' or 'fair' condition. The data indicates that the standard of protection varies from protection against the 1 in 2-year event to the 1 in 100-year event. The Hampshire Avon CFMP states that over the last 25 years, engineering schemes have been implemented to reduce flood risk in the catchment including Fordingbridge.
Ringwood	Several walls and embankments lie in the west of Ringwood. The defences protect Ringwood from the Bickerley Millstream and are in fair to good condition and the defences offer protection against the 1 in 75-year event.
New Milton / Milford-on-Sea / Lymington	Embankments, walls and a number of flood gates are situated along the coastline from New Lane to the Lymington Marina. From Lymington Marina to Lymington New Forest Hospital, lie walls, flood gates, quays and embankments which offer flood protection against the Lymington River. Embankments and walls offer protection along areas of the Dane Stream and its tributaries. These include the Milford Crescent area of Milford-on-Sea, the Downton Lane area of Downton, Stopples Lane in Hordle and Brook Avenue in New Milton. The defences vary in condition from very poor to very good. Some of the small defences are noted to offer 'zero' standard of protection particularly in the Lymington, Keyhaven and Stopples Lane areas and therefore the standard of protection is unknown. However, most of defences protect against the 1 in 200-year event. The New Forest CFMP states that a flood storage reservoir on Danes Stream protects Milford-on-Sea. The Danes Stream has been significantly modified for flood defence purposes in Milford-on-Sea. The New Forest CFMP also states that Lymington benefits from a Flood Alleviation Scheme.

East Boldre	The flood defences in the East Boldre area consist of embankments. An Embankment is situated to the south of Sowley Lane and is noted to offer 0 standard of protection. Therefore, the level of protection is unknown and further advice should be sought from the relevant authority if these defences may be influential to development. Further embankments are located along the right and left bank of the Beaulieu River in Bucklers Hard and continue along the right bank to Needs Ore Point. The defences are in either good or fair condition and defences along the Beaulieu River offer protection against the 1 in 10, 25 or 100-year events.
Calshot Spit to Hythe Marina	1.2km of shingle ridge and concrete wall defences in this area of Southampton Water are located along the lee of Calshot Spit, in three individual lengths near the former Fawley Power Station site and along a 1.7km stretch south of Hythe, which is protecting Hythe village. Calshot spit also affords some protection by preserving the low energy environment of the currently eroding saltmarshes.
Cadnam / Totton / Marchwood / Hythe	There are a number of defences located in the north-east of the study area. Embankments lie either side of the Pollardsmoor Stream in Copthorne. These defences are in good or fair condition and either offer protection against the 1 in 5 or 25-year event. Embankments border the majority of the Calmore Canal, which are either in good or fair condition and offer protection against the 1 in 25-year event. Tidal and fluvial defences are located along Barley Water in Rushington. These are a combination of walls and embankments, they are in good, fair or very poor condition and either offer no protection or protect against the 1 in 5 or 50-year event. Along the River Test lies a number of embankments, flood gates, walls and beaches which provide fluvial, tidal, and coastal protection. The defences are in very good, good or fair condition and offer protection from the 1 in 25, 50, 100 or 200-year events. Several defences in Marchwood Industrial Park area offer 0 standard of protection from flood events. Therefore, the level of protection is unknown and further advice should be sought from the relevant authority if these defences may be influential development. An embankment is situated along the North Didben Stream to the north of Hithe. The embankment is in good condition and offers protection from the 1 in 25-year event. Along the bank of the River Test in Hythe lie embankments, walls, and a promenade. These are in good or fair condition and offer protection from either the 1 in 25 or 200-year event.

5.2 Coastal Protection Works, Milford-on-Sea

5.2.1 A series of coast protection works were constructed at Milford-on-Sea between 1936 and 1968, to better protect the cliff from erosion. This means that the local source of beach material is significantly reduced, and the coastline is now fixed and cannot naturally change over time. As a result, beach control structures are required (to reduce long-shore drift and retain material) as well as beach recharge. Without these measures seawalls would be very vulnerable to failure.

5.2.2 Several storms in 2020 led to significant erosion on the beach and overtopping of the seawall at Westover, Milford-on-Sea. Half of the seawall eventually collapsed due to the foundations becoming undermined, and the other half was in a state of collapse. Large waves on the seafront therefore made their way to the cliffs behind and continued eroding them[28].

5.2.3 The Milford-on-Sea Coastal Protection Works scheme was an emergency project to reinstate the protection of the Milford-on-Sea coast. The project has been split into two phases, with Phase 1 completed in January 2021.

5.2.4 Phase 1 involved creating a rock revetment to protect 180m of the seawall that had not yet completely failed, preventing further failure, and reducing the wave impact on the structure. The constructed rock revetment joined an existing revetment fronting the White House. This emergency revetment installation allows for a full works scheme across the whole frontage to now be designed in more detail (Phase 2). For more information on Phase 2, refer to Section 6.1.

