Hampshire Local Flood Risk Management Strategy

July 2013

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Foreword

The Flood & Water Management Act, which came into being in 2010, placed a number of statutory duties on Hampshire County Council in its new role as Lead Local Flood Authority to address local flood risk. One of these duties is to produce a Local Flood Risk Management Strategy.

We have worked closely with partners, local communities, residents and interested parties in preparing this Strategy to help us understand the broad nature and extent of flood risk across Hampshire. This will help us greatly improve our knowledge of flood risk in Hampshire; an understanding on which we hope to build over time.

The evidence and information within it will also place Hampshire County Council in a strong position to be able to bid for future funding from central Government, as it becomes available, to address flood problems across Hampshire.

Alongside this Strategy Hampshire County Council is putting in place plans and procedures for flood investigations and compiling a register of flood risk features. A programme of district Surface Water Management Plans is also in preparation to further improve our understanding of flooding issues around the county, and to provide clarity on how we will implement our duties under the Act.

This is an over-arching strategy, setting the scene for more detailed assessments of flood risk in the future. It should be seen as the first step in understanding flood risk in Hampshire rather than an end in its own right.

Enhancing Hampshire's environment and promoting sustainability are key priorities for Hampshire County Council, to which this Strategy will make a significant contribution.

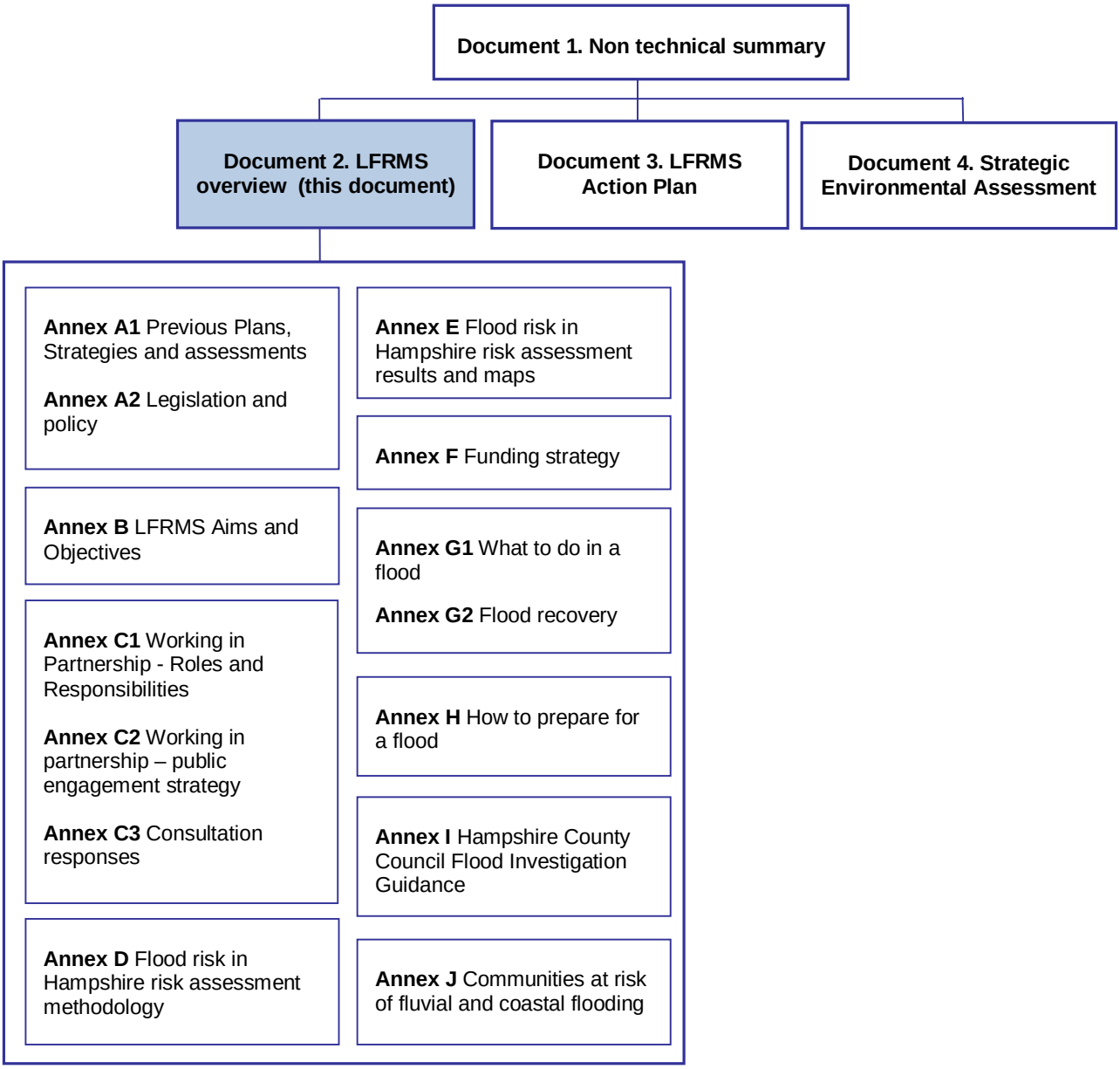
Councillor Seán Woodward

Executive Member for Economy, Transport and Environment

Hampshire County Council

www.hants.gov.uk/flooding

The LFRMS structure



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Glossary and Abbreviations

Aquifer	Layer of water-bearing permeable rock, sand or gravel which is capable of providing significant amounts of water.
Catchment	The extent of land which catches and holds rainwater.
Catchment Flood Management Plan (CFMP)	Strategic planning tool through which the Environment Agency works with other key decision-makers within a river catchment to identify and agree policies for sustainable flood risk management.
Combined Sewer System	Sewer system that carries both sewage and storm water.
Communities and Local Government (CLG)	Communities and Local Government is the Government department which sets policy on local government, housing, urban regeneration, planning and fire and rescue. They have responsibility for all race equality and community cohesion related issues in England and for building regulations, fire safety and some housing issues in England and Wales. The rest of their work applies only to England. Provides funding to and agrees expenditure plans for Local Authorities
Cost-Benefit Analysis	Analysis which quantifies in monetary terms the costs and benefits of a proposed scheme, including items which the market does not provide a readily available monetary value for. Sometimes referred to as Benefit-Cost Analysis.
DG5 Register	A water company held register of properties which have experienced sewer flooding (either internal or external flooding) due to hydraulic overload, or properties which are ‘at risk’ of sewer flooding more frequently than once in 10 years.
Designing for Exceedance	Designing for Exceedance is an engineering philosophy or approach which aims to plan for and manage flows which are larger than the designed capacity of infrastructure during rainfall events. An example of deigning for exceedance would be the use of car parks to store water during flood events. Construction Industry Research and Information Association (CIRIA) have published a designing for exceedance best practice manual.

Environment Agency (EA)	The Environment Agency is the leading public body for protecting and improving the environment in England and Wales today and for future generations. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways. It will also have a new strategic overview for all forms of inland flooding.
Exceedance Flows	Excess flow that appears on the surface once the capacity of the underground drainage system is exceeded.
Exception Test	When a development type is not compatible with flood risk in a particular location, the exception test may be applied if there are valid reasons as to why the development should proceed.
FCERM	Flood and Coastal Erosion Risk Management
Floods Directive	The EU Floods Directive came into force in November 2007 and is designed to help Member States prevent and limit the impact of floods on people, property and the environment. It was transposed into English law in December 2009 by the Flood Risk Regulations.
Flood Risk Assessment (FRA)	An assessment of the likelihood and consequences of flooding in a development area so that development needs and mitigation measures can be carefully considered.
Flood Zones	These are a national dataset held by the Environment Agency and show the predicted probability of flooding for any given area. The zones were created following Defra's Making Space for Water pilot study. This was a Government programme that sought to take forward the developing strategy for flood and coastal erosion risk management in England.
Flood Zone 1	Low probability of flooding – Land considered as having less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
Flood Zone 2	Medium probability of flooding – Land considered as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding in any year (0.5% to 0.1%).
Flood Zone 3a	High probability of flooding – Land considered as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea in any year (>0.5%).

Flood Zone 3b	The Functional Floodplain – This zone comprises land where water has to flow or be stored in times of flood. Land within this zone is considered to flood with an annual probability of 1 in 20 (5%) or greater in any year, or has been designed to flood in an extreme (0.1%) flood.
Flood defence Grant in Aid (FDGiA)	Grant in Aid funding is provided by Defra to the Environment Agency to invest in flood risk management schemes.
Fluvial flooding	Flooding from rivers.
FMfSW	The Environment Agency's Flood Map for Surface Water.
Foul Flooding	Flooding that is contaminated with sewage.
Greenfield Run-off Rate	The rate of runoff which would occur from a site that was undeveloped and undisturbed.
Groundwater flooding	Flooding caused by raised groundwater levels, typically following prolonged rain. High groundwater levels may result in increased overland flow flooding
Internal Drainage Boards	Drainage districts have been established in the most drainage sensitive parts of the country; low lying areas a prolonged risk from flooding. Drainage boards are responsible for the improvement and maintenance of rivers, drainage channels and pumping stations, as well as consenting, providing planning advice, advising on SuDS adoption and emergency response within their districts.
Lead Local Flood Authority (LLFA)	Lead Local Flood Authorities are unitary authorities or County Councils, and have been established as part of the Flood and Water Management Act. LLFAs are responsible for leading the co-ordination of flood risk management in their area, but can delegate flood or coastal erosion functions to another risk management authority by agreement.
Local Development Framework (LDF)	A non-statutory term used to describe a folder of documents which includes all the local planning authority's Local Development Documents (LDDs). The local development framework will also comprise the statement of community involvement, the local development scheme and the annual monitoring report.
Local Resilience Forums (LRF)	LRFs are multi-agency forums, bringing together all organisations who have a duty to co-operate under the Civil Contingencies Act, and those involved in responding to emergencies. They prepare emergency plans in a co-ordinated manner.

Main River	Main Rivers are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. A main river is defined as a watercourse shown as such on a main river map, and can include any structure or appliance for controlling or regulating flow or water in, into or out of a main river. The Environment Agency's powers to carry out flood defence works apply to main rivers only. Main rivers are designated by Defra.
Making Space for Water	Government Strategy for flood and coastal erosion risk management in England.
Multi-Agency Flood Plans (MAFP)	Multi-Agency Flood Plans are specific emergency plans which should be developed by LRFs, to deliver a coordinated plan to respond to flood incidents.
Ordinary Watercourse	An ordinary watercourse is any other river, stream, ditch, cut, sluice, dyke or non-public sewer which is not a Main River. The local authority or Internal Drainage Board has powers over such watercourses.
Overland Flow/Surface Water Run-Off	Water flowing over the ground surface that has not reached a natural or artificial drainage channel.
Pitt Review	An independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.
Planning Policy Statement 25 (PPS 25)	Sets out Government policy on development and flood risk to ensure that flood risk is taken into account at all stages in the planning process, to avoid inappropriate development in areas at high risk of flooding, and to direct development away from areas at highest risk.
Pluvial Flooding	'Pluvial' flooding (or surface runoff flooding) is caused by rainfall and is that flooding which occurs due to water ponding on or flowing over the surface before it reaches a drain or watercourse.
Preliminary Flood Risk Assessment (PFRA)	Requirement under the EU Floods Directive/Flood Risk Regulations. The LLFA must complete a preliminary assessment report on past and future flood risk, and identify significant flood risk areas using national datasets.
Pluvial Flooding	Flooding from rainfall – another name for surface water flooding.
Rate Support Grant	Funding mechanism from CLG to Local Authorities, which provides funding for all Local Authority responsibilities.

Regional Flood and Coastal Committee (RFCC)	RFCCs have replaced Regional Flood Defence Committees following the Flood and Water Management Act. They consult with the Environment Agency to help develop flood risk management solutions, as well as providing advice on community engagement, coastal erosion, incident management and emergency planning within their regions. They also have a responsibility for raising local levies and providing an accountable forum for testing new ideas and ways of working.
Resilience Measures	Resilience measures are designed to reduce the impact of water that enters property and businesses, and could include measures such as raising electrical appliances.
Resistance Measures	Resistance measures are designed to keep flood water out of properties and businesses, and could include flood guards for example.
Riparian Owners	A riparian owner is someone who owns land or property adjacent to a watercourse. A riparian owner has a duty to maintain the watercourse and allow flow to pass through freely.
Risk	In flood risk management risk is defined as the probability of a flood occurring *x* consequence of the flood.
River Basin Management Plan (RBMP)	A management plan for all river basins required by the Water Framework Directive. These documents will establish a strategic plan for the long-term management of the River Basin District, set out objectives for water bodies and, in broad terms, what measures are planned to meet these objectives, and act as the main reporting mechanism to the European Commission.
SuDS Approval Body (SAB)	The County Council.
Sequential Test	A planning principle that seeks to identify, allocate or develop land in low flood risk zones before land in high risk zones.
Shoreline Management Plan (SMP)	A plan providing a large-scale assessment of the risk to people and to the developed, historic and natural environment associated with coastal processes. It presents a policy framework to manage these risks in a sustainable manner.
Source Protection Zones (SPZ)	Zones defined by the Environment Agency for groundwater sources (wells, boreholes and springs used for public drinking water supply) showing the risk of contamination from any activities that might cause pollution in the area.
South East Plan	A broad development strategy for a region for a 15 to 20 year period prepared by the South East England Partnership Board.

Special Protection Area (SPA)	Areas protected under the EU Birds Directive which support significant numbers of wild birds and their habitats.
Strategic Flood Risk Assessment (SFRA)	A SFRA provides information on areas at risk from all sources of flooding. The SFRA should form the basis for flood risk management decisions, and provides the basis from which to apply the Sequential Test and Exception Test (as defined in PPS25) in development allocation and development control process.
Surface Water Flooding	In the context of this report, surface water flooding describes flooding from sewers and ordinary water courses that occurs as a result of heavy rainfall.
Sustainable Urban Drainage Systems (SuDS)	Sustainable drainage systems or sustainable (urban) drainage systems: a sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate and by attenuating and conveying surface water runoff slowly compared to conventional drainage. SUDS can operate at different levels; ideally in a hierarchy of source control, local control and regional control.
Water Framework Directive (WFD)	EC water legislation designed to improve and integrate the way water bodies are managed throughout Europe. The WFD came into force on in December 2000. Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015.

Abbreviations

AStSWF	Areas Susceptible to Surface Water Flooding
BDBC	Basingstoke and Deane Borough Council
CIL	Community Infrastructure Levy

DEFRA	Department for Environment, Food and Rural Affairs
EBC	Eastleigh Borough Council
EHBC	East Hampshire Borough Council
EIA	Environmental Impact Assessment
FBC	Fareham Borough Council
FRM	Flood Risk Management
FWD	Flood Warning Direct
FWMA	Flood and Water Management Act 2010
GBC	Gosport Borough Council
GHG	Greenhouse Gas
GWSWMP	Ground Water Surface Water Management Plan
HBC	Havant Borough Council
HCC	Hampshire County Council
HDC	Hart District Council
HRA	Habitats Regulations Assessment
HRF	Hampshire and Isle of Wight Resilience Forum
LDD	Local Development Documents
LFRMS	Local Flood Risk Management Strategy
LPA	Local Planning Authority
NFCERMS	National Flood and Coastal Erosion Risk Management Strategy
NFDC	New Forest District Council
PUSH	Partnership for Urban South Hampshire
RBC	Rushmoor Borough Council
RMA	Risk Management Authority
SE7	South East Seven
SWMP	Surface Water Management Plan
TVBC	Test Valley Borough Council
WCC	Winchester City Council

1 Introduction

1.1 Why flood risk is important in Hampshire?

1.1.1.1 The risk of flooding is an important issue across Hampshire with parts of the coastline low-lying with many towns and villages located near rivers. These areas

are vulnerable to flooding both from the sea, and also from rivers following heavy rainfall.

1.1.1.2 Due to a changing climate, the risk of flooding may increase as sea levels rise, winter rainfall increases and intense storms become more frequent. This means more people are likely to be at risk more often. Flooding can never be completely prevented but can be managed by measures to reduce both how likely it is to occur and the impact when it occurs.

1.1.1.3 The Hampshire Local Flood Risk Management Strategy (LFRMS) is an important new tool to help individuals, communities, businesses and authorities understand and manage flood risk within the county. Its primary focus is on **local flooding** from surface water, groundwater or ordinary water courses such as streams and ditches. Hampshire County Council is now responsible for managing this type of flood risk. Local flooding is becoming increasingly common, and is becoming increasingly important, but until recently there has been little understanding of the risks or actions to address the risk. Historically flood risk management has concentrated on high impact and often low frequency river and tidal flooding. In addition, there has been a lot of confusion over who to contact about flooding, particularly surface water flooding.

Local flooding is described in more detail in Chapter 2 of this document

1.1.1.4 Traditional approaches to flood risk management will need to be supplemented by everyone working together and by those at risk taking responsibility to help themselves, alongside the threat from flooding being reduced through robust planning policies, good land management practices, and regular maintenance of water bodies and water management structures. However the risk of flooding cannot be completely eliminated, nor can flood damage be entirely prevented. Where investment is required, it is important that it is spent in the highest risk areas, and that it is spent as effectively as possible. This Strategy has therefore undertaken a **county wide risk assessment** using the most recent and the most detailed data and evidence available on a county wide scale.

The Hampshire County current and future flood risk assessment is presented in Chapter 4 and Annexes D and E

1.1.1.5 However, for those who suffer flooding, it matters little what type of flooding is causing the problem. Sometimes it is not even clear what the type of flooding is Who to contact in an emergency, who to contact when you have experienced flooding, **who is responsible** for managing the risk, and **what you can do to protect yourself** are important questions that need to be answered.. Therefore this Strategy aims to provide information about all forms of flooding and the organisations involved in all aspects of flood risk management, from flood protection to dealing with a serious flooding event. It will not repeat information that is available elsewhere but will signpost the reader to relevant material.

Detailed Information about Flood risk management roles and responsibilities can be found in Chapter 3 and Annex C1

1.2 Why are we doing this now?

1.2.1.1 The Flood and Water Management Act 2010 (FWMA) creates a new role for County Councils and Unitary Authorities as Lead Local Flood Authorities (LLFAs). The Act requires LLFAs to develop, maintain, apply and monitor a Strategy for local flood risk management (a Local Flood Risk Management Strategy – LFRMS) in its area.

Chapter 2 and Annex A2 provides further detail about the legislation and policy that covers local flood risk

1.2.1.2 The requirements of the Act and the duties it hands to LLFAs means that Hampshire County Council, like other unitary and county authorities across the country, is now responsible for the management of flood risk related to groundwater, surface water and ordinary watercourse flooding. This Strategy is the means by which the County Council will discharge its duty to provide leadership and coordinate local flood risk management.

1.2.1.3 The Environment Agency still retains responsibility for coastal and river flooding - therefore the County Council does not have a direct responsibility to deal with flooding from these sources. However, given the extensive length of coastline in Hampshire the LFRMS does not ignore risk management issues arising from coastal or Main River flooding. Whilst not wishing to operate beyond the County Council's powers there are clear and important links between coastal processes and surface water flooding and the Strategy recognises this.

1.2.1.4 Where there is a risk of flooding from combined sources, or where the responsibility for flooding is not clear, Hampshire County Council will take a lead role in determining responsibility and coordinating other bodies.

1.3 What area this Strategy covers?

1.3.1.1 Although the geographic county of Hampshire includes the cities of Portsmouth and Southampton, these districts are unitary authorities and LLFAs in their own right, as is the Isle of Wight Council. Therefore this LFRMS does not cover Southampton, Portsmouth or the Isle of Wight. The administrative county of HCC is shown in Figure 1.1 below.

1.4 Who this Strategy is relevant to

1.4.1.1 The Strategy sets out measures to manage the local flood risk in Hampshire and is relevant to anyone who lives, works, visits or travels in the county. The Risk Management Authorities[1], the Environment Agency, District Councils and Highways Authorities must act consistently with the Strategy, and Water and Sewerage Providers must have due regard for the Strategy when delivering their services.

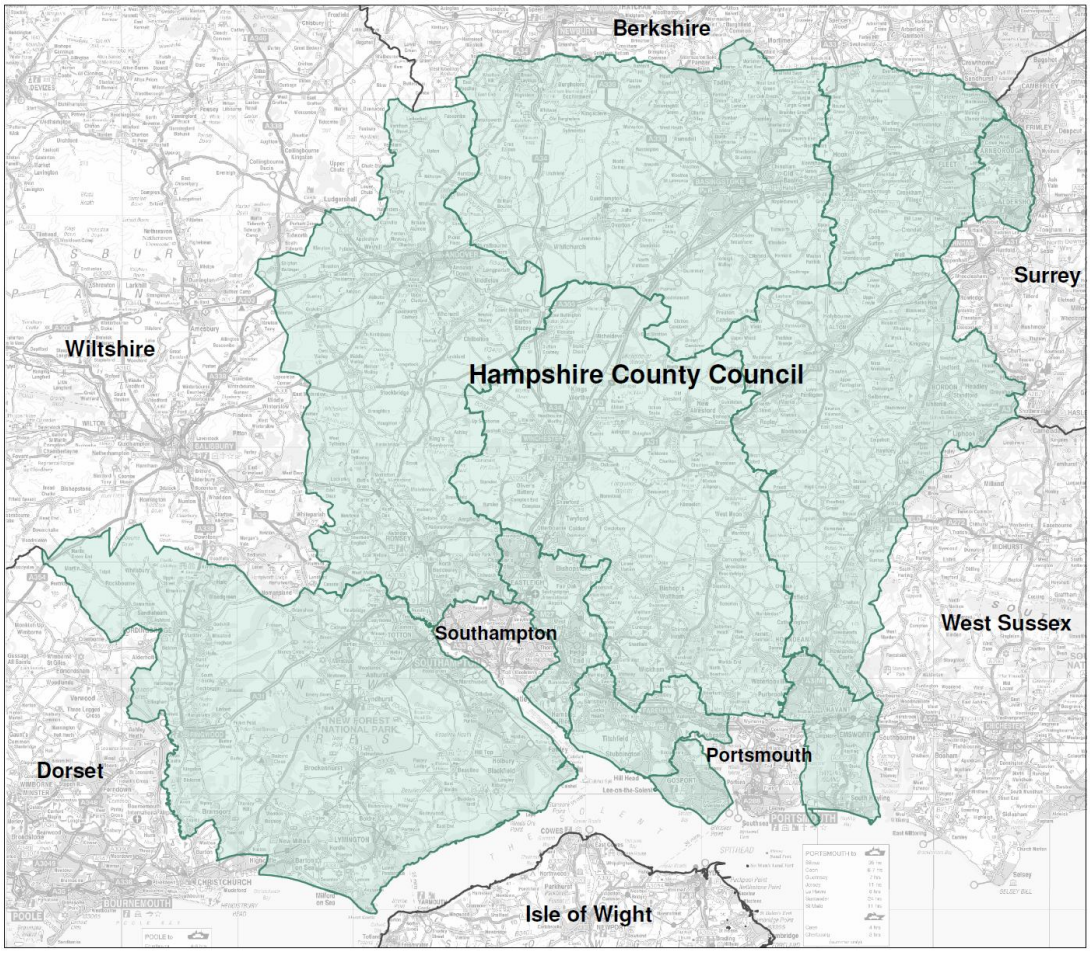


Figure 1-1 Administrative county of Hampshire

1.5 Who has been involved in developing this Strategy?

1.5.1.1 In order to co-ordinate flood risk management activity across Hampshire County Council and other flood risk management authorities, the County Council

[1] Risk Management Authorities are defined in the Flood and Water Management Act as the LLFA, district/borough councils, the Environment Agency, water and sewerage companies, the Highways Authority and Internal Drainage Boards. Their role in LFRM is discussed in Annex C1.

established a Strategic Flood & Water Management Group comprising representatives from across the County Council and a range of other organisations. A LFRMS steering group was established under the governance of the Strategic Group, and that steering group has been responsible for:

The partner and public engagement process is discussed in Chapter 3 and Annex C2

- developing the aims and objectives of the Strategy ensuring the most relevant and contemporary flood risk data is used
- ensuring consistency with the Environment Agency National Flooding and Coastal Erosion Risk Management Strategy and that it meets the requirements of all Risk Management Authorities in Hampshire
- identifying interested parties and ensuring the engagement process is inclusive

1.5.1.2 Figure 1.2 shows how the steering group is governed and communicates with other parties.

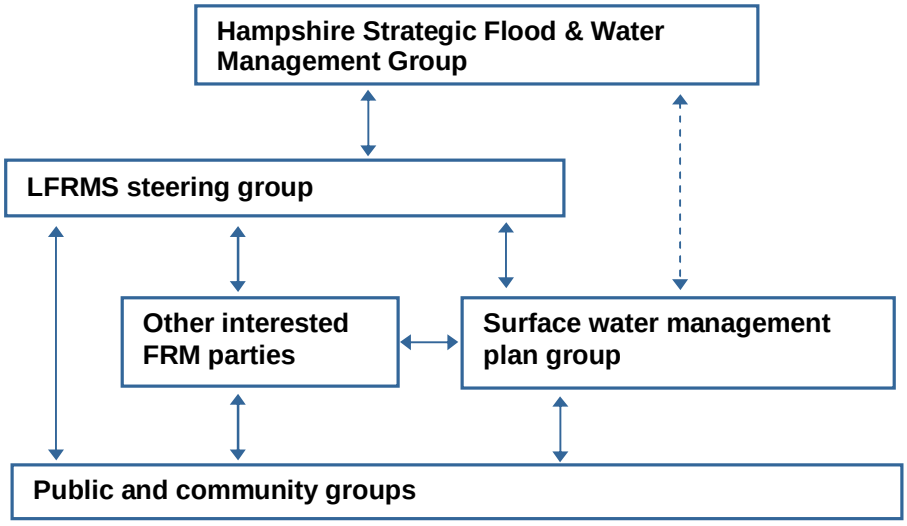


Figure 1-2 LFRMS governance

1.5.1.3 Figure 1.3 details the members of the LFRMS steering group.

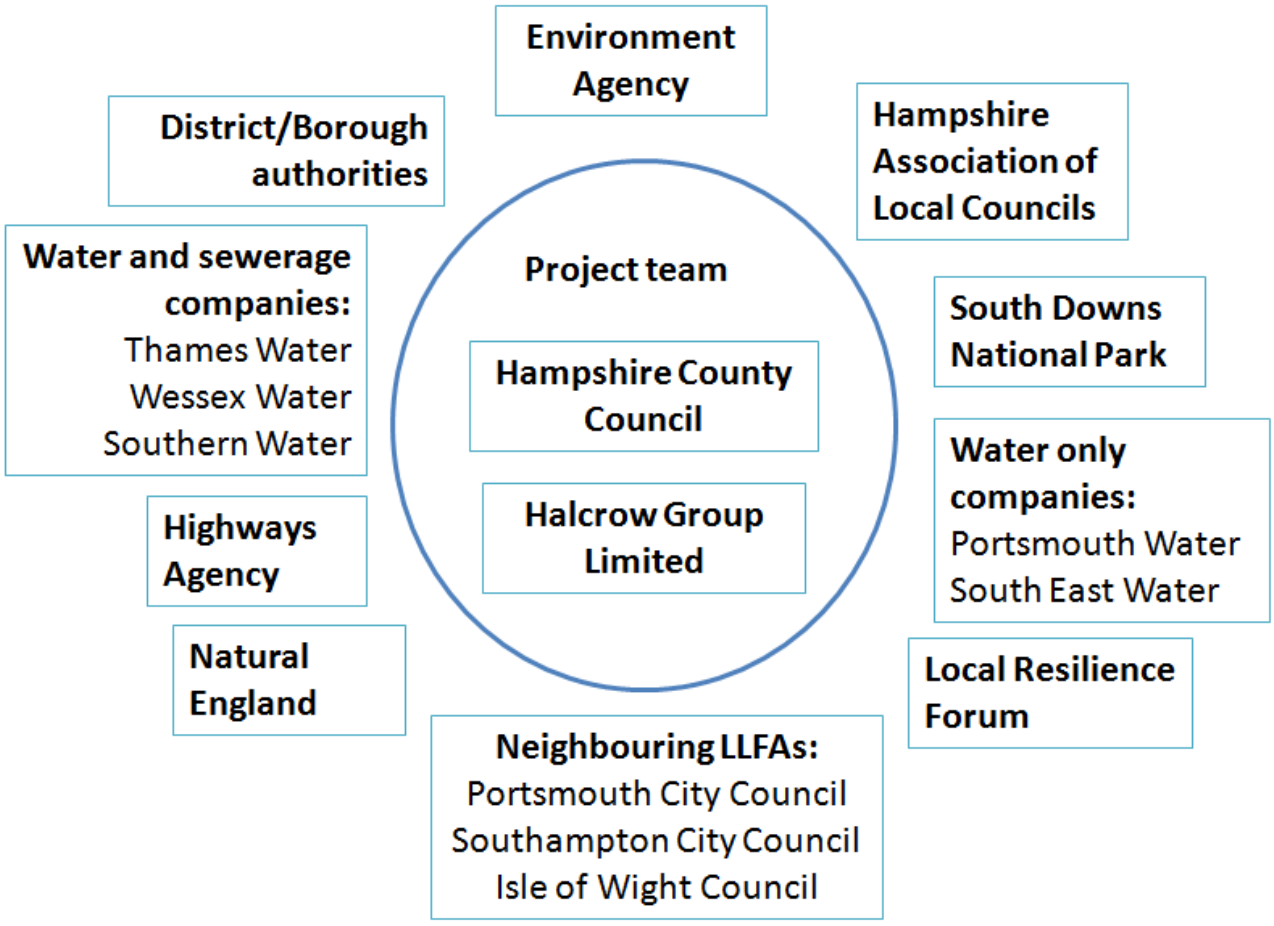


Figure 1-3 LFRMS steering group

1.6 Working together to achieve multiple benefits

1.6.1.1 The most cost effective measures to improve local flood risk management will only be determined and delivered through partnership working. By working with our partners and other interested parties, including community groups, Hampshire County Council will identify local flood risk management measures and together determine the most appropriate ways of funding these. Annex F details our funding strategy, and identifies the main funding mechanisms available to us. In order to successfully attract funding for local flood risk management measures, Hampshire County Council will need to ensure that every pound spent is effective. Where local flood risk management schemes are proposed, these schemes will need to demonstrate multiple benefits, not just flood risk mitigation, in order to attract funding. This will require close partnership working with interested parties and other risk management authorities.

Annex F identifies the main funding mechanisms available for local flood risk management

1.7 What period does this Strategy cover?

1.7.1.1 This Strategy has a 15 year timeframe, covering April 2013 to March 2028. This timeframe has been chosen to ensure sufficient longevity and that it can take a

short, medium and long term view of flood risk across the county. It will also ensure that it is valid over a period that matches local plans being developed in accordance with the National Planning Policy Framework. There will be a formal update of the Strategy following the review of the Preliminary Flood Risk Assessment (PFRA) in 2017. A number of triggers have also been identified that would require the Strategy to be reviewed. This is discussed in Chapter 6.

1.7.1.2 Both the LFRMS Action Plan and the framework for monitoring environmental performance of the LFRMS will be reviewed concurrently on a two yearly cycle. This will help ensure that throughout it's life the Strategy is up to date and known to be performing.

1.8 Assessments of the LFRMS

1.8.1.1 As the LFRMS could have significant effects on the environment, either positive or negative, it has been the subject of a Strategic Environmental Assessment (SEA), which follows the requirements of the SEA Directive (2001/42/EC) and the UK SEA Regulations. The SEA included consideration of how the LFRMS meets Water Framework Directive (2000/60/EC) requirements for water quality and hydromorphology. A separate Habitats Regulations Assessment (HRA) screening has been undertaken, to ensure the LFRMS complies with the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EC) and their transposing UK Habitats Regulations.

1.9 Next steps

1.9.1.1 The Strategy has been developed as a suite of documents and assessments that combine to provide the overall strategic direction of local flood risk management in Hampshire. The LFRMS Action Plan is a separate document to the main Strategy document to enable the Action Plan and the Strategy to be reviewed and revised independently as necessary. The Strategic Environmental Assessment is a statutory document and must therefore be presented as a standalone document. These documents are supported by a non-technical summary and a series of annexes.

1.9.1.2 Figure 1.4 below shows how the different documents combine to form the overall Strategy.

1.9.1.3 This strategy is the first step in a continuous process, which will put us in a stronger position to understand local flood risk, and to secure FRM funding to deliver improvements to the quality of life for the residents of Hampshire. This Strategy is based on the latest information and it is accepted that our understanding of flood risk may change over time as data and information is updated. Therefore the Strategy will be kept up to date to reflect new information on local flood risk management as it becomes available and reviewed at defined milestones and triggers (as outlined above).