5.3 Beach Recharge, Milford-on Sea

5.3.1 Coastal protection works around Christchurch Bay, including Milford-on-Sea, has led to a reduction in the natural supply of beach material. New Forest DC instigated a scheme in 2008 to undertake regular beach recharges to replenish the beaches at Milford-on-Sea, and since then over 50,000 tonnes of material has been added to these beaches. Recharge works were undertaken in 2021 and have

[28] New Forest District Council, Westover, Milford-on-Sea Urgent Coast Protection Works https://www.newforest.gov.uk/article/1695/Westover-Milford-on-Sea-urgent-coast-protection-works

increased protection to the seawall[29]. In 2023, 4.500 tonnes of material were placed on the beach. Without the supply of additional material, beach levels will further deplete. The level of the beach fronting the beach hut seawall at the eastern end of the frontage is currently very low. If beach levels drop too low, there is a potential that the seawall will become undermined, ultimately resulting in the failure and collapse occurring. It is likely that this would quickly lead the loss of the beach huts and the promenade, then other infrastructure further back. Property would also become increasingly at risk from erosion. The beach recharge is intended to replace some of the recent losses and mitigate against possible failure of the seawall until additional protection works can be undertaken.

5.4 Timber Groyne Maintenance, Milford-on-Sea

5.4.1 Milford-on-Sea is exposed to high energy waves and damaging storms due to its location in the Bay. Coupled with the composition of the beach, this results in significant abrasion and damage to the timber groynes along the Milford-on-Sea frontage. The groynes require replacing typically every 3 to 5 years.

5.4.2 As part of New Forest District Council's on-going programme of timber groyne repairs, the groynes at Milord-on-Sea are regularly replaced.

5.4.3 In order to make these works as efficient as possible and reduce disturbance, timber groyne repairs are undertaken at the same time as the beach recharge.

5.4.4 The maintenance of these groynes will improve the level of coastal flood protection to Milford-on-Sea.

5.5 Flood Warning Service

5.5.1 The Environment Agency operates a Flood Warning Service[30] in respect to main river and tidal flooding across England. 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.

5.5.2 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[31].

5.5.3 There are 18 Flood Warning Areas in New Forest which are shown in Appendix A Figure 9 and are as follows:

- Coast at Lymington and Keyhaven including Pitts Deep and Sowley
- Coast at Calshot, Lepe, Hythe, Marchwood, Eling and Redbridge
- Danes Stream from Ashley (New Milton) to Milford-on-Sea
- Bickerley, Ringwood and the B3347 from Christchurch to Stony Lane in Christchurch
- Brockenhurst and Boldre on the River Lymington, and The Weirs through Angel Valley
- Lymington on the River Lymington
- Beaulieu including Beaulieu estuary and the open coast between Thorns Beach and Needs Ore Point
- Coast at Fawley, including Fawley Power Station and Oil Refinery
- Groundwater flooding for Pentridge and Cranborne
- The Bridges, Little Thatch, Watermead, Capberton, Three Bridges and Old Bridge Cottage, West Street, Avon Edge and Stubbings Meadow Caravan Park in Ringwood

[29] New Forest District Council, Milford-on-Sea Beach Recharge https://www.newforest.gov.uk/article/2720/Milford-on-Sea-Beach-Recharge
[30] Environment Agency, Check for Flooding in England https://check-for-flooding.service.gov.uk/
[31] Environment Agency, 2022, Sign up for Flood Warnings https://www.gov.uk/sign-up-for-flood-warnings

- Areas in Britford, Charlton All Saints, Downton and Fordingbridge in close proximity to the River Avon
- Groundwater flooding for Damerham and Martin
- Kingsby Lane, Bickerley Terrace, West Street, Riverside, Lynes Lane, Kings Arm Lane, Strides Lane and Market Place in Ringwood
- Roman Quay, Timbermill Court and Bowerwood in Fordingbridge
- Landford, Wellow Mill, and Wade Bridge, on the River Blackwater
- A3057 Greatbridge Road, Romsey, Broadlands, Testwood and Totton Bypass on the River Test
- Ashurst Bridge, Rushington, Brokenford, and Eling on the Bartley Water
- Groundwater flooding for the Cranborne Chase in West Hampshire including Rockbourne

5.5.4 The Environment Agency publishes 'Water situation: area monthly' reports for England'[32] 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'[33] 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.

5.5.5 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".

5.6 Residual Risk

5.6.1 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.

5.6.2 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 provide a relatively robust depiction of flood risk for specific conditions, all modelling requires the making of core assumptions and the use of empirical estimations relating to (for example) rainfall distribution and catchment response.

5.6.3 Steps should be taken to manage these residual risks through the use of flood warning and evacuation procedures, as described in Section 6 and 7.

[32] Water situation: area monthly reports for England 2022 https://www.gov.uk/government/publications/water-situation-local-area-reports
[33] Groundwater: current status and flood risk https://www.gov.uk/government/collections/groundwater-current-status-and-flood-risk

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 provides guidance on the range of measures that could be considered in order to control and mitigate flood risk. These measures should be considered when preparing a site-specific FRA.

6.1 Flood and Coastal Erosion Risk Management (FCERM) schemes

6.1.1 The programme of FCERM schemes[34] identifies three proposed schemes in the New Forest administrative area for the next 6 year period:

- Calmore and Totton Flood Alleviation Scheme,
- Hurst Spit Beach Management Plan 2021/22 to 2025/26, and,
- Westover, Milford-on-Sea Coastal Protection Works - Phase 2.