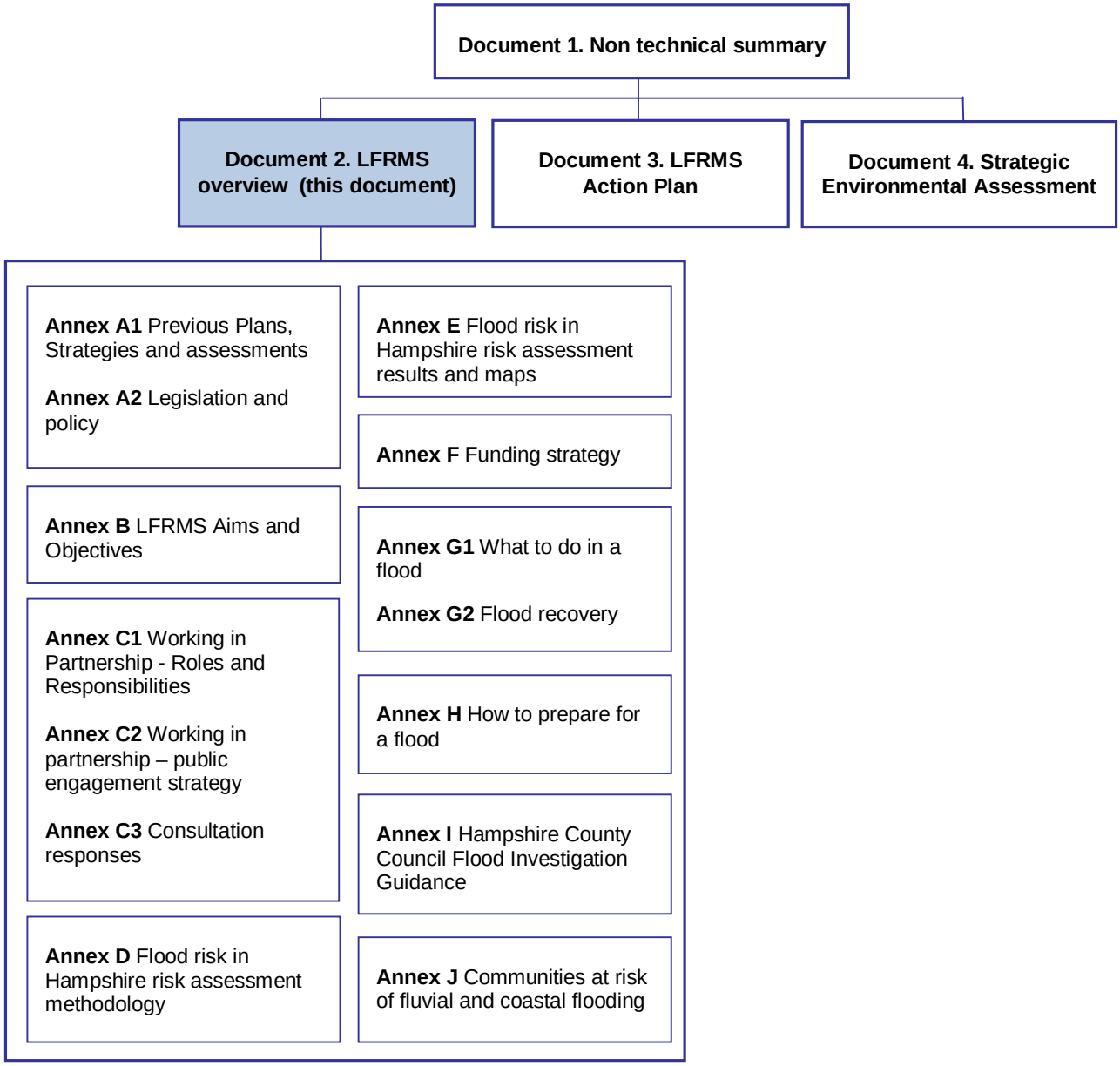


Figure 1-4 - Structure of the Local Flood Risk Management Strategy document

2 Local Flood Risk Management Strategies

2.1 What is a LFRMS and why produce a LFRMS

2.1.1.1 Flooding is a natural phenomenon which can bring benefits to the environment such as improving soil fertility, increasing stores of groundwater and maintaining biodiversity in floodplains and along rivers. However where flooding affects people and property it can have devastating effects, threatening health and life, and incurring substantial costs. Hampshire County Council wants to manage flooding in a way that will benefit people, property and the environment.

2.1.1.2 Following the flooding in the summer of 2007, which affected much of the UK, the Government commissioned Sir Michael Pitt to carry out a review to examine the event and identify how the risk of flooding could be reduced. This review 'Learning Lessons from the 2007 floods' recognised that there were major limitations in the ways that flooding was managed. It proposed that upper tier authorities should lead local flood risk management and coordinate the different groups involved in this. The Flood and Water Management Act 2010 implements many of Sir Michael Pitt's recommendations and provides an opportunity for better management of flood risk.

2.1.1.3 Under the Flood and Water Management Act, Hampshire County Council is now a Lead Local Flood Authority (LLFA) and has new statutory powers and responsibilities for understanding and coordinating local flood risk management, in partnership with other organisations in Hampshire. Local flood risk management includes flooding from surface runoff, ordinary watercourses and groundwater. Key to our new responsibilities is that we must **'develop, maintain, apply and monitor a Strategy for local flood risk management' in Hampshire.** The Local Flood Risk Management Strategy (LFRMS) is the means by which we are doing this. It must be consistent with the National Flood and Coastal Erosion Risk Management Strategy (NFCERMS) published by Defra and the Environment Agency[2] and provides the vision and direction of flood risk management in Hampshire.

2.1.1.4 Building on other plans (see Figure 2.1 below, and Annex A1) this LFRMS identifies the extent of local flood risk in Hampshire, establishes priorities for managing local flood risk, and identifies how Hampshire County Council will work together with Risk Management Authorities, other interested parties, and local communities to manage local flood risk. As part of the LFRMS we have produced an LFRMS Action Plan which outlines measures to achieve the Strategy's objectives, investment needs and planned actions to manage local flood risk in Hampshire. Chapter 5 details the measures and actions for areas with the very highest risk required to deliver the Strategy objectives.

Other plans that precede or inform this strategy are available in Annex A1.

[2] http://www.environment-agency.gov.uk/research/policy/130073.aspx

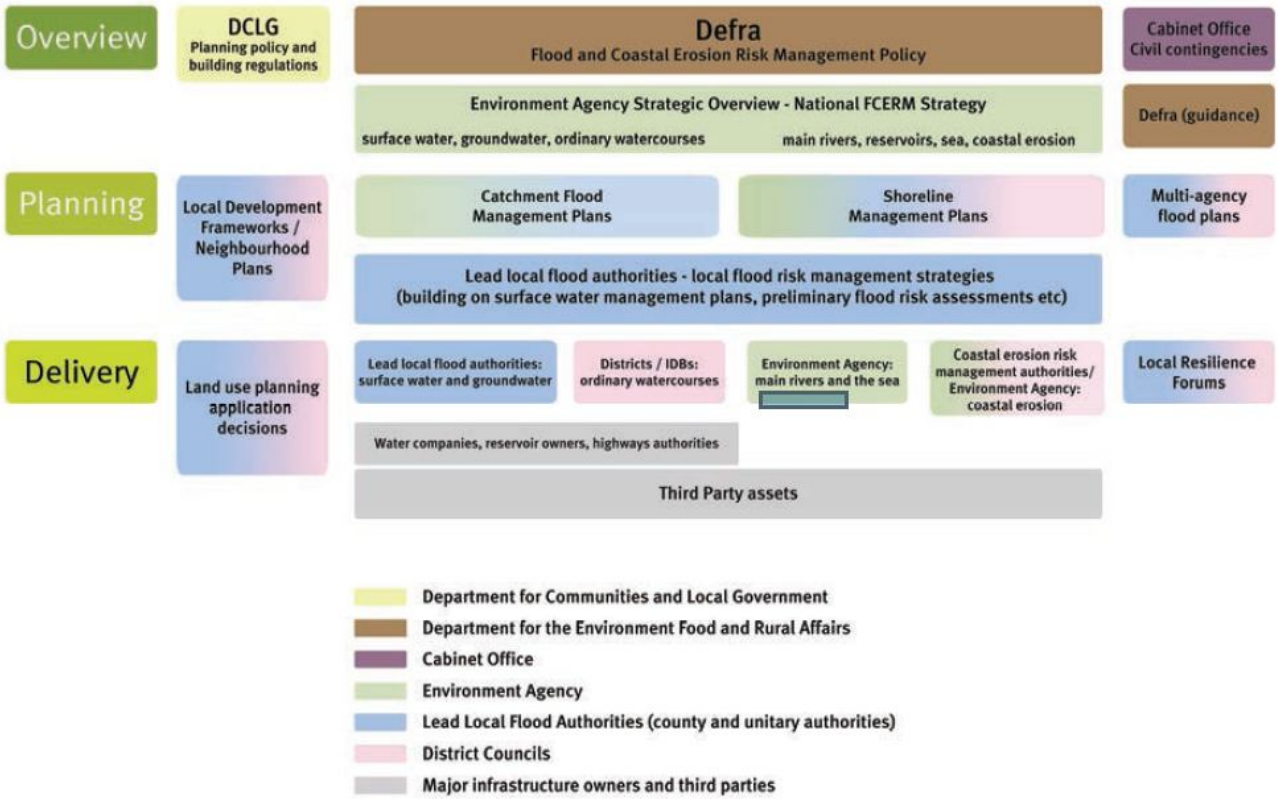


Figure 2-1 – How the LFRMS fits in with other plans and strategies. Source Environment Agency National Flood and Coastal Erosion Risk Management Strategy for England and Wales, 2011.

2.2 What is Flooding?

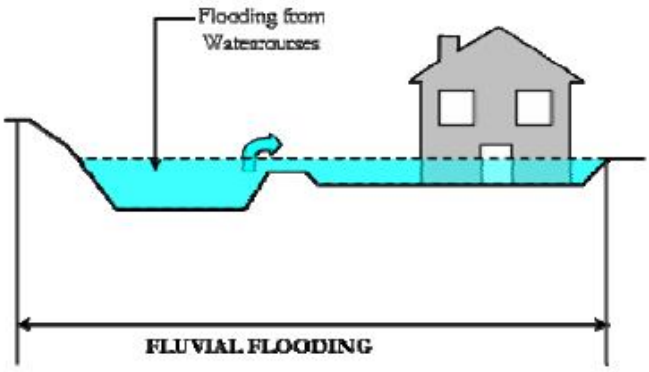
2.2.1.1 Flooding is often defined by where the water comes from. In this section the different sources of flooding are explained.

2.2.1.2 Local flood risk, defined as flooding from surface water, groundwater and ordinary water courses is the focus of the Strategy. Flooding from the sea and from rivers are the predominant sources of flood risk to the region's most populated areas; however these forms of flooding are not the responsibility of Hampshire County Council. However we recognise that the most severe flooding is often caused when different sources combined. In addition, Hampshire County Council as an LLFA has a duty to consider flooding issues where there are multiple causes or where responsibility for flooding is not immediately obvious. Whilst developing the Strategy we have therefore considered where local flooding combines with river, coastal and sewer flooding and we will work in partnership with the Environment Agency and local water and sewerage companies where there are combined sources of flooding.

2.2.2 Fluvial flooding

2.2.2.1 Fluvial flooding is also known as river flooding. It occurs when a river cannot hold the volume of water which drains into it from the surrounding land (known as a catchment). In the context of this Strategy, we refer to fluvial flooding as flooding from Main Rivers.

2.2.2.2 Main Rivers can be thought of as larger streams and rivers, or smaller watercourses with strategic drainage importance. The definition of a Main River is predominantly related to administrative responsibility; if a watercourse is designated as a Main River then the Environment Agency is responsible for managing flooding from that watercourse.



2.2.2.3 Watercourses which are not designated as Main Rivers are known as ordinary watercourses, Hampshire County Council is responsible for managing flooding from ordinary watercourses.

Current understanding of fluvial and coastal flood risk is described in Section 4.4.4

2.2.2.4 Annex E contains maps of Main Rivers and Ordinary Watercourses.

2.2.3 Coastal flooding

2.2.3.1 Flooding from the sea (coastal flooding) tends to occur as a result of high tides, surges in sea water and strong winds which raise the sea level above the ground level of the coast.

2.2.3.2 Flooding along the coast also brings challenges in respect of combined flood risks. An example of this is where surface water drainage can be affected by the action of tide-locking. This is where drainage outfalls discharging by gravity at the coast become blocked for a period of time by high tides and the surface water system backs up. If there is insufficient capacity within the drainage network, this may lead to surface flooding when it coincides with an extreme rainfall event. It is likely that, with the predicted effects of sea level rise, this form of flooding will increase in the future.

2.2.3.3 Both river and coastal flooding are generally well understood, can be predicted to some extent and flood protection measures are in place at many locations at risk from these types of flooding.

2.2.4 Sewer flooding

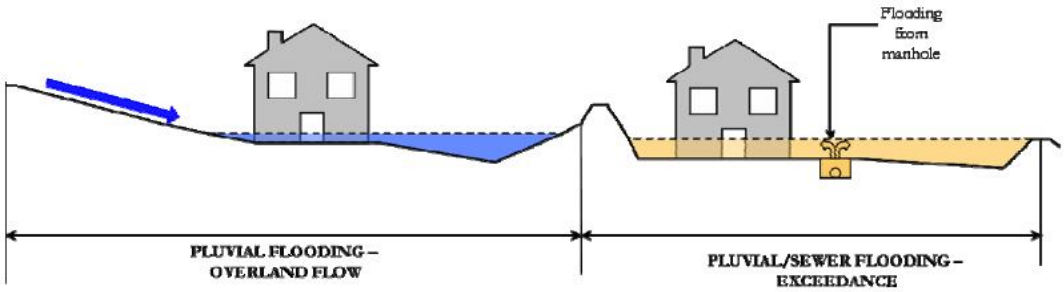
2.2.4.1 Sewer flooding occurs when the below ground sewer network cannot cope with the volume of water that is entering it and flood water emerges from the below ground system. Where a sewer serves more than two properties it is classified as a public sewer and all public sewers are owned and maintained by the water and sewerage company.

2.2.4.2 The majority of sewer flooding is the result of temporary problems such as blockage, siltation, collapses and equipment or operational failure. However, sewer flooding is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding.

2.2.4.3 Sewer flooding can be a result of blocked drains, the sewer network not being able to hold all the water flowing into it, or as a result of groundwater inundating the system and using some of the capacity. Sewer flooding often occurs at the same time as other types of flooding (particularly surface water flooding) when the sewer is a combined sewer (surface water and foul water in the same sewer) or where misconnections have taken place (surface water wrongly drains into the foul sewer). Sewer flooding remains the responsibility of the Water and Sewerage Company. However, because sewer flooding often occurs at the same time as other forms of flooding, Water and Sewerage Companies have a key role to play in the management of local flood risk.

2.2.5 Surface Water flooding

2.2.5.1 Surface water flooding is also known as pluvial flooding. This type of flooding occurs when rainfall cannot soak into the ground, cannot drain into local surface water drains and flows across the ground. This type of flooding is often (but not exclusively) associated with high intensity rainfall and occurs very quickly during or after the rainfall event.



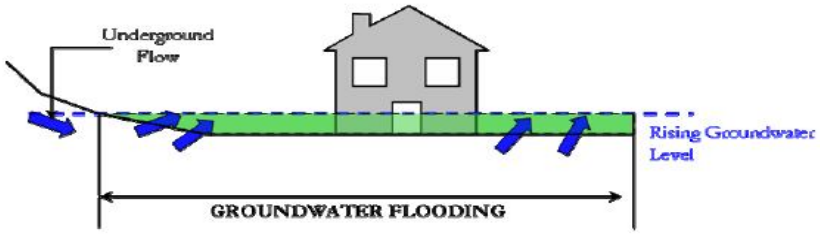
2.2.5.2 Surface water flooding is often quite localised and is much more difficult to predict than river or coastal flooding. This means there is often limited advanced notice of this type of flooding.

2.2.6 Groundwater flooding

2.2.6.1 Water held within permeable rocks beneath the surface of the ground is known as groundwater. This can cause flooding when the water level within these rocks rises above the surface. Groundwater flooding is therefore generally a feature of areas which lie above an aquifer.

2.2.6.2 Groundwater flooding can also occur in connection to river flooding when higher water levels in the river locally increase groundwater levels in adjacent permeable rocks. This can be a particular problem when adjacent low ground sits below the river bank height.

2.2.6.3 Levels of groundwater tend to respond to rainfall more slowly than water levels in rivers or on the surface. Normally groundwater levels are highest in spring following the winter months when there is generally more rainfall. This slow response to weather patterns means that groundwater flooding can occur a long time after the occurrence of prolonged or heavy rainfall



2.2.6.4 This slow response of groundwater levels also means that when groundwater flooding occurs it tends to last longer than other forms of flooding, often for several weeks or months.

2.2.7 Reservoir flooding

2.2.7.1 This is the flooding caused when an embankment holding back water is breached. The safety of reservoirs in England and Wales is governed by the Reservoirs Act. This ensures regular inspections for reservoirs deemed as posing a high risk. Hampshire County Council delivers its responsibilities for reservoir flood risk as part of its emergency planning role, therefore reservoir flooding is not being considered as part of this Strategy.

2.3 Aims and Objectives of the LFRMS

2.3.1.1 The aim of the Hampshire Local Flood Risk Management Strategy is to produce a plan to reduce and manage flood risk in a way that will benefit people, property and the environment.

2.3.1.2 In consultation with the steering group, and following consultation with interested parties eight objectives have been developed to support this aim. The SEA assessed the objectives and concluded that they have positive impacts on the natural and built environment. The objectives are listed and explained below:

Annex B provides a detailed breakdown of the objectives, outlining why each is important .

Further detail of the SEA assessment of the objectives is within the SEA document

- ***Improve our knowledge and understanding of local flood risk in Hampshire***
  - A thorough understanding of the risk from flooding is key to effective management of local flooding. This requires an understanding of where flooding may occur, how often these areas may flood and what the impacts of this flooding could be.

- ***Develop a Strategy, policy and a LFRMS Action Plan to manage these risks, providing balanced social and environmental benefits for the identified investment need***
    - The Strategy will identify a wide variety of potential measures that will reduce the negative impacts of flooding and where possible deliver additional benefits to wider society and the environment.

- ***Work in partnership with other flood risk management authorities to deliver the Strategy and LFRMS Action Plan***
    - Partnership working and cooperation are vital to ensure that a thorough understanding of local flood risk is established and that the measures selected to manage this risk are realistic, sustainable and effective. Working together will also help the delivery of multiple benefits above and beyond that of flood risk management

- ***Maintain, and improve where necessary, local flood risk management infrastructure and systems to reduce risk***
    - The principle purpose of the Strategy is to reduce local flood risk. The Strategy will identify and develop a variety of means to do this, including maintenance and improvements to existing local flood risk management infrastructure

- ***Ensure that local planning authorities take full account of flood risk when allocating land and considering permitting development (by avoiding development in inappropriate locations and minimising flood risk wherever possible)***
    - Whilst it is outside the scope of the Strategy to specify where development can occur, it will identify where flood risk may increase due to inappropriate development and help local planning authorities make informed decisions about flood risk when considering development.

- ***Engage with local communities to increase public awareness and reporting of flooding and promote appropriate individual and community level planning and action***
    - Throughout the development of the Strategy the partners will engage with local communities to ensure that their knowledge and views are considered. The measures considered to mitigate flood risk will include awareness raising and knowledge sharing activities.

- ***Improve and support community level flood response and recovery***
    - The actions under the Strategy will aim to reduce the likelihood of flooding whilst increasing the ability of individuals and the community to respond to and recover from flooding when it occurs.

- ***Identify all available national, regional and local funding mechanisms to deliver flood risk management interventions.***
    - The Strategy needs to ensure that measures selected to reduce flood risk are economically viable. To achieve this, the Strategy will identify potential funding mechanisms which can help deliver the flood risk management actions identified within the LFRMS Action Plan.

2.3.1.3 Chapter 5 explains what actions are and will be undertaken to meet the objectives. Hampshire County Council will review these objectives according to the Strategy review timetable (see Chapter 6), to assess how we are performing and whether the objectives should be added to or updated. Every measure identified as part of the LFRMS Action Plan has been assessed against these objectives to confirm that the action or measure is appropriate.

2.4 Consistency with national objectives

2.4.1.1 The Flood and Water Management Act states that Local Strategies must be consistent with the National Flood and Coastal Erosion Risk Management Strategy (NFCERMS). Principally, this refers to consistency with the overall aims and objectives of the NFCERMS, and with the six "guiding principles".

The guiding principles are explained in Annex B

2.4.1.2 The aims and objectives of the Hampshire LFRMS, detailed in section 2.3, have been developed based on the objectives of the National Strategy, interpreting them for the specific Hampshire context. They have been developed and agreed at both steering group and workshops for interested parties. The Strategic Environmental Assessment of the LFRMS has been undertaken alongside the development of the Strategy, with the Strategy being adapted to seek environmental opportunities rather than purely to mitigate environmental impacts. Therefore we believe that the objectives we have chosen, which have been used as our guiding principles throughout the risk assessment process, and the development of the LFRMS Action Plan, will ensure that the Strategy will be consistent with the National Strategy.

2.4.1.3 The six guiding principles are outlined below.

- Community focus and partnership working
- A catchment and coastal "cell" based approach
- Sustainability
- Proportionate, risk-based approaches
- Multiple benefits
- Beneficiaries should be allowed and encouraged to invest in local risk management

2.4.1.4 The NFCERMS identifies that careful planning is required to ensure that appropriate, sustainable options are selected and that they are implemented properly. This Local Strategy provides an opportunity to present a clear picture of what will be done to manage risk. It brings together relevant information contained in other plans and strategies such as Catchment Flood Management Plans (CFMPs), Shoreline Management Plans (SMPs) and Water Framework Directive River Basin Management Plans (RBMPs). This strategy will help communities understand the risks they face, what they can do to manage them and how risk management authorities are working together to help manage them.

3 Working together

3.1 Why work in partnership?

3.1.1.1 Hampshire County Council is ultimately responsible for delivering the LFRMS. However we cannot deliver the aims and objectives set out in Chapter 2 alone. We need to work together with other organisations.

3.1.1.2 Our aim in producing the Local Flood Risk Management Strategy is to produce a plan to reduce and manage flood risk in a way that will benefit people, property and the environment. Working with a wide range of organisations and individuals helps us to consider these beneficiaries as part of the Strategy. By working together we are able to share information, develop realistic plans and achieve a better result than we would if we worked individually.

3.1.1.3 As already mentioned, the most cost effective measures to improve local flood risk management will only be determined and delivered through partnership working. Hampshire County Council needs to work closely with our partners and interested parties, including community groups, to identify local flood risk management measures and together determine the most appropriate ways of funding these. Only by achieving multiple benefits are we likely to be able to attract the necessary investment to reduce local flood risk. The text box on the following page is an example of the community and authorities working together to develop the most effective strategy to reduce all forms of risk.

See Chapter 5 and the SEA report for further information on how flood risk management measures can achieve multiple benefits

3.2 Who is involved?

3.2.1.1 There are three main categories of organisations and individuals who Hampshire County Council has worked with to deliver the LFRMS:

- **Risk Management Authorities**, as defined by the Flood and Water Management Act 2010. This includes relevant departments and services within Hampshire County Council and district/borough councils as well as external organisations. See footnote 1 on page 8 for a definition of RMAs.
- **Other interested flood risk management partners**, which are defined as organisations who have a responsibility for drainage and flood risk management, or who may be affected by the LFRMS (e.g. Natural England and the Highways Agency), and;
- **Public and local community groups**, which includes flood action groups, parish/town councils, businesses and individuals and households at risk from flooding.

Annex C2 provides further information about our community engagement approach

3.2.1.2 There is a range of other relevant organisations that have key roles to play in local flood risk management, have a responsibility for drainage and flood risk management, or may be affected by the LFRMS. Hampshire County Council has

engaged and will continue to engage with these interested parties to ensure that wider aspects of flood risk management are considered.

3.2.1.3 Figure 1.3 outlines the partnership model which we have adopted in the preparation of this Strategy.

Flooding in Emsworth – Working in partnership to find a solution

The town of Emsworth suffers from flooding as a result of main river and tidal flooding which is exacerbated in part by inadequacies in the historic local drainage network at key pinch points. This has knock-on effects on the ability of surface water to drain away at certain times. Particular problems are experienced in Bridge Road, Horndean Road and Selangor Avenue.

Emsworth does not feature as a high risk ward in the assessment underpinning this Strategy as it does not suffer from groundwater or surface water flooding in their own right.

However, the Environment Agency is well aware of the flooding problem in Emsworth and has been liaising with the local community through the Emsworth Residents Association's Flood Action Group and other interested parties including the County Council, Havant Borough Council, Highways Agency, Network Rail, Southern Water and local landowners.

A number of options are currently being appraised to devise the most appropriate means to address these flooding problems with the funds available. These options include the possibility of creating areas of additional flood storage to the north of the town alongside other smaller scale improvements to the local drainage infrastructure (e.g. upgrading the Bridge Road trash-screen) and individual Property Level Protection.

The response to flooding in Emsworth clearly illustrates the benefits of joint-agency working which, while never straight-forward, can pay dividends and help resolve complex problems which can not be managed by a single organisation. The involvement of the Emsworth Residents Association's Flood Action Group also highlights the benefits of having a well-organised and proactive local Flood Action Group.

3.3 Flood risk management roles and responsibilities

3.3.1.1 The Flood and Water Management Act identifies the responsibilities for the organisations which are defined as 'Risk Management Authorities' (RMAs). Some of these responsibilities were newly introduced by the Flood and Water Management Act, others are longstanding from previous legislation. All of the Risk Management Authorities share a number of duties and powers:

The roles and responsibilities of the RMAs are detailed in Annex C1

- Duty to have regard to, or act in a manor consistent with the national and local strategy.
- Duty to co-operate with other RMAs in the exercise of their flood and coastal erosion risk management functions, including sharing flood risk management data.
- Power to take on flood and coastal erosion functions from another risk management authority when agreed by both sides

3.3.1.2 In addition to these shared duties individual RMAs also have specific roles and responsibilities. They are summarised within this section of the Strategy and explained in greater detail in Annex C1.

3.3.1.3 **Hampshire County Council** is the Lead Local Flood Authority and is responsible for taking the lead in managing flood risk from local sources. This includes surface water, groundwater and ordinary watercourses and also where there is an interaction between these sources and main rivers or the sea. The county council also has other related roles in emergency planning and highway drainage.

3.3.1.4 The **Environment Agency** is responsible for managing flood risk from main rivers, large reservoirs and the sea, and also has a strategic overview role over all flood and coastal erosion risk management. It also has a key role in providing flood warnings to the public, supporting emergency responders when flooding occurs, protecting and improving the environment and promoting sustainable development.

3.3.1.5 **Southern Water, Thames Water and Wessex Water** are water and sewerage companies responsible for the provision of foul and surface water sewerage across the whole of Hampshire and providing water to the majority of Hampshire. **South East Water, Portsmouth Water, Cholderton & District Water Company Ltd and Sembcorp Bournemouth Water (formerly Bournemouth & West Hampshire)** provide water services only.

3.3.1.6 The **Highways Agency** and **Hampshire County Council Highways Departmen**t are responsible for managing flood risk on roads and highways within the county. The Highways Agency is responsible for managing major trunk roads and motorways. Hampshire County Council is the Highways Authority responsible for managing all other public highways.

3.3.1.7 Within Hampshire there are **11 District or Borough Councils** who, in addition to their role as Local Planning Authority (LPA) have powers to undertake flood risk management work on ordinary water courses. The District or Borough Councils are also category 1 responders to emergencies and are responsible for assisting in the preparation of Multi-Agency Flood Plans.

3.3.1.8 **Hampshire and the Isle of Wight Resilience Forum (HRF)** is the mechanism by which the emergency responding agencies in Hampshire routinely cooperate with each other as a partnership to discharge their duties under the Civil Contingencies

Act 2004. The HRF is not a statutory body nor does it have powers to direct its members; however, it is the agreed forum that co-ordinates multi-agency emergency preparedness, including risk assessment, contingency planning, training and exercises to enhance Hampshire's preparedness for emergencies. The HRF has prepared the Hampshire County Multi-Agency Flood Plan which details roles and responsibilities for preparedness, contingency planning, training and emergency response.

3.3.1.9 There are three **Regional Flood and Coastal Committees (RFCC**) that operate within Hampshire. They are the Southern, Thames and Wessex Committees. The RFCC is primarily responsible for ensuring there are coherent plans to identify, communicate and manage the risk from all sources of flooding and all coastal erosion risk. They are established by the Environment Agency under the Flood and Water Management Act 2010, and comprise both independent members and those appointed by the LLFAs. They also act as a link between the Environment Agency, LLFA and other risk management authorities and are responsible for promoting efficient and risk based investment in flood risk management and coastal erosion.

3.3.1.10 Flood risk management is not something that can be left solely in the hands of certain organisations and forgotten by everyone else. Even if this Strategy was being devised at a time of substantial public sector budgets, the Risk Management Authorities would still not be able to prevent all floods or solve all concerns. **Households, businesses and landowners** have their part to play too. For example people who own land which adjoins a water course (also known as riparian owners) have a responsibility to make sure that the flow of water is not obstructed (for example, by clearing gullies and vegetation) and maintaining existing flood defences. Everyone has a role in reporting flooding problems and ensuring that they are themselves prepared for flooding. We recognise that individuals will need support and advice to help them engage with flood risk management. Ensuring that we communicate well and share information is therefore vital to the success of the Strategy. The means by which Hampshire County Council has engaged with local communities during the development of the Strategy and the ways in which we will continue to do so are explained in Annex C2.

Annex C2 details how Hampshire County Council have engaged with partners and interested parties

3.3.1.11 **Developers** are responsible for properly considering flood risk so that they do not put occupants of new developments at risk, or increase flood risk elsewhere. The flood risk management obligations placed on developers are clearly set out in the National Planning Policy Framework.

3.3.1.12 Hampshire County Council will work with the Local Planning Authorities to address the link between flood risk and new development . Hampshire County Council also makes its data on flood risk freely available to planning authorities to use when making planning decisions.

3.3.1.13 The County Council is fully aware that flooding does not respect administrative boundaries, hence the broad extent of public engagement undertaken throughout the process of preparing this Strategy. While the LFRMS steering group and interested parties group include the district councils in Hampshire and adjoining LLFAs, the County Council recognises the need to engage even further to reflect the river basin catchments which flow through Hampshire.

3.3.1.14 The **South East Seven** (SE7) group of strategic (County and Unitary) authorities has established a flooding sub-group as a means of sharing both best practice and understanding on how they are each responding to the new duties created under the FWMA. In recent times the SE7 has grown beyond its founding seven members and now incorporates both East and West Sussex County Councils along with Surrey, Kent and Hampshire and the Unitary Authorities of Southampton, Portsmouth, Medway, Brighton & Hove and the Isle of Wight. This group has been consulted on the Strategy and kept informed of progress on its preparation.

Basingstoke Canal

The Basingstoke Canal runs for 32 miles, from the village of Greywell in Hampshire to Woodham in Surrey. The canal is jointly owned by Hampshire and Surrey County Councils. It is managed on their behalf by the Basingstoke Canal Authority (BCA). Also in place is a partnership arrangement between Hart, Rushmoor, Guildford, Surrey Heath, Woking and Runnymede councils and a number of local parish and town councils who have riparian responsibilities and contribute revenue funding to maintain the canal**.**

The owners are responsible for managing the structures and other assets along the length of the canal in order to ensure its safe operation and the safety of those living alongside the canal. Through the BCA they are also responsible for managing the flow of water along the canal in order to minimise flood risk. The BCA has developed a number of asset, operational and emergency flood management plans and these are regularly reviewed.

The canal follows a series of contours along its length and consequently is raised on embankments in many areas. A breached or collapsed embankment is the most likely cause of a significant flood event on the canal. A large tree growing on an embankment which blows over is the most likely cause of a breach, with the displaced root plate possibly creating a hole in the embankment.

Another concern is what happens to sluice water once it has left the canal. The canal owners have long standing historical rights to release water, yet once off canal property it becomes the responsibility of the owner of the land that the drains run through. If left, drain channels can choke with weeds, saplings and debris and lead to flooding when used.