Calmore and Totton Flood Alleviation Scheme

6.1.2 The Calmore Canal passing through Totton exacerbates surface water flooding after heavy rain because culvert restrictions cause high water levels reducing the efficiency of the road drainage network. A Flood Alleviation Scheme is in the pipeline to reduce the flood risk to Calmore and Totton, however no further information has been reported.

6.1.3 **Recommendation:** Where appropriate, development adjacent to the Calmore Canal in Totton should facilitate the delivery and maintenance of a Flood Alleviation Scheme through site design and financial contribution.

Hurst Spit Beach Management Plan 2021/22 to 2025/26

6.1.4 Hurst Spit is becoming increasingly vulnerable to damage due to the net loss of shingle, which is putting the flood embankments behind it and the habitats and species it protects at risk. To resolve this, the Environment Agency, in partnership with New Forest District Council, Hampshire County Council, Natural England and JBA Consulting are exploring options for a sustainable future for the coastal frontage between Hurst Spit and Lymington[35].

6.1.5 The Hurst Spit to Lymington project look forwards into the next 100 years and appropriately explores what an adaptive coastline could and should look like.

Westover, Milford-on-Sea Coastal Protection Works – Phase 2

6.1.6 This scheme is a continuation of the Coastal Protection Works outlined in Section 5.2.

6.1.7 Beach levels at the eastern end of the beach hut seawall are currently extremely low, and it is becoming increasingly difficult to retain a beach. As a result, the seawall is becoming increasingly vulnerable to failure. Whilst beach recharges have sustained beach levels, in the long-term small scale beach recharges are not sustainable or efficient.

6.1.8 Phase 1 of the project involved constructing an emergency 180m rock revetment to protect a damaged section of the seawall from further failure.

6.1.9 Phase 2 is a long term solution and involves designing and constructing a full works scheme to provide the required protection across the whole frontage, over and above the urgent works undertaken in Phase 1.

[34] 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
[35] Environment Agency, Hurst Spit to Lymington Project Information Page https://consult.environment-agency.gov.uk/solent-and-south-downs/hurst-spit-to-lymington-project/

6.1.10 To prevent eventual failure, a proposal to install a rock revetment has been put forward and this has now received planning permission. The work also requires a Marine Licence from the Marine Management Organisation; the application for this is being undertaken simultaneously with the planning application. This is a long process and requires careful assessments in terms of the potential environmental impacts of the works. It is, however, hoped that a licence will be issued in time for the rock revetment to be constructed around March / April 2024.

6.1.11 **Recommendation:** Retain the Coastal Change Management Area for Barton-on-Sea to Milford-on-Sea.

6.2 Safeguard land for defence improvements

6.2.1 As detailed in Section 2, the North Solent SMP and Poole and Christchurch Bays SMP set out the policies for each of the policy units along the New Forest coastline. The Christchurch Bay and Harbour FCERM Strategy and the Hurst Spit to Lymington Strategy will continue to develop the preferred options for each policy unit.

6.2.2 It is vital that New Forest DC and NPA safeguard land in accordance with these strategies for the implementation of these measures over the coming years.

6.2.3 The following policy units are identified for 'hold the line':

- 5C14 Redbridge to Calshot Spit
- 5C15 Calshot Spit
- 5C18 Salternshill to Park Shore
- 5C19 Park Shore to Sowley
- 5C21 Elmer's Court to Lymington Yacht Haven
- 5C22 Lymington Yacht Haven to Saltgrass Lane
- 5F01 Hurst Spit
- A.1 Hurst Spit
- A.2 Milford Seafront
- A.3 Rook Cliff

6.2.4 The Environment Agency will seek a 16 metre set back from flood defences for maintenance purposes. Permission is required for any activity within 16m of a sea defence structure, or within 16m of the bank of a tidal main river.

6.2.5 The following policy units are identified for managed realignment:

- A.4 Cliff Road
- B.2 Barton-on-Sea Marine Drive East
- B.3 Barton-on-Sea Marine Drive and Marine Drive West
- B.4 Naish Cliff

6.2.6 **Policy Recommendation:** Safeguard land for flood defence maintenance and future upgrades / managed realignment and construction of new set back defences within A1-4, B2-4, 5C14, 5C15, 5C18, 5C19, 5C21, 5C22, 5F01. Where possible, safeguard a 16 metre wide undeveloped buffer strip alongside flood defence structures. Development adjacent to the coastal frontage should facilitate the delivery of improvements to and maintenance of flood defences, through both site design and financial contribution.

6.3 Emergency Planning

6.3.1 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.

6.3.2 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.

6.3.3 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.

6.3.4 New Forest DC is designated as a coast protection authority, and therefore possesses the duties and powers as specified under the Coast Protection 1949[36].

6.3.5 The following existing plans and arrangements for managing flood emergencies are relevant to the New Forest administrative area.

New Forest District Council Emergency Response Plan

6.3.6 New Forest DC have prepared an Emergency Response Plan[37] which sets out the principles of an effective emergency response and provides a plan to enable the Council to respond to a wide range of emergencies, including a flood event.

Wiltshire Council's Householders' Guide for Emergencies

6.3.7 Wiltshire Council have prepared a householders' guide for emergencies[38] which gives information on how to respond to an emergency situation, including emergency evacuation, damage to property and possessions, and specific detail on what to do if you live in an area at risk of flooding.

6.3.8 Further flood advice can be found on the websites for New Forest DC[39], Hampshire County Council[40] and Wilshire Council[41].

6.3.9 **Recommendation:** New Forest DC and NPA 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.

Emergency planning considerations for reservoirs

6.3.10 New Forest DC will need to evaluate the potential damage to buildings or loss of life in the event of dam failure, compared to other risks, when considering development downstream of a reservoir. New Forest DC is also advised to consult with the owners/operators of raised reservoirs, to establish constraints upon safe development.

6.3.11 New Forest DC should also consider any implications for reservoir safety and reservoir owners and operators caused by new development located downstream of a reservoir, such as the cost of measures to improve the design of the dam to reduce flood risk, the operation of the reservoir, and general maintenance costs, by consulting with reservoir owners and operators on plan and development proposals. Local authorities, as category 1 responders, can access more information about reservoir risk and reservoir owners using the Resilience Direct system. Developers should be expected to cover

[36] 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
[37] New Forest District Council, 2015, Emergency Response Plan https://www.newforest.gov.uk/article/1026/Emergency-planning
[38] Wiltshire Council, 2010, Householders' guide for Emergencies https://www.wiltshire.gov.uk/civil-emergencies-flooding-homeowners
[39] New Forest District Council, Emergency Planning https://www.newforest.gov.uk/article/1026/Emergency-planning
[40] Hampshire County Council Flooding Advice https://www.hants.gov.uk/community/emergencyplanning/whattoplanfor/floodingadvice
[41] Wiltshire Council Drainage and Flooding https://www.wiltshire.gov.uk/article/6195/Drainage-and-flooding

any additional costs incurred, as required by the National Planning Policy Framework's 'agent of change' policy (paragraph 193). This could be through Community Infrastructure Levy or section 106 obligations for example.

6.4 Maintenance of watercourses

Main River

6.4.1 The Environment Agency will 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.

6.4.2 Under the Environmental Permitting (England and Wales) Regulations (2016)[42], an environmental permit is required if works are to be carried out:

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

6.4.3 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.

6.4.4 **Policy Recommendation:** Safeguard an 8 metre wide undeveloped buffer strip alongside Main Rivers or flood defence structure and prioritise riverside restoration. Safeguard a 16 metre wide undeveloped buffer strip alongside tidal flood defence structures.

Ordinary watercourse

6.4.5 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.

6.4.6 As the LLFA, Hampshire County Council (HCC) and Wiltshire Council (WC) are responsible for the consenting of works to ordinary watercourses and have 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[43] or WC[44] on their websites.

6.4.7 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 has prepared a Flood Risk Management Guidance for Landowners document which provides information on the rights and responsibilities of riparian owners[45].

6.4.8 WC provides guidance on the Ordinary Watercourse Consent Application, activities that can be consented and a number of other areas relevant to riparian owners on their website[44].

[42] The Environmental Permitting (England and Wales) Regulations 2016 http://www.legislation.gov.uk/uksi/2016/1154/contents/made
[43] Hampshire County Council, Making changes to a watercourse https://www.hants.gov.uk/landplanningandenvironment/environment/flooding/changewatercourse
[44] Wiltshire Council, Land Drainage and Ordinary Watercourse https://www.wiltshire.gov.uk/civil-emergencies-land-drainage-ordinary-watercourse
[45] Hampshire County Council, 2020, Flood Risk Management Guidance for Landowners https://documents.hants.gov.uk/flood-water-management/HCCFloodRiskManagement-Landowners.pdf

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

6.5 River restoration

6.5.1 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.

6.5.2 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.

6.5.3 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[46]. Further guidance on river restoration is available from the Environment Agency[47].

Higher Level Stewardship Scheme

6.5.4 The Verderers of the New Forest Higher Level Stewardship (HLS) Scheme is the largest environmental improvement scheme in England. It supports the ancient tradition of commoning and is restoring internationally important New Forest habitats. Since 2010 the scheme has delivered dozens of projects across the New Forest, totalling 20 miles of restoration to watercourses and approximately 5,000 hectares of SSSI wetland habitats being improved and protected.

6.5.5 Various techniques have been used to restore wetlands in the New Forest. These include filling in drainage ditches, returning straightened streams to their natural curves and meanders, and making over-deepened channels shallower again to encourage out-of-bank flooding in high flows.

6.5.6 Restoring the mires not only protects these special habitats but also means they continue to act as a carbon sink. The slower-moving streams are interacting more naturally with their floodplains, meaning more water is stored during heavy rainfall, as well as making the area more resilient to winter floods and summer droughts. The restoration works should also help to reduce the impact of flood risk downstream[48].

6.5.7 Projects have been completed at the following locations[49]:

- Akercombe Bottom
- Buckherd Bottom
- Camel Green, Queens Meadow and Drivers Nursery
- Claypits Bottom
- Ditchend Bottom
- Fletchers Thorns
- Hawkhill and Furzey Lodge
- Longwater Lawn
- Penny Moor

[46] 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
[47] Environment Agency, Fluvial Design Guidance Chapter 8 https://assets.publishing.service.gov.uk/media/60549ae1e90e0724c0df4619/FDG_chapter_8_-_Works_in_the_river_channel.pdf
[48] River Restoration Helping to Reduce Flood Risk in the New Forest https://www.hlsnewforest.org.uk/2016/02/09/river-restoration-helping-to-reduce-flood-risk-in-the-new-forest/
[49] Forestry Commission, October 2014, New Forest Wetland Restoration: Summary Information on Completed Projects https://www.hlsnewforest.org.uk/app/uploads/sites/3/2018/03/FC_Examples_Completed_Wetland_Restoration_Oct_2014.pdf

- Picket Bottom
- Soldiers Bog
- Markway (undertaken prior to the HLS scheme).