It is for this reason that the LFRMS needs to recognise the flood risk issues associated with the canal. Only by working together with partners and recognising the different statutory duties the County Council itself delivers, for example as canal owner / operator, emergency planning authority and Lead Local Flood Authority and taking into account the interactions and responsibilities of different riparian owners, can flood risk along the canal be successfully managed

4 Our Understanding of Flooding in Hampshire

4.1 Characteristics of Hampshire

4.1.1.1 Hampshire is a predominantly rural county with its population centred around the main urban areas of South Hampshire (Eastleigh, Fareham, Gosport, Havant), Andover, Basingstoke and Winchester in Central Hampshire and Farnborough, Aldershot and Fleet to the north. This study focuses on the area within the administrative boundary of Hampshire County Council, so excludes the unitary authorities of Southampton and Portsmouth.

4.1.1.2 Bordered to the south by the Solent, the county is drained by 17 separate river catchments. To the north and east, the rivers Kennet, Loddon and Wey Addleston Bourne drain towards the Thames. Much of central Hampshire is dominated by the catchments of the Test and Itchen, both high quality chalk streams, which, along with the Hamble and Meon, drain in a southerly direction to Southampton Water and the Solent. In the west of the county, the Avon drains to the west and the Lymington River and Beaulieu River drain the New Forest towards the Solent and Southampton Water. Towards the south and east, the River Wallington drains south to Portsmouth Harbour and the Rother flows east to join the Arun. The different characteristics of these rivers and catchments influence the flood risk of the surrounding areas, with slow responding groundwater dominated catchments (such as the Test and Itchen) more prone to groundwater flooding, whilst quick responding catchments may be more prone to river or surface water flooding.

4.1.1.3 Flooding from the sea is the predominant source of flood risk to Hampshire's most populated areas on low lying coastlines in Portsmouth, Southampton, Gosport, Havant, Fareham, Eastleigh and the New Forest[3].

[3] Partnership for Urban South Hampshire Strategic Flood Risk Assessment, 2007

4.1.1.4 A map of the location of Hampshire's Main Rivers/ordinary watercourses is shown in Figure 4.1.

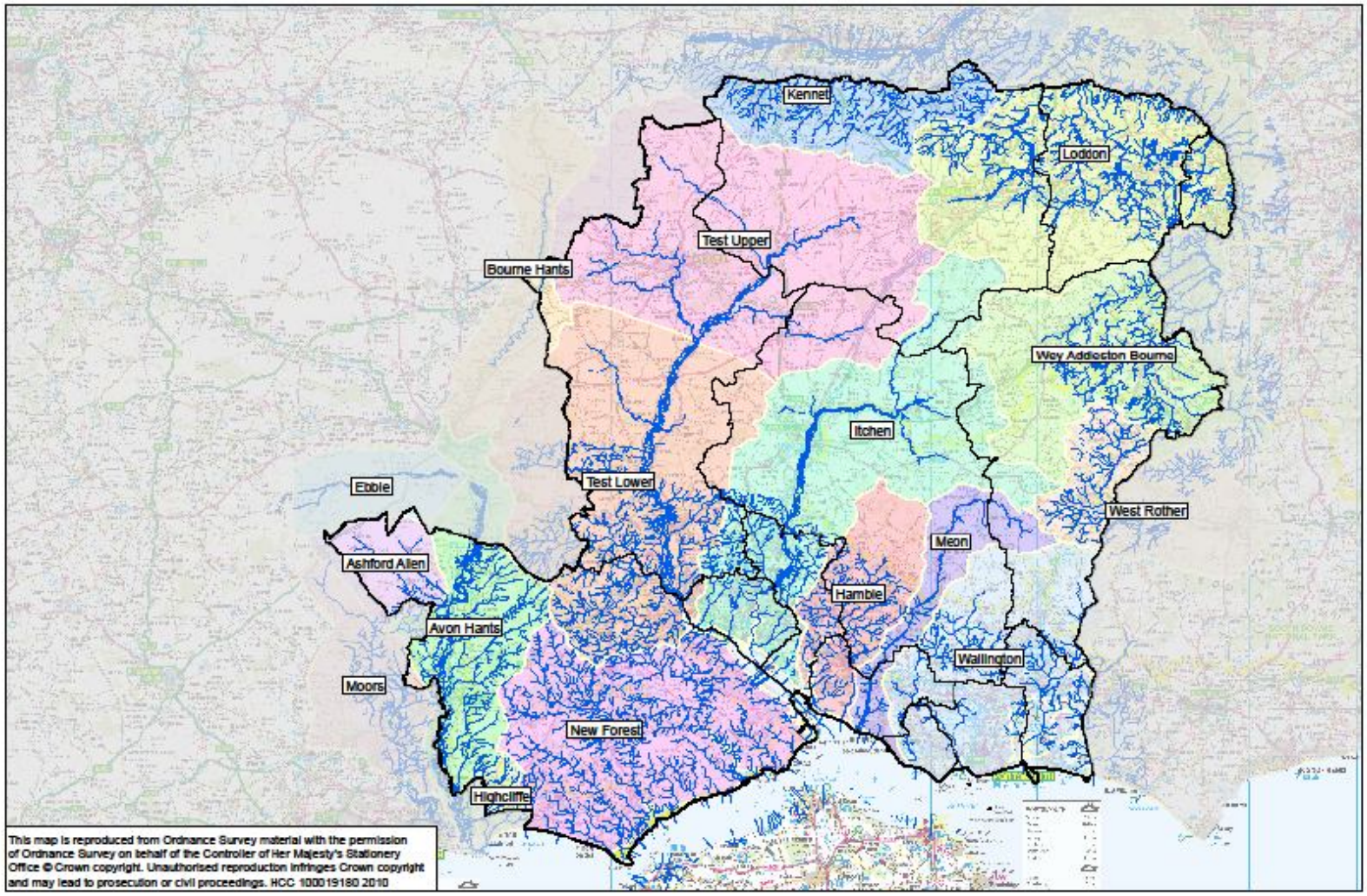


Figure 4-1 Main watercourses in Hampshire

4.2 Types of flooding in Hampshire

4.2.1.1 Flooding in Hampshire can occur for a variety of reasons due to the characteristics of the county which include an extensive coastline, large river network and chalk (and other) aquifers. This Strategy focuses on local flooding which is caused by surface water, groundwater and flooding from ordinary water courses. However as the most severe floods are often caused by the interaction of different sources of flooding it is important that we consider other types of flooding and work with those organisations responsible for its management.

4.3 Our understanding of historical flooding in Hampshire

4.3.1.1 Our understanding of past flooding in Hampshire is based on information gathered by Hampshire County Council, District and Borough Councils, the Environment Agency and local residents. This information is summarised below, however it is not intended to provide an exhaustive list of all flood events or areas affected by flooding, but rather an indication of the types of flood events which have occurred in the past. You can find further detail in the Hampshire Preliminary Flood Risk Assessment, Strategic Flood Risk Assessments and Catchment Flood Management Plans. Hyperlinks to these plans can be found in Annex A1.

4.3.2 Groundwater flooding

4.3.2.1 Groundwater is a significant cause of flooding in Hampshire. Past flooding from groundwater has been caused both directly as water levels rise above ground level, and indirectly as high groundwater causes flooding of rivers which are dominated by water from aquifers. This has been the case in a number of areas of Hampshire, such as Basingstoke and Deane where flooding has mainly been due to high groundwater-fed flows on the rivers Test and Loddon which caused overtopping of river banks. In addition within this area there have been reports of localised flooding in the upper parts of the Loddon catchment due to high groundwater levels. A number of villages in the area also experience problems of sewage back-up into properties due to groundwater infiltrating into the pipes when groundwater levels are high. Southern Water is actively working with partners to address this problem in a number of areas.

4.3.2.2 In Hampshire groundwater flooding can be extensive in the Hampshire chalk groups shown in Figure 4.2.

4.3.2.3 By their nature, the impacts from groundwater flooding (in the Chalk) are hard to prevent, so groundwater flood risk management necessarily focuses on development of flood warning systems (including information dissemination) and mitigation is focussed both on increased conveyance and property resilience measures.

4.3.2.4 Hampshire County Council is currently preparing a Groundwater Surface Water Management Plan (GWSWMP) which will provide further detail about groundwater flood risk and measures required to reduce the risk.

4.3.2.5 There is already a county wide groundwater flood warning system operated by the Environment Agency. This warning system, based on trigger levels identified in selected “sentinel” boreholes, is already fairly well developed, although this is being

reviewed by the GWSWMP. The Environment Agency also provides advice on improving the resilience of properties to groundwater flooding and this will be referred to within the LFRMS Action Plan.

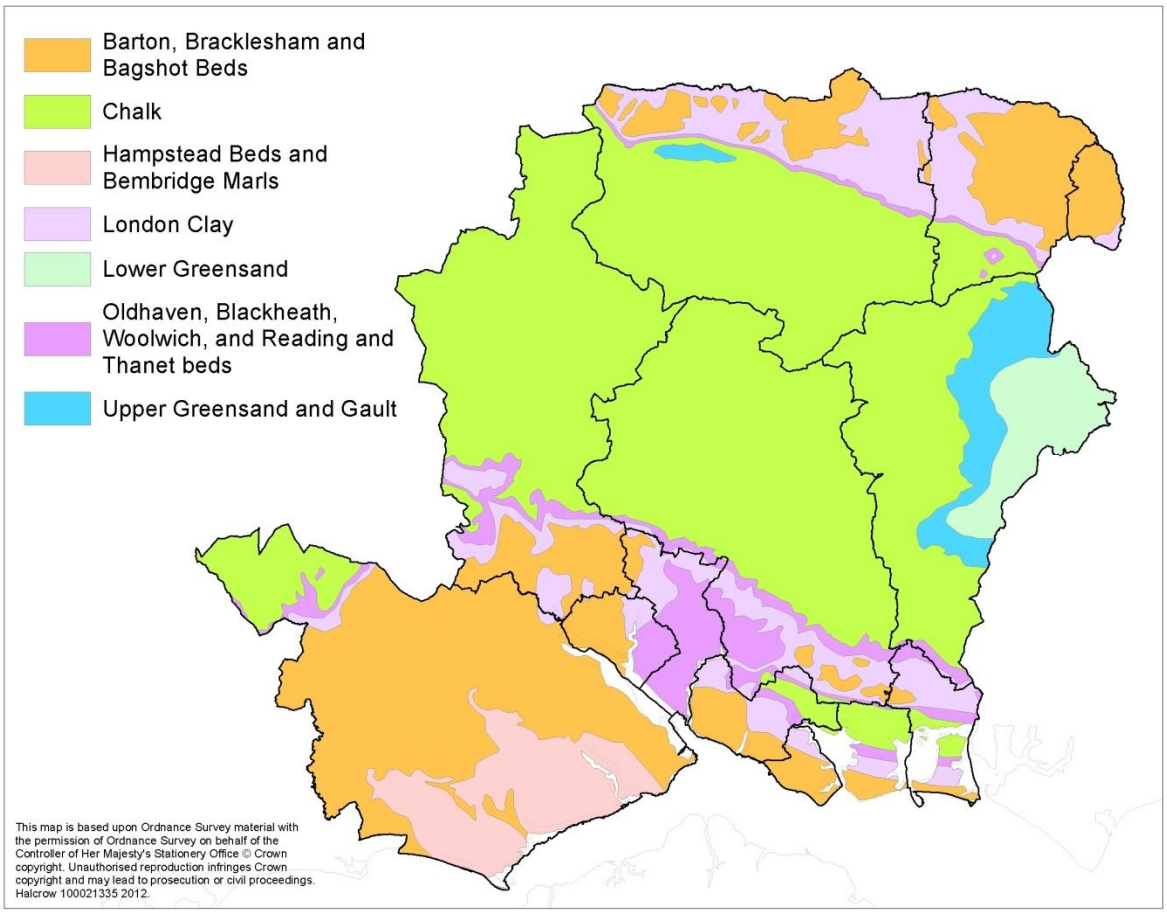


Figure 4-2 Hampshire underlying geology

4.3.2.6 Significant groundwater flooding occurred across Hampshire in 2000/2001, particularly in the areas of the Rivers Test, Itchen, Meon, Wallington and Lavant. More than 700 properties in over 100 settlements throughout the county were affected by groundwater flooding during this period. Parts of the south west of the county, in the New Forest and Hamble catchments also flooded during this period as a result of springflows from local minor aquifers and flow into rivers fed from chalk aquifers underlying Salisbury plain.

4.3.3 Fluvial flooding

4.3.3.1 Fluvial flooding (from rivers) has occurred throughout the county including New Forest streams in December 2000 and January 2001, when 10 properties were affected and along the River Test and Loddon (both often with some groundwater influence). The River Blackwater caused severe flooding in 2006/07. Along the coast, high tides have exacerbated river flooding, as rivers are prevented from

discharging into the sea. This has occurred in the south west in areas including Milford on Sea and Lymington.

4.3.4 Coastal flooding

4.3.4.1 Flooding from the sea is the predominant source of flood risk to the region's most populated areas on low lying coastlines in Portsmouth, Southampton, Gosport, Havant, Fareham, Eastleigh and the New Forest. The most vulnerable areas of land are near to the coast, where there is a high probability of flooding occurring and are identified in the Environment Agency Flood Map. In November 2006, the 10 Local Planning Authorities (LPAs) and Hampshire County Council, which make up the Partnership for Urban South Hampshire (PUSH) commissioned a sub-regional Strategic Flood Risk Assessment (SFRA) to supplement this understanding of flood risk to the area.

4.3.4.2 The SFRA describes in detail some of the key areas of risk from coastal flooding for both the present day and into the future, including key statistics in relation to present day flood risks and accounting for climate change. It study also looked at the infrastructure that is in place to manage the risks of flooding to those communities that live close to the coast.

4.3.5 Surface water flooding

4.3.5.1 Surface water flooding has occurred throughout the county and on occasion has combined with foul flooding as the drainage systems are overwhelmed by heavy rainfall. In 2007 parts of Hampshire were affected by surface water flooding. Rushmoor (Farnborough and Aldershot) was one area affected during this event. Notable surface water flooding also occurred in Portsmouth and Langstone harbours in 2000/01 when 114 properties were flooded. Overwhelmed drainage networks have also caused flooding in other areas including (but not limited to) Lyndhurst, Hamble, Andover and Romsey.

4.3.5.2 Hampshire County Council has collated information about flooding gathered by local officers and reported by the public. This along with the locations of the 1997/98, 2000/01 and 2003/04 groundwater flooding is shown in Figure E1 in Annex E. This map shows the location of known incidents, but it is important to remember that it does not show how severe the flooding was.

4.4 Our understanding of current and future flood risk

4.4.1.1 Information about historical flooding in Hampshire gives us some indication of areas which may be at risk of flooding now and in the future. However this evidence will not tell us everywhere that may flood. To understand this potential risk (where risk is the likelihood of flooding occurring multiplied by the consequence of that flooding to people, property and the environment) we use modelled data.

Risk = Frequency of flooding x Consequence of flooding

4.4.1.2 The Environment Agency has modelled and mapped flood risk from Main Rivers (and some ordinary watercourses[4]) for over 10 years. Until recently less attention has been paid to the assessment of flood risk from other sources of flooding (most notably surface runoff, the majority of ordinary watercourses and groundwater) although knowledge is rapidly improving as new studies and assessments are undertaken as explained below.

4.4.2 Surface Water and Ordinary Watercourse Flood Risk

4.4.2.1 Since the large scale flooding in the summer of 2007 much work has been undertaken to better understand flood risk from surface runoff and ordinary watercourses. At the national scale the Environment Agency has produced two national surface water maps:

- Environment Agency 'Areas Susceptible to Surface Water Flooding' national map (AStSWF) – this map, which covers England and Wales, was released in June 2009 to provide a general indication of areas which are more likely to suffer from surface water flooding, and;
- Environment Agency 'Flood Map for Surface Water' national map (FMfSW) – this map, which covers England and Wales, was released in November 2010 and provides a revised approach to mapping surface water flooding including accounting for the presence of drainage systems.

4.4.2.2 The maps indicate where surface water is likely to flow or pond. They show flooding caused by rainfall but not overflowing watercourses, drainage systems or public sewers caused by catchment-wide rainfall events or river flow.