6.5.8 Projects under this scheme have seen drainage channels that were artificially straightened by Victorians restored to more natural schemes. This work has slowed water flow and helped to reduce flood risk and prevent flash floods racing downstream.

6.5.9 The HLS scheme focuses on achieving environmental benefits in priority areas and will eventually transition into the new Countryside Stewardship scheme which will reduce flood risk on a wider scale.

Wessex DWMP

6.5.10 The Wessex DWMP identifies a project on Clockhouse Stream, which flows through Shirley south to Bockhampton. Along this watercourse there is a focus on reconnecting and re-wilding the river. The DWMP also identifies a green recovery challenge project to store the water environment on the Ripley Brook.

6.5.11 **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. This is particularly applicable to culverted sections of watercourses in Totton, Marchwood, Hythe, Ringwood, Bransgore, and New Milton.

6.5.12 **Policy Recommendation:** New Forest DC should explore options for river restoration on the floodplains of the River Avon upstream of Ringwood and Fordingbridge, and of the River Blackwater near Totton, to attenuate the fluvial flood risk to downstream receptors. Suitable restoration measures are likely to include enhancing the sinuosity of floodplain channels, reconnecting channels to natural storage areas on the floodplain, and removing artificial structures such as weirs and culverts.

6.6 Flood storage

6.6.1 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.

6.6.2 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.

6.6.3 Further guidance on Flood Storage is provided within Chapter 10 of the Environment Agency's Fluvial Design Guide[50].

Brockenhurst

6.6.4 Brockenhurst has been identified in the New Forest Catchment Flood Management Plan as an area that should, where possible, seek to extend floodplain storage, creating wetland habitat and providing ecological enhancements such as improving the condition of the Lymington River SSSI.

Higher Level Stewardship Scheme

6.6.5 As described in Section 6.5, under the Higher Level Stewardship Scheme, many projects are being delivered throughout the study area resulting in 5,000 hectares of wetland habitats being improved and protected.

[50] Environment Agency, Fluvial Design Guidance Chapter 10
https://assets.publishing.service.gov.uk/media/60549b7a8fa8f545cf209a29/FDG_chapter_10_-_Flood_storage_works.pdf

6.6.6 **Policy Recommendation:** New Forest DC should encourage and appraise options for creating flood storage areas, either as part of proposed developments or as stand-alone flood risk management strategies, through the removal of embankments or the artificial lowering of natural high ground. This is most appropriate to the River Avon and its tributaries upstream of Fordingbridge and Ringwood, as well as the River Blackwater and its tributaries near Totton.

Floodplain compensation

6.6.7 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.

6.6.8 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.

6.6.9 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[51].

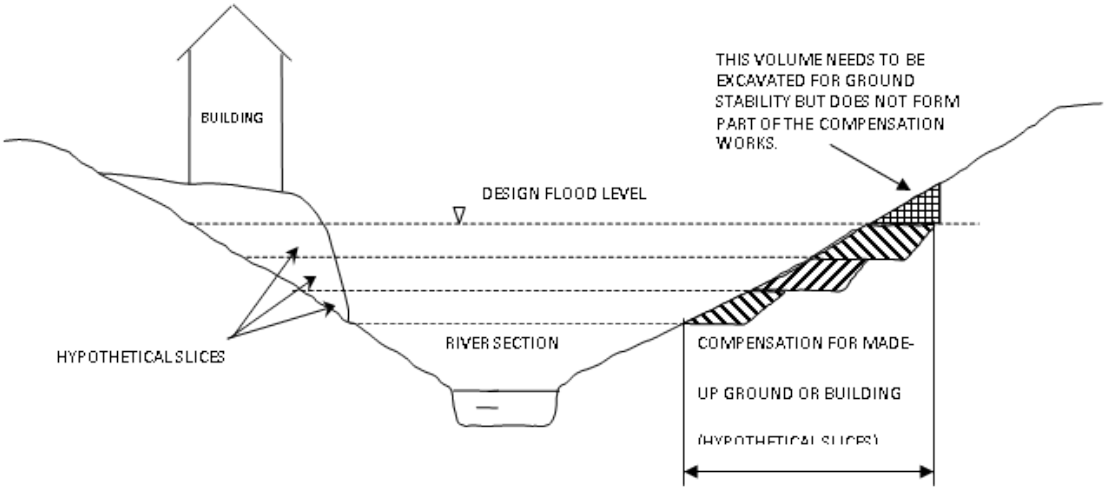


Figure 6-1 Example of Floodplain Compensation Storage (Environment Agency 2009)

6.6.10 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.

6.6.11 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.