4.4.2.3 These maps primarily represent surface runoff, but they can also be used to identify flooding from ordinary watercourses. The Environment Agency's national maps are satisfactory to help identify broad areas of risk across the county, but they are not

[4] The Environment Agency's Flood Map only consider watercourses where the upstream catchment is >3 km2, therefore many ordinary watercourses will not be included

considered reliable prediction of flooding at an individual property level[5]. To build on this information Hampshire County Council produced a Preliminary Flood Risk Assessment (PFRA).

4.4.2.4 As part of the PFRA all of the available modelling was analysed by Hampshire County Council, the District Councils, the Environment Agency and water companies to identify which sources of mapping were most representative of known flooding in Hampshire. This is known as the 'locally agreed surface water information'. Within Hampshire we have agreed that the following three datasets are suitable for inclusion in the 'locally agreed surface water information':

- Area susceptible to surface water flooding
- Flood Map for Surface Water 1:200
- Localised Flooding Incidents

4.4.2.5 The County Council is now in the process of producing more detailed Surface Water Management Plans (SWMP) in the areas identified by the PFRA to be at the highest risk. The aim of the SWMPs is to improve understanding of flood risk and identify specific measures to reduce or mitigate this risk in those areas. These SWMPs have been produced, or are currently being produced, in Basingstoke and Deane, Eastleigh, Rushmoor and Hart districts. They will be undertaken elsewhere to ensure complete county-wide coverage (by individual district) by 2015.

4.4.2.6 This LFRMS is separate and distinct from these SWMPs. However, the LFRMS risk assessment process and the LFRMS itself are consistent with the draft findings of the SWMPs. The final outputs of the initial SWMPs will be used in future revisions of the Strategy and LFRMS Action Plan. Chapter 6 provides details of how and when the Strategy and LFRMS Action Plan will be updated.

4.4.3 Groundwater flood risk

4.4.3.1 Current understanding of groundwater flood risk is very limited due to the complexities of representing the flow and emergence of groundwater. There is no currently available method to predict the future risk of groundwater flooding and existing approaches have tended to focus on the susceptibility of areas to groundwater flooding.

4.4.3.2 The Environment Agency has produced a groundwater susceptibility map, known as the 'Areas Susceptible to Groundwater Flooding' map, which identifies vulnerability to groundwater flooding on a

Figure E2 in Annex E maps the Areas Susceptible to Groundwater flooding.

[5] For a detailed explanation of the Flood Map for Surface Water and the Areas Susceptible to Surface Water Flooding maps, please see http://www.environment-agency.gov.uk/research/planning/129324.aspx

1km square grid. It was developed specifically for LLFAs for use in PFRAs to enable them to obtain a broad understanding of whether an area is vulnerable to groundwater flooding. Each 1km square grid has been classified by the percentage (<25%, >=25% to 50%, >=50% to <75%, >=75%) of that square which is vulnerable to groundwater flooding.

4.4.3.3 As part of the discussion about 'locally agreed surface water information' for the PFRA, the suitability of Areas Susceptible to Groundwater Flooding map was reviewed. It was agreed that due to the extreme groundwater flooding that occurred in Hampshire in 2000-2001 that existing records are likely to be more accurate than the modelled information. This approach was confirmed during the second LFRMS steering group workshop, and the risk assessment uses this data.

4.4.4 Coastal and river flood risk

4.4.4.1 While this LFRMS is primarily concerned with flooding from ground and surface water (consistent with the County Councils responsibilities under the FWMA), as stated in section 2.2, all sources of flooding are inter-related.

4.4.4.2 This is most apparent when flooding and coastal erosion on the coast (reflecting the impacts of climate change on sea level and high tides) can impact on the ability of water to drain from the land. This is particularly the case when high tides coincide with high river or groundwater levels and heavy rainfall inland.

4.4.4.3 The LLFA is not responsible for determining the risk of river flooding, coastal flooding or coastal erosion. Any information on these risks presented in this document and the Risk Assessment in Annex D is just a snapshot, and may be updated at any time by the Environment Agency. Therefore the most appropriate source of information regarding these risks is the Environment Agency's What's in Your Backyard website (www.environment-agency.gov.uk/wiyby).

4.4.4.4 The ward specific action plans for the high risk wards identify where local flood risk combines with coastal or river flooding, and this information is then used to determine what interested parties need to be involved in delivering the actions. Work has been carried out by the Environment Agency to identify and rank the 'communities at risk' of coastal and fluvial flood risk. The methodology used by the Environment Agency to determine the communities at risk is detailed in the text box on Page 31. Table 4.1 shows the ten highest communities at risk.

4.4.4.5 Coastal flooding and erosion risk is managed in Hampshire by the Environment Agency and the maritime local authorities using their permissive powers under he Water resources Act 1991 and Coast Protection Act 1949. Where local flood risks combine with flood risks from coastal sources, they are considered as part of this Strategy. In addition to identifying combined sources of flood risk through this Strategy, the County Council, working with partners, interested parties and local communities, is working on a number of projects addressing issues arising from coastal flooding. The projects, and how they are helping coastal communities adapt to climate change risks, are described in the box on page 33.

Table 4-1 Communities at risk of fluvial and coastal flooding (EA, 2013)

Community at risk	Flood risk	Total number of properties at significant or moderate fluvial or coastal risk	EA communities at risk rank
Gosport	Tidal	1415	1
Chandlers Ford	Fluvial	1352	2
Fleet	Fluvial	1349	3
Eastoke	Tidal	1135	4
Porchester	Tidal	869	5
Marchwood	Fluvial and Tidal	781	6
Romsey	Fluvial	598	7
Totton	Fluvial and Tidal	592	8
Frogmore	Fluvial	478	9
Hedge End	Fluvial	425	10

Methodology used to determine the ranking of communities at flood risk

The Environment Agency (EA) has been looking at all communities at flood risk across the region, with a view to determining the flood risk prevention measures that can be undertaken.

A number of data sets are available to use to determine the flood risk, however not all of this data is up to date. There are two ways in which flood risk is modelled within the Environment Agency, either by using deterministic or probabilistic techniques

The Flood Map is an example of the outputs of 'deterministic' modelling. Deterministic modelling provides a simplistic 'yes' or 'no' answer to the question, "in a specific scenario, am I in an area at risk of flooding"? The Flood map therefore describes what happens under one set of specific circumstances – for example flood risk when defences are present or not present, for a particular flood.

The Flood map shows Flood Zones which are produced to enable local authorities to apply the National Planning Policy Framework, ensuring flood risk assessments are undertaken for planning applications in areas at risk of flooding. Local flood risk models and mapping are used to refine Flood Zones; these may also provide extra information such as flood depths and velocities.

NaFRA is an example of probabilistic modelling. Probabilistic modelling describes the overall chance of flooding, rather than the chance of flooding associated with a specific event or scenario. It can tell us about the likelihood of an outcome which can help us make better risk management decisions. NaFRA is produced using probabilistic modelling. Local flood risk models can also be used to update NaFRA

The ideal data set to use to rank communities at flood risk is the National Flood Risk Assessment (NaFRA). It is a national assessment of flood risk across England and Wales, showing the likelihood of flooding in any year from rivers and the sea. It considers the location, type and condition of defences, mapped on a 50m x 50m grid in three probability bandings.

The bandings are:

- **Significant:** The chance of flooding in any year is greater than 1.3% (1 in 75)
- **Moderate:** The chance of flooding in any year is greater than 0.5% (1 in 200) but less than 1.3% (1 in 75)
- **Low:** The chance of flooding in any year is 0.5% (1 in 200) or less

For the purpose of this work the EA have considered both significant and moderate bandings. However our local knowledge and understanding of the data used in NaFRA determines confidence in the output information. Where confidence in the NaFRA data is low we have used our flood map modelled data and flood zones.

4.4.5 Sewer flooding

4.4.5.1 While this LFRMS is primarily concerned with flooding from ground and surface water, as stated in section 2.2, all sources of flooding are inter-related.

4.4.5.2 All water and sewerage companies maintain a register of properties at risk of flooding due to hydraulic overload in the sewerage network. This is known as the DG5 register and part of the set of Ofwat DG (Director General) Indicators.

4.4.5.3 There are three water and sewerage companies that serve customers in the Hampshire County Council Area, Thames Water, Wessex Water and Southern Water. The DG5 Register is a register of properties and areas that have suffered or

are likely to suffer flooding from public foul, combined or surface water sewers, due to the system being overloaded. There are 3 at risk reporting categories:

- 1 in 20 year;
- 1 in 10 year; and
- 1 in 2 year.

4.4.5.4 This reporting categorisation reflects the frequency of flooding incidents in properties/areas and the return period of the storm that causes the flooding. For a sewer to be classified as over-loaded, the flow of a storm must be unable to pass through it due to a permanent problem, not due to problems such as a blockage, siltation or a collapse. Flooding that occurs during more intense storm events (greater than 1 in 20 years) is also excluded. When a solution is in place to rectify the overloading a property or area is removed from the register.

4.4.5.5 As part of the obligation to Ofwat, sewerage companies are required to undertake capacity improvements to alleviate sewer flooding problems on the DG5 register during the current Asset Management Period (2010 – 2015) with priority being given to more frequent internal flooding problems.

4.4.5.6 Although Wessex and Southern Water were able to provide the at risk register at a detailed enough level to be used in ward level risk assessment, Thames Water were only able to provide it at a scale too coarse to be used at a ward level. Therefore the risk assessment has not been able to quantify the impact of sewer flooding.

4.4.5.7 However, Hampshire County Council will work with the water and sewerage companies to understand the future sewer flooding alleviation programmes agreed between the company and Ofwat, as well as to ensure the ward specific action plans are aligned with these programmes.

4.4.5.8 That said, the ward specific action plans produced for the high risk wards do identify where there are known interactions between sewer flooding and other sources of flooding. Where such interactions exist, the action plan recommends that the responsible water and sewerage company should be a member of the delivery team for that ward.

Coastal adaptation

Work is underway on a **Coastal Adaptation Project.** The aim is to define a strategic county-wide approach to adaptation in the coastal zone, in order to allow all public bodies within the county of Hampshire to make informed and prioritised risk-based decisions in relation to their assets now and in the future.

The project is broken down into 5 task areas:

Assessment of Risk of Hampshire's publicly owned assets which could be affected by coastal change.

Develop a long term overarching strategy for adaptation of all publicly owned assets that have been identified as at risk from coastal change

Develop an overarching Funding Strategy

Develop a Coastal Engagement Strategy

Study of requirements and availability of mitigation land

The CAP is initially focussing on Hampshire County Council assets and all publicly owned assets that have been identified as 'Essential Local Services'. A risk assessment is being undertaken which will identify assets at risk of coastal change (flooding and erosion) over the next 100 years split, into three epochs 0-20, 20-50 and 50-100 years. Once the assessments are completed and assets critical to service delivery have been identified, an Adaptation Action Plan will be developed in order to identify which assets will have emergency evacuation plans prepared (if not already in existence), which would be suitable for property level resilience measures, which could benefit from a change of use or disposed of altogether.

The aim is to complete this initial assessment of County Council assets by Summer 2013.

The County Council is also working on a project in partnership with other local partners (e.g. District Councils) known as **Coastal Communities Adapting to Change** (CCATCH) – *the Solent* '

This forms part of an EU Interreg IVa – 2 seas cross-border programme project called 'Coastal Communities 2150 and Beyond' (CC2150) which is being led by the Environment Agency. The aim is to engage vulnerable communities who are at risk from coastal change, by raising their awareness and developing visions for how their coast should adapt in the future. The project is focusing on six discrete stretches of coast. These sites may not be the most at risk but reflect a range of the different communities and issues around the Solent and are: Beaulieu to Calshot; Southampton, Upper West Itchen; Netley and Royal Victoria Country Park ; Solent Breezes Holiday Park; Hayling Island and Langstone and Yarmouth, Isle of Wight

The project is working with the local communities to raise awareness and understanding of coastal change in their area. The aim is to develop visions of how the community want their coast to look in the future and a strategy to help the community achieve that vision. This will then help communities to adapt and become more resilient to future changes. Community involvement will take place to make sure that views are heard and knowledge shared through workshops, public exhibitions and demonstrations of resilience measures, as well as contributing to publications. The funded project runs until June 2014. After that is it hoped that the communities will be in a position to implement the strategy themselves. The project website provides further details see http://www.solentforum.org/current/CCATCH/

4.5 Changes to current and future flood risk

4.5.1.1 Flood risk in Hampshire may change for a variety of reasons including climate change, urban developments, 'urban creep'[6] and maintenance regimes or deterioration of assets which perform a flood management function.

4.5.2 Climate Change

4.5.2.1 There is clear scientific evidence that global climate change is happening now. It cannot be ignored. Over the past century around the UK we have seen sea level rise and more winter rain falling in intense wet spells. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation; however the broad trends are in line with projections from climate models.

4.5.2.2 Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

4.5.2.3 Experts have enough confidence in large scale climate models to say that we must plan for change. There is more uncertainty at a local scale but model results can still help us plan to adapt. For example we understand rain storms may become more intense, even if we can not be sure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09)[7] are that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance or rarer) could increase locally by 40%.

4.5.2.4 Climate change can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability. The latest UK climate projections provide information about possible changes at a number of scales, including river basin district (RBDs). Hampshire lies predominantly within the South East RBD, with parts also in Thames and South West RBDs. Table 4.2 outlines the projected changes in winter rainfall, sea level rise and peak river flows in Hampshire.

[6] Urban creep includes extensions to existing properties and the paving over of gardens. As urban creep often falls outside the development control process, its impacts on peak flows and volumes are less likely to be mitigated than development which is subject to planning applications.

[7] http://ukclimateprojections.defra.gov.uk/

Table 4.2: UKCP09 Climate projections for 2050s medium emission scenario for the RBDs covering Hampshire

South East RBD	South West RBD	Thames RBD
Winter precipitation increase by around 18% and is very likely to be between 2 and 39%	Winter precipitation increase by around 12% and is very likely to be between 2 and 26%.	Winter precipitation increase by around 15% and is very likely to be between 2 and 32%
Precipitation on the wettest day in winter increase by around 16% and is very unlikely to be more than 34%	Precipitation on the wettest day in winter increase by around 9% and is very unlikely to be more than 22%	Precipitation on the wettest day in winter increase by around 15% and is very unlikely to be greater than 31%
Relative sea level at Portsmouth is very likely to increase by between 10 and 40 cm above the 1990 level.*	Relative sea level at Bristol is very likely to increase by between 10 and 40 cm above the 1990 level.*	Relative sea level at Sherness is very likely to increase by between 10 and 40cm from the 1990 levels.*
Peak river flows in a typical catchment are likely to increase by between 11 and 24%	Peak river flows in a typical catchment are likely to increase by between 9 and 18%	Peak river flows in a typical catchment are likely to increase by between 8 and 18%

** Projected sea level rise does not include the extra potential rise as a result of polar ice sheet loss*

4.5.2.5 Within Hampshire the UKCP09 projections indicate that winters will become wetter, with central estimates of increase in winter precipitation of about 18%. These wetter winters and more of this rain falling in wet spells may increase river flooding within Hampshire. A typical catchment could experience increased peak river flows of between 8 and 24%.

4.5.2.6 More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for these eventualities. The sea level on Hampshire's coast is very likely to increase by between 10 and 40cm above 1990 levels. This combined with potential rising river levels may also increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

4.5.3 Urban development and impact on flooding

4.5.3.1 Increased urbanisation and development within urban areas can have an impact on flooding, particularly surface water flooding. Urban creep describes activities such as paving over gardens and building extensions. This sort of development increases the hard surfaces in a town, reducing the opportunity for water to filter into the soil, increasing the volume of water which has to run off into drains and the speed at which it flows so increasing the intensity of the peak flow. The activities which make up urban creep are often outside the development control process so their impacts on flooding are less likely to be controlled than development which is subject to normal planning procedures.

4.5.3.2 Population growth is likely to result in increased demand on existing infrastructure and services, such as sewerage networks and local water supplies. The requirement for additional housing can result in new development that causes land take of greenfield (and brownfield) land, visual intrusion, and increased flood risk (to the new development or the surrounding local area) or development unsympathetic to the surrounding landscape or built heritage. In turn this can increase pressure on biodiversity and ecosystems. However, new development could also bring opportunities – most notably the retro-fitting of SuDS to adjacent existing development.

4.5.3.3 New residential or commercial developments generally increase the area covered by hard surfaces and could therefore increase the risk of surface water flooding. However new legislation, including the National Planning Policy Framework requirement for all development to be sustainable, the National SuDS standards and the forthcoming requirement for a drainage strategy for new development to be approved by the SuDS Approving Body (SAB), will help ensure that new developments do not increase the risk of local flooding.