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

6.6.12 **Policy Recommendation:** In line with the NPPF, development should be steered away from Flood Zone 3a wherever possible, and the fluvial floodplain should be safeguarded for flood storage. Should redevelopment be proposed within the floodplain of the fluvial watercourses, changes in building footprint, land raising, or other structures could impact upon the ability of the fluvial floodplain to store water. Floodplain compensation storage may need to be provided to ensure no increase in flood risk elsewhere. Where floodplain compensation is required, it must be provided on a level for level, volume for volume basis in relation to the design flood extent, (i.e., 1% AEP fluvial flood event including climate change). Typically, this needs to be provided on land which does not already flood and is within the site boundary.

6.7 Working with natural processes

6.7.1 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.

6.7.2 These types of measures include river restoration and flood storage that have been discussed in Sections 6.5 and 6.6.

6.7.3 Appendix A Figure 8 provides information from the Environment Agency's 'Working with Natural Processes – Evidence Directory'[52] about where these measures could be applied.

6.7.4 This map shows that although there are a lot of existing woodland constraints[53] within the New Forest administrative area, there are still a wide range of opportunities to implement natural processes to alleviate flooding. There are potential opportunities for riparian woodland planting around the majority of watercourses in the administrative area, as well as wide opportunity for floodplain woodland planting, particularly around the Hampshire Avon. It should be noted that large areas of the New Forest are internationally designated for nature conservation purposes with SAC, SPA and Ramsar designations. Woodand planting may not be compatible with the management objectives for these designated sites.

6.7.5 Several areas with potential for floodplain reconnection exist in the north, again focused around the Hampshire Avon, as well as some smaller areas to the south around New Milton. There are fewer areas with floodplain reconnection potential within the New Forest Administrative area, with the largest areas around the Huckles Brook, Dockens Water and Linford Brook.

6.7.6 Further information about these datasets is included in SFRA Report Part 1. Riparian woodland planting also holds the potential to confer environmental benefits such as improved water quality, Biodiversity Net Gain, wildlife corridors, and carbon sequestration, in unison with natural flood management.

6.7.7 **Policy Recommendation:** In partnership with relevant risk management authorities (for example Environment Agency and land owners), explore opportunities to implement natural flood management techniques 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 are substantial opportunities for riparian and floodplain woodland planting across the district, with these being most heavily concentrated on the floodplains of the River Avon (most notably near Fordingbridge, Ringwood, and Sopley), as well as along the tributaries of the River Blackwater near Totton and Avon Water.

Green Infrastructure

6.7.8 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:

[52] 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
[53] Within the Working with Natural Processes Document, project areas of woodland constraint are identified owing to existing woodland, watercourses, peat, roads, rail and urban areas.

- 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.

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

6.7.10 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[54].

6.7.11 **Policy Recommendation:** In partnership with relevant risk management authorities (for example Environment Agency, Hampshire County Council, and land owners), maximise the flood attenuation benefits of the district's GI network through the enlargement of existing, and creation of new riparian and floodplain woodlands, most notably on the floodplains of the River Blackwater and the River Avon, as well as their tributaries.

Nutrient Neutral Development

6.7.12 The water quality of rivers and coastal waters 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 local area which need to be protected from these effects include:

- The Solent Maritime SAC, Solent and Isle of Wight Lagoons SAC, the Solent and Southampton Water SPA, and the Solent and Southampton Water Ramsar site.
- The River Avon SAC, Avon Valley SPA and Ramsar site.

6.7.13 In order for development to be permitted by New Forest DC and NPA, 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 in order for them to be 'nutrient neutral' if they would otherwise lead to a likely significant impact on a Protected 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.

6.7.14 Further information is provided on the NPA website[55] and the New Forest DC website[56] regarding requirements for new development and potential offsetting schemes and.

[54] 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/
[55] New Forest NP Webpage: Nutrient mitigation. https://www.newforestnpa.gov.uk/planning/guidance-on-applying/supporting-documents/nutrient-mitigation/
[56] New Forest DC Webpage: Nutrient neutral development. https://www.newforest.gov.uk/article/2714/Nutrient-neutral-development

6.7.15 **Policy Recommendation**: Supplement the offsetting of nutrients from new development through the creation of natural buffer zones and wetlands in parts of the study area that are at greatest risk of surface water flooding.

6.8 Surface water management

6.8.1 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.

6.8.2 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.

6.8.3 The CMPs set out additional expectations for priority areas of Lymington, Brockenhurst, New Milton South, Ringwood, Totton, Totton South East, Hythe, Cadnam and Ower.

6.8.4 Where major development is due to take place, HCC will make it best practice that a pre-application assessment is sought by the developer for the surface water management features of any proposed development, and HCC will ensure LPAs only approve new developments that sufficiently demonstrate that a rigorous maintenance regime will be implemented for their surface water management systems.

6.8.5 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.

6.8.6 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

6.8.7 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.

6.8.8 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 ideally be achieved by incorporating Sustainable Drainage Systems (SuDS). Consideration of sustainable drainage systems early in the design process for development, including at the pre-application or master-planning stages, can lead to better integration, multi-functional benefits and reduced land-take.

6.8.9 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.

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

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

6.8.11 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[57] 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[58] for guidance on the design, maintenance, and operation of SuDS.