4.5.3.4 The County Council has established a SuDS working group which will, in partnership with the other RMAs, be developing procedures and processes for the implementation of the SAB. The group will also provide guidance and design principles for developers that will establish region wide principles and processes to ensure that new development does not increase the risk of local flooding.

4.5.3.5 The County Council is engaging with the district councils as they develop their local plans. As part of this engagement process, where this strategy provides a robust evidence base, the authorities will be advised to include a policy that ensures inappropriate development does not occur in areas of known local flood risk.

4.5.4 Land use planning

4.5.4.1 There are a number of significant development proposals that will, as they move forward, affect the population size, distribution and pattern across the county. Planned housing development, as of the 1st April 2012, is summarised in Table 4.3 which provides a picture of where the more significant developments are expected in the county, excluding Southampton and Portsmouth districts

Table 4.3 Planned housing developments of > 500 dwellings in Hampshire (excluding Portsmouth and Southampton) at 1st April 2012

District	Population Centre	Area	Estimated number of new residential dwellings
Basingstoke and Deane	Basingstoke	Popley (Sherborne Road)	784
Basingstoke and Deane	Basingstoke	Rooksdown Lane	750
East Hampshire	Bordon	Proposed strategic allocation at Bordon/ Whitehill	4,000
Fareham	Fareham	New Community North of Fareham (Wellbourne)	6,500 – 7,500
Gosport	Gosport	Rowner (Renewal Project)	596[8]
Hart	Fleet	Church Crookham	843
Rushmoor	Aldershot	Aldershot Urban Extension (Wellesley)	3,850[9]
Test Valley	Andover	Land east of Icknield Way (East Anton)	1,956
Test Valley	Andover	Land at Picket Twenty	1,053
Test Valley	Andover	Land at Picket Piece	530
Test Valley	Romsey	Abbotswood	770
Winchester	Waterlooville	Strategic Allocation west of Waterlooville	2,860[10]
Winchester	Winchester City North	Andover Road (Barton Farm)	2,000
Winchester	Whiteley	Strategic Allocation North of Whiteley	3,500[11]

[8] 388 dwellings to be demolished
[9] Number of dwellings in planning application
[10] Includes Old Park Farm (under construction) and Grainger site -a small amount of the land is in Havant district.
[11] Dwellings increased from 3000 to 3,500 by local plan inspector in Jan 2013

4.5.4.2 There is a need to ensure that the evidence base used to make planning decisions and formulate policy is consistent and appropriate for the local flood risk experienced across the county. Local Planning Authorities should use the outputs of this Strategy's risk assessment when making planning decisions and if they update their Strategic Flood Risk Assessments. Hampshire County Council will take responsibility for the system for reporting and recording local flooding incidents. Hampshire County Council will also maintain a list of structures which are likely to have a significant effect on flood risk: this is called the Flood Risk Register (and is currently available from www.hants.gov.uk/flooding/floodriskregister). Both the Flood Risk Register and records of local flooding incidents will be readily available to all who need to see them.

4.5.4.3 The Flood and Water Management Act requires RMAs to co-operate and share information which relates to the management of flood risk. The Act also contains a general requirement to contribute to the achievement of the principles of 'sustainable development.' One of the main means of delivering the Government's policy objectives on sustainable development, as set out in the National Planning Policy Framework, is through the preparation by local planning authorities of local plans.

4.5.4.4 As set out in section 1 of this Strategy, one of the principles under-pinning the County Council's approach to preparing this Strategy is 'working together to deliver multiple benefits'. There are strong links between many aspects of the LLFA's new duties under the Act and the local planning process. The County Council is keen to ensure that the local planning authorities in Hampshire encapsulate the key principles and messages from this Strategy in the planning process when allocating land for development, making decisions about the detailed design and layout of developments and considering the provision of infrastructure on specific sites. Flood risk management infrastructure, while less glamorous than new schools or community facilities, is just as important to the long-term quality of life of those who will occupy new development.

4.5.4.5 Therefore, while local planning authorities will undoubtedly prepare their own Strategic Flood Risk Assessments in support of their own local policy making, the County Council recommends that district and borough councils treat this Strategy as an important 'material consideration' in the planning process. This Strategy should be referred to in Local Plans and decisions and should help influence the location, design and layout of new developments. The measures identified in the LFRMS Action Plan should be considered when local planning authorities prepare infrastructure assessments and Community Infrastructure Levy (CIL) Charging Documents.

4.5.5 Maintenance and deterioration of assets

4.5.5.1 As assets age and deteriorate they will become less capable of performing their original flood risk management function. The impact on flood risk will vary depending on the type of asset. For example drains may silt up, or ditches become blocked by rubbish or extensive plant growth reducing their capacity to carry water and therefore increasing the risk of surface water flooding. Other assets, such as

flood walls can weaken over time and become less able to withstand the forces of flood water which they hold back. Routine maintenance, such as clearing drains can mitigate this risk and extend the lifetime of assets. However without this regular maintenance and a programme of replacement and remediation, the deterioration of assets with age would increase flood risk.

4.6 Current and future risk assessment methodology

4.6.1.1 We have undertaken a risk assessment of flooding in Hampshire to identify the wards which are most vulnerable to local flooding so that we can target investment where it will provide the greatest benefit. To identify the likelihood of flooding we have used:

- Flood Map for Surface Water 1 in 30 and 1 in 200
- HCC records of localised flooding incidents[12]
- Records of the 2000-2001 groundwater flooding.

4.6.1.2 We have chosen to use the Flood Map for Surface Water in preference to the Areas Susceptible to Flooding map (see section 4.4) because it uses slightly more sophisticated modelling techniques including assumptions about ground permeability, drainage capacity and flow routing around structures. As part of the PFRA the use of the Flood Map for Surface Water was agreed among interested parties as being more representative than the Areas Susceptible to Flood Map.

Ranking of communities in terms of coastal and fluvial flood risk is presented in Annex J; the methodology used for determining the ranking is presented in Section 4.4.4

4.6.1.3 We have assessed the consequences of this flooding in relation to:

- The residential properties which flood internally
- The non residential properties (such as shops and factories) which flood internally
- The number of critical infrastructure features which flood internally (such as schools, hospitals, electricity sub stations)
- The length of motorway and A-roads which flood

4.6.1.4 In order to effectively target flood risk management measures in high risk areas, the spatial resolution of the risk assessment needs to be small enough to effectively identify risk, whilst not being so small to pinpoint and name individual properties at risk. Following consultation with the steering group and interested parties we have

[12] Where measures have already been applied to reduce any risk within this dataset a view has been taken as to the extent of the residual risk and this has been used in the subsequent assessment

chosen to assess the risk at a ward level. A ward is also a geographical scale that is understood by communities, applicable across the county and at which published data is readily available.

4.6.1.5 We are aware that flooding does not respect administrative boundaries such as wards, so when we look at managing this risk or investigating the flood risk in more detail we will examine it more closely and will consider the issue both at a ward and a river catchment scale.

4.6.1.6 The method followed seeks to ascribe a monetary value to an incidence of flooding from each data source (identified in paragraph 4.6.1.1) based on assigning standardised costs to flooded property and roads (as listed in paragraph 4.6.1.3). This enables an objective and comparative assessment of flood risk to be carried out for each source of data. Each data source represents both a different type of flooding and different frequencies of flooding. We have therefore been able to sum the costs of flooding to each ward, from each data source to establish a 'combined' risk. Undertaking fresh modelling has not been possible during the development of this Strategy; instead our approach has sought to make the best use of available data.

4.6.1.7 The outcome of this assessment is a series of maps which express the risk of flooding as an annual economic value. The assessment provides a relative comparison of estimated damages only across the whole of Hampshire by different types of flooding and types of asset / infrastructure at risk. It should not be interpreted as expressing the real cost of flooding.

For a detailed explanation of the risk assessment methodology, refer to Annex D.

4.7 Current and future risk assessment results

4.7.1.1 Figures 4.3 – 4.6 below show the outputs of the Hampshire wide risk assessment by ward, for groundwater, surface water flooding, reported flooding incidents and combined risk. Annex E shows these maps in more detail, presented at a district level.

4.7.1.2 The method followed provides a comparative assessment of flood risk between wards in terms of annualised economic cost. We have used this information to rank the wards, '1' being the ward with the highest risk of flooding. Tables 4.4 – 4.7 lists the wards identified with the highest ranked risk of flooding for each of the types of flooding assessed, and identifies the wards with the highest combined risk.

4.7.1.3 Twenty ward specific action plans have been produced. This represents the 5% of wards with the highest ranked risk. They include the 5 wards with the highest 'combined' risk of flooding, the 5 wards with the highest groundwater only flood risk, the 5 wards with the highest ranked risk according to the HCC dataset and the 5 wards with the highest ranked risk calculated from the Environment Agency Flood Map for Surface Water.

4.7.1.4 It is not economically or practically possible to resolve all flooding issues within Hampshire, therefore the risk assessment has been used to focus activities in areas where it will be possible to achieve the greatest benefit. Whilst this means that

Ward Specific Action plans have only been produced for the highest risk wards, this Strategy does not exclude other wards. Many of the measures proposed in chapter 5 will benefit all wards throughout Hampshire, not just those with specific action plans.

4.7.1.5 This risk assessment does not include the cost of flooding from river and coastal flooding (which are not classed as local flooding). However, the risk of river and coastal flooding has been provided by the Environment Agency through the communities at risk initiative. Where one of the high risk wards contains a community at risk, this has been identified in the tables below.

Table 4.4 The five wards with the highest overall risk of flooding (combined groundwater, HCC database and EA surface water map)

Overall Risk rank	Ward	Economic cost of flooding (£k)	Communities at risk of fluvial and coastal flooding
1	Droxford, Soberton and Hambledon (Winchester)	194	Hambledon
2	Fareham East (Fareham)	153	Wallington South Fareham
3	Penton Bellinger (Test Valley)	148	Thruxton Appleshaw
4	St Mary's (Test Valley)	144	Andover
5	Popley East (Basingstoke and Deane)	141	

Table 4.5: The five wards with the highest risk of flooding from groundwater

Groundwater Risk rank	Ward	Overall (combined rank)	Economic cost of flooding (£k)	Communities at risk of fluvial and coastal flooding
1	Droxford, Soberton and Hambledon (Winchester)	1	153	Hambledon
2	Fareham East (Fareham)	2	130	Wallington South Fareham
3	Upper Meon Valley	6	84	
4	Battins (Havant)	16	60	East Havant
5	Cheriton and Bishops Sutton (Winchester)	17	58	Cheriton

Table4.6: The five wards with the highest risk of flooding identified using the HCC reported incidents database

HCC database risk rank	Ward	Overall (combined) rank	Economic cost of flooding (£k)	Communities at risk of fluvial and coastal flooding
1	Tadley North (New Forest)	22	60	
2	Eversley (Hart)	96	23	
3	Totton East (New Forest)	87	18	Totton (part of)
4	Abbey (Test Valley)	11	15	Romsey (part of)
5	Lymington Town (New Forest)	55	15	

Table 4.7: The five wards with the highest risk of flooding identified from the Environment Agency Flood map for surface water (FMfSW)

FMfSW risk rank	Ward	Overall (combined) rank	Economic cost of flooding (£k)	Communities at risk of fluvial and coastal flooding
1	St Mary's (Test Valley)	4	142	Andover
2	Popley East (Basingstoke and Deane)	5	141	
3	Eastrop (Basingstoke and Deane District)	7	118	
4	Brookvale and Kings Furlong (Basingstoke and Deane)	10	111	
5	Hart Plain (Havant)	12	103	

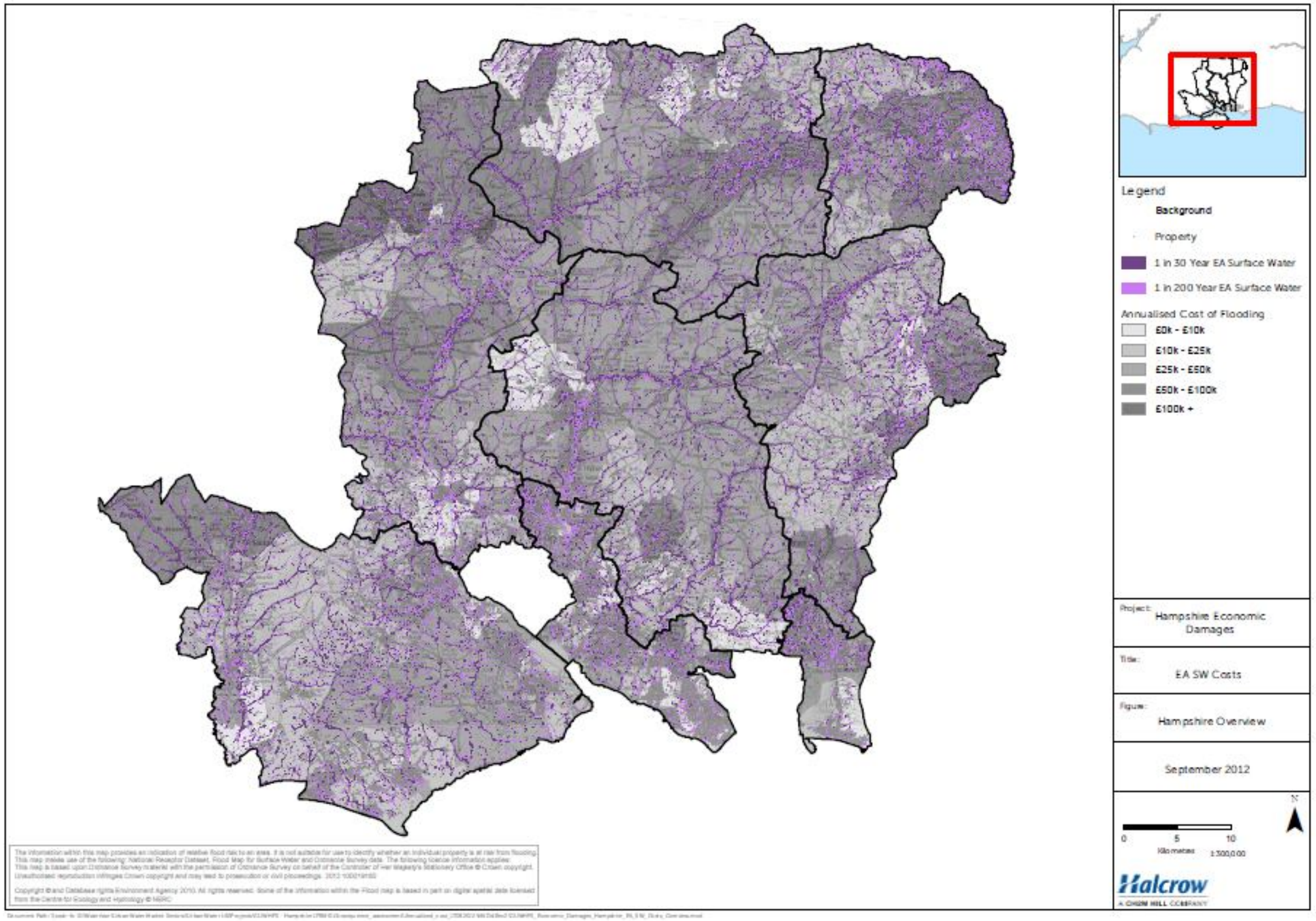


Figure 4.3: Risk of flooding calculated as an economic cost from the Environment Agency Flood Map for Surface Water