6.8.12 The NPPF[59] currently states that major developments (10 dwellings or more; or 1,000sqm non-residential floor space) should incorporate SuDS unless there is clear evidence that this would be inappropriate. Schedule 3 of the FWMA is due for implementation in 2024 and requirements for SuDS may therefore change. The New Forest District Local Plan[60] states in Policy ENV3 that all new development is required to incorporate design measures that improve resource efficiency and climate change resilience and reduce environmental impacts wherever they are appropriate and capable of being effective, such as the use of SuDS.

6.8.13 HCC have outlined their stance towards SuDS in the Local Flood and Water Management Strategy (2020) document[61], 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.

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

6.8.15 At the time of writing Schedule 3 has not been enacted. However, the Jenkins Review[62] published in January 2023, made recommendations that Schedule 3 be enacted by Defra. The current indication by Defra is that Schedule 3 is likely to be enacted during 2024.

6.8.16 When considering planning applications, New Forest District Council and New Forest National Park should seek advice on the management of surface water from the relevant flood risk management bodies, principally Hampshire County Council and Wiltshire Council. This should ensure that the development's proposed minimum standards of operation are appropriate, and, through the use of

[57] CIRIA C697 SuDS Manual. Available from: https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS
[58] Sustainable drainage systems: non-statutory technical standards, 2015 https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards
[59] Ministry of Housing, Communities and Local Government, 2021, National Planning Policy Framework https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf
[60] New Forest District Council, 2020, Local Plan https://www.newforest.gov.uk/media/705/Local-Plan-Document-2016-2036/pdf/Local_Plan_2016-2036_Part_One_FINAL.pdf?m=637329191351130000
[61] Hampshire County Council Local Flood and Water Management Strategy https://documents.hants.gov.uk/flood-water-management/local-flood-water-management-strategy.pdf
[62] Defra, Updated July 2021, Surface water and drainage: a review of responsibilities https://www.gov.uk/government/publications/surface-water-and-drainage-review-of-responsibilities

planning conditions or planning obligations, that there are clear arrangements for on-going maintenance over the development's lifetime.

6.8.17 Within the New Forest District Local Plan, several strategic site allocations have highlighted the incorporation of SuDS within their plans, including:

- Strategic Site 8: Land at Hordle Lane, Hordle – Enhance land along the stream and tree belt that forms the western boundary of the site as a natural recreational greenspace area and wildlife corridor, incorporating sustainable drainage measures to manage watercourse flood risks and surface water runoff.
- Strategic Site 10: Land to the east of Brockhills Lane, New Milton – Manage flood risk from the Danes Stream and its tributary in an ecologically sensitive manner, integrating sustainable drainage measures around existing watercourses and the greenspace framework for the site.
- Strategic Site 13: Land at Moortown Lane, Ringwood – Integrate sustainable drainage features to manage watercourse and surface water flood risk in the eastern part of the site.

6.8.18 **Policy Recommendation:** Strengthen the existing surface water policy requirements for proposed developments in parts of the administrative area that are at the greatest risk of surface water flooding such as Fordingbridge, Totton, Hythe, Ringwood, Brockenhurst, Bransgore, and New Milton. As advocated by the CMPs, New Forest DC and NPA are encouraged to consider setting requirements in these sub-areas of a 50% betterment of surface water runoff rates for significant brownfield developments, and the provision of surface water exceedance flow generated by hydraulic modelling for significant greenfield developments.

Limiting urban creep

6.8.19 **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 CMPs).

6.9 Flow routing

6.9.1 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.

6.9.2 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.

6.9.3 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.

6.9.4 **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.

6.10 Risk of groundwater flooding

6.10.1 **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.

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

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

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

6.10.3 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.

6.10.4 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.

6.10.5 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.

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

6.11 Consulting with Water companies

6.11.1 Southern Water and Wessex 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, the relevant water company will assess whether the public system has the capacity to accept the flows or provide a solution that identifies necessary mitigation if not.

6.11.2 **Recommendation:** As part of their Sites Allocation process, New Forest DC and NPA should consult with Southern Water or Wessex 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. Section 6 provides details on measures to reduce the causes and impact of flooding. Section 7 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.*

Sections 6 and 7 outline the approach that New Forest DC and NPA should consider in relation to flood risk planning policy and development management decisions. These measures should also be considered when preparing a site-specific FRA.

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 the SFRA Part 1 (reproduced from PPG Table 2) provides a compatibility matrix and determines which types of development are appropriate in areas of flood risk[63].

7.3 Finished floor levels

7.3.1 **Policy Recommendation:** All development within Flood Zones 2 and 3 should set finished floor levels above the design flood level (0.5% AEP for tidal flooding, 1% AEP for fluvial 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.

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

[63] Planning Practice Guidance Flood Risk and Coastal Change https://www.gov.uk/guidance/flood-risk-and-coastal-change#table1

7.3.3 Guidance document "Accounting for residual uncertainty: an update to the fluvial freeboard guide – technical report"[64] 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. Most developments should use this guidance document to determine freeboard, the only exceptions to this being minor developments that fall under the standing advice for flood risk.

7.3.4 With reference to the 'Flood risk assessment: standing advice for flood risk'[65], finished floor levels should be a minimum of whichever is higher, 300mm above the general ground level of the site or 600mm above the estimated river or sea flood level.

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

7.3.6 There are also circumstances where flood resilience measures should be considered first. These are described further in Section 7.8. For both Less and More Vulnerable developments where internal access to higher floors is required, the associated plans showing the access routes and floor levels should be included within any site-specific FRA.

7.4 Protection against groundwater flooding

7.4.1 Although many of the 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.

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

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

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

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

7.4.5 *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,

[64] 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
[65] Preparing a flood risk assessment: standing advice https://www.gov.uk/guidance/flood-risk-assessment-standing-advice

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.

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

- Homeowners Guide to Flood Risk66 – lists various measures that are applicable to flooding in general, and,
- Flooding from groundwater67 - Practical advice to help homeowners reduce the impact of flooding specifically from groundwater.

7.5 Access / escape

7.5.1 **Policy recommendation:** New development must have safe access / escape during the design flood (0.5% AEP for tidal flooding, 1% AEP for fluvial flooding) including an appropriate allowance for climate change. 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.

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

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

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

7.5.4 A useable 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) without the intervention of emergency services or others during design flood conditions, including climate change allowances (i.e., 0.5% tidal flood event or 1% AEP fluvial flood event and surface water 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[68]).

7.5.5 In some circumstances, safe access above the design flood event (1% AEP fluvial flood level or 0.5% AEP tidal flood level) may not be achievable. In these circumstances the Environment Agency and the LPA should be consulted to determine whether the safety of the site occupants can be satisfactorily

[66] Homeowners guide to flood resilience. Know Your Flood Risk, July 2018. https://www.floodguidance.co.uk/wp-content/uploads/2018/07/KnowYourFloodRiskGuide_July18.pdf
[67] Environment Agency, 2011, Flooding from groundwater. Accessed April 2022 https://www.gov.uk/government/publications/flooding-from-groundwater
[68] 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

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. The LPA may also seek a higher financial contribution to raising the levels of strategic shoreline defences from the developers of sites where the provision of safe access/escape routes is not achievable.

7.5.6 The guidance document 'Flood Risk Emergency Plans for New Development' published by the Environment Agency and ADEPT[69] provides more detail on safe access and escape.

7.6 Places of safety

7.6.1 **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.

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

7.6.3 However, places of safety play an important role where, for whatever reason, evacuation in advance of flooding is not achieved. Places of safety should be designed to facilitate rescue in case emergency care is needed or if it's unlikely to be safe for occupants/users to wait until flood waters have receded sufficiently.

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

7.7 Emergency Plans

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

7.7.2 **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.

7.7.3 The Environment Agency has a tool on their website to create a Personal Flood Plan[70]. 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.

7.7.4 Emergency Plans should include:

- How flood warning is to be provided, such as:
  - Availability of existing flood warning systems,
  - Where available, rate of onset of flooding and available flood warning time, and,
  - How flood warning is given.

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

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

7.7.5 There is no statutory requirement for the Environment Agency or the emergency services to approve emergency plans. The LPA 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, New Forest DC and NPA 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.

7.8 Flood resistance and resilience strategies

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

7.8.2 'Property Flood Resilience' is an approach to building design which aims to reduce flood damage and speed recovery and reoccupation following a flood. It uses a combination of flood resistance and recovery measures and is described in the industry-developed CIRIA Property Flood Resilience Code of Practice71, which provides advice for both new-build and retrofit. It includes specific guidance for local authority planners.

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

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

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

[71] 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

7.8.5 Where historic buildings are involved, early consultation with Historic England should be undertaken and their guide[72] on flood resilience for historic properties provides additional information.

Flood Resistance 'Water Exclusion Strategy'

7.8.6 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.

7.8.7 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.

7.8.8 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.

7.8.9 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'

7.8.10 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.

7.8.11 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.

7.8.12 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.
- Design access to all spaces to permit drying and cleaning.
- Raise the level of electrical wiring, appliances and utility metres.

7.8.13 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

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

designed in such a way as to prevent entrainment of debris which in turn could increase flood risk and/or breakaway posing a danger to life during high flows.

7.9 Local Design Codes

7.9.1 **Recommendation:** It is recommended that New Forest DC and NPA 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[73] (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 HCC in their capacity as the LLFA.

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

8. Next Steps

8.1 Next steps

8.1.1 New Forest DC and New Forest NPA should use this SFRA and associated mapping to:

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

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

8.2 Future monitoring and update

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

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

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

Appendix A Figures

Appendix B Tidal Flood Risk Mapping

B.1 Southampton Model

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)

B.2 Milford to Lymington Model

1 Coastal Erosion Risk

2 Future Coastal Flood Zones

Defended

Maximum Flood Depth Figures

3 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2020

4 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2050 (Higher Central)

5 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2120 (Higher Central)

6 Maximum Flood Depth: Defended 1 in 200 Year (0.5% AEP) 2120 (Upper End)

Maximum Flood Hazard Figures

7 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2020

8 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2050 (Higher Central)

9 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2120 (Higher Central)

10 Maximum Flood Hazard: Defended 1 in 200 Year (0.5% AEP) 2120 (Upper End)

Undefended

11 Maximum Flood Depth: Undefended 1 in 200 Year (0.5% AEP) 2120 (Upper End)

12 Maximum Flood Hazard: Undefended 1 in 200 Year (0.5% AEP) 2120 (Upper End)