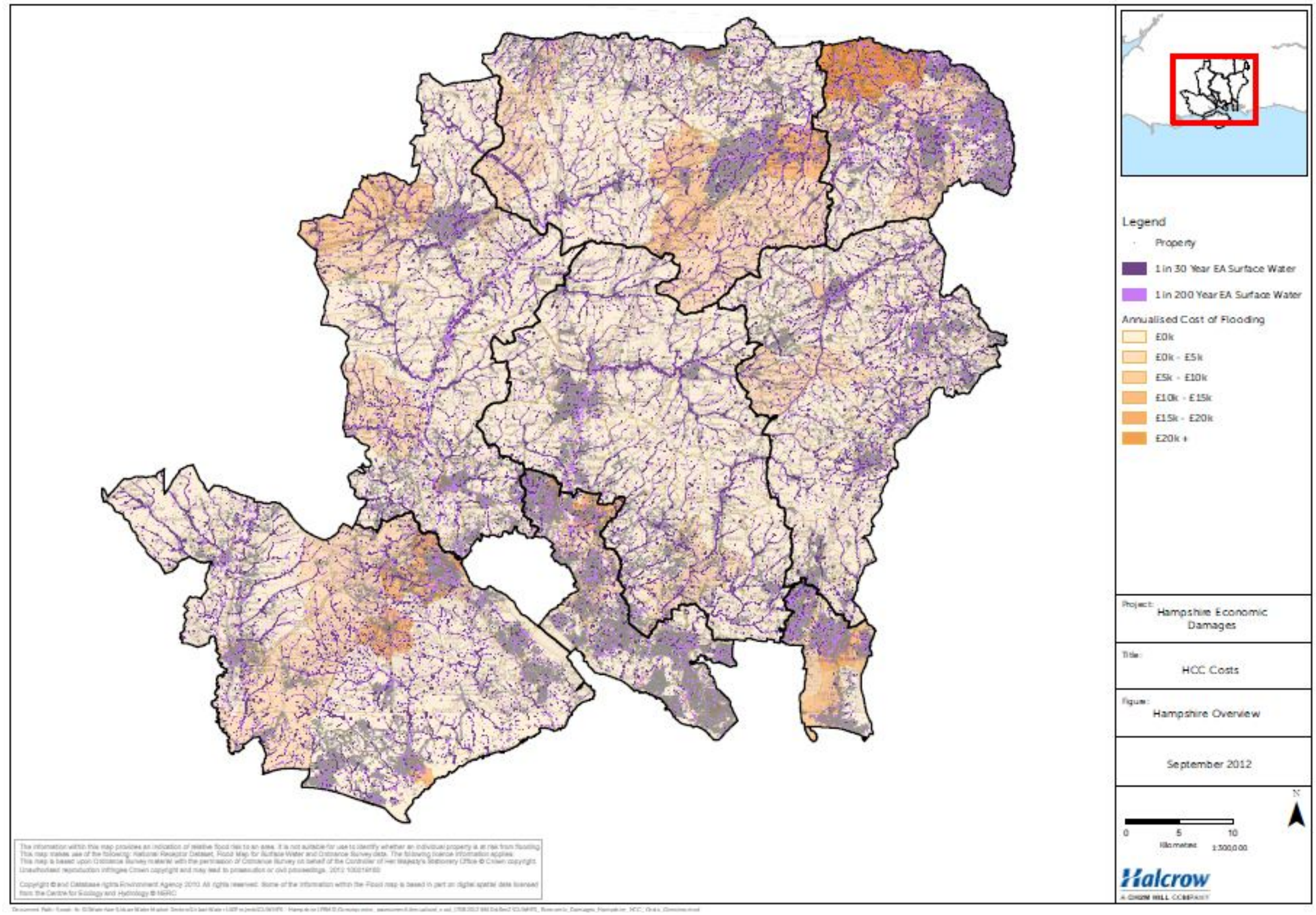


Figure 4.4: Risk of flooding calculated as an economic cost from Hampshire County Council reported incidents.

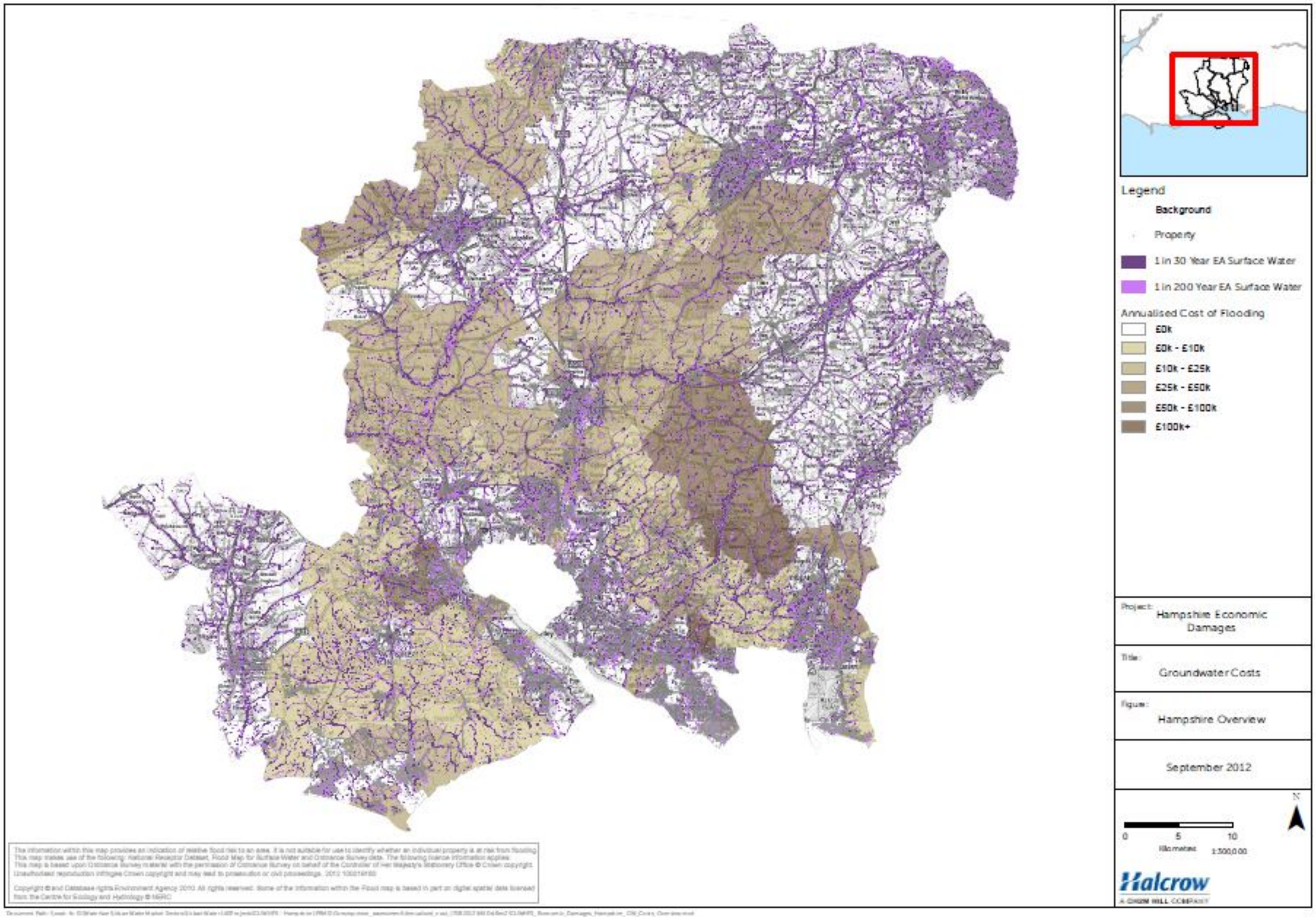


Figure 4.5: Risk of flooding calculated as an economic cost from records of groundwater flooding in 2000/2001

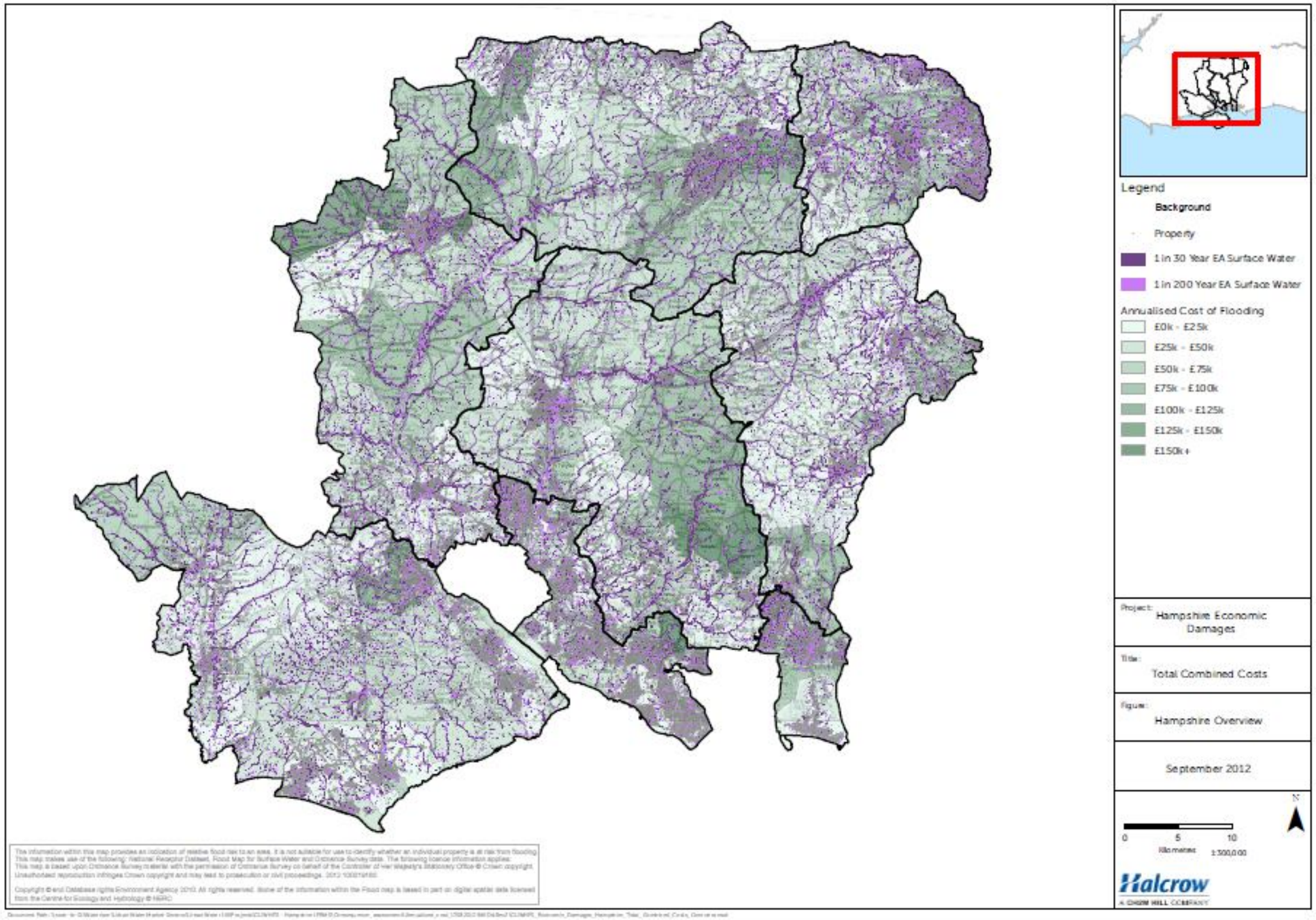


Figure 4.6: Risk of flooding calculated as an economic cost by combing all three data sources

4.8 Understanding uncertainty

4.8.1.1 Any assessment of risk is inherently uncertain. The approach we have followed is aimed at producing a high level, standardised understanding of risk to allow comparison of relative flood risks. It cannot tell us whether individual properties or features are at risk from flooding. We have used a method which is proportionate to the aims of the Strategy and the data which we have available. The reasons for uncertainty arise from features of the data we have used and assumptions we have made.

- Historical data: we know that it has flooded in these locations and so know that it could flood again. However we also know that some areas that could be susceptible to flooding may not yet have flooded or we may not have recorded information when and if they did. In addition, changes in land use and climate which may affect the likelihood of flooding cannot be shown in our records of past flooding.
- Modelled flooding: this shows more information on locations that could flood and can be used to examine the potential changes due to land use and climate change. However we have to make lots of assumptions when modelling data and we can never be certain that these are correct.

4.8.1.2 As more data becomes available, possibly through investigations carried out by the County Council in its LLFA role, and more detailed studies are undertaken through surface water management plans and other studies, our understanding of flooding and climate processes increase. We will ensure that this increased understanding is used to refine our assessment of local flood risk in future revisions of the LFRMS Action Plan and the Strategy.

5 Measures

5.1.1.1 The risk assessment has identified the highest, high, moderate and low flood risk wards within Hampshire. In order for the Strategy to be proportionate in the way in which it manages and mitigates local flood risk, the individual actions or procedures (known as measures) to achieve the objectives must be balanced with the risk. Therefore a different approach to measures development is appropriate for each level of risk.

5.2 Types of local flood risk management measures

5.2.1.1 One of the key concepts to consider when identifying the most suitable measure to manage flood risk in a location is the source-pathway-receptor model. For flooding to occur there must be a source of flooding, such as heavy rainfall, groundwater or high flows in a river. The water from this source then reaches a receptor (something affected by flooding, such as people and property) by a pathway (such as sewers and drains, land, or the floodplain).

5.2.1.2 It is important to manage flooding at a catchment level, so that a problem caused by flooding is understood within the context of the wider area. The source – pathway – receptor model helps to achieve this. Whilst the risk assessment was viewed at a ward level, measures identified to manage flood risk need to be considered at a wider catchment level.

5.2.1.3 Measures to mitigate flooding can be defined by whether they manage flooding at the source, pathway or receptor. Source measures aim to reduce the volume or rate of water causing the flooding. Pathway measures are designed to manage the passage of flood water both in terms of volume and direction. Measures which focus on receptors are designed to reduce the negative impact of flooding on people, property and the environment. Before Hampshire County Council is able to decide how best to address flooding, we need to fully understand it so that the most appropriate type of activity to mitigate flood risk can be identified. Therefore further investigation into flooding is often required before any control measure can be identified. Such investigation can be considered a type of measure in itself.

5.2.1.4 Measures to mitigate flood risk can also be defined in terms of the measure itself, rather than the issue it addresses. Structural measures are those which require development of permanent or fixed physical structures, for example extending drainage infrastructure or building a flood defence wall.

5.2.1.5 Non structural measures are those which do not involve the development of fixed or permanent physical infrastructure. They are often related to changing behaviour, providing information or maintaining existing structural measures.

5.2.1.6 Table 5.1 identifies a number of measures identifying whether their focus is on investigation, source, pathway or receptor and whether they are structural or non structural.

Table 5.1: Types of flood risk management measures

Focus	Type	Theme	Example of Measures
Investigation	Non structural	Study	Surface water management plans, local flood risk studies
Investigation	Non structural	Survey/modelling	Flow survey, topographical survey, modelling
Investigation	Non structural	Social	Community perception surveys
Source	Structural	Flow reduction/Source control	SuDS (new and retrofit)
			Land management practices
Source	Non structural	Policy	Planning policies to influence location and design of development
Source	Non structural	Resilience	Temporary or demountable flood defences
			Improved resilience and resistance measures
			Improved weather warning
Source	Non structural	Education	Social change, education and awareness
Pathway	Structural	Conveyance	Restoring or increasing capacity in drainage systems
			Separation of foul and surface water sewers
			Managing overland flows (e.g. changing cambers, raising kerbs)
Pathway	Structural	Diversion (of pluvial runoff)	New or altered runoff routes
Pathway	Structural	Storage (pluvial)	Offline/online attenuation of pluvial flow

Focus	Type	Theme	Example of Measures
Pathway	Non structural	Maintenance	Improved maintenance regimes or enforcement
Pathway	Non structural	Policy	Land management practices
Receptor	Structural	Protection/permanent defences	Property level resilience (permanent)
			Community level resilience (permanent)
Receptor	Structural	Exceedence	Matrix signs, permanent signage of exceedence routes etc
Receptor	Non structural	Resilience	Improved weather warning
			Property level resilience (non-permanent)
			Community level resilience (non-permanent)
Receptor	Non structural	Education	Social change, education and awareness
Receptor	Non structural	Policy	Planning policies secure mitigation in new development

5.2.2 Investigations

5.2.2.1 The risk assessment undertaken in this Strategy has identified where Hampshire County Council needs to be focussing its attention. It has also identified the type of flooding that causes the greater risk in each ward. However, a strategic risk assessment is not normally detailed enough to understand the exact sources, pathways and receptors of flooding. Therefore a more detailed study, assessment or plan may be required. Examples of plans already in development are the Hampshire Groundwater Surface Water Management Plan and the Eastleigh, Rushmoor and Basingstoke Surface Water Management Plans.

5.2.2.2 Hampshire County Council, in its role as Lead Local Flood Authority, has a responsibility to record and investigate significant flood events, as detailed in Section 19 of Part 3 of the Flood and Water Management Act 2010. The Council

has developed a procedure to be followed when a flood is reported. This procedure is set out in Annex I.

5.2.3 Source control

5.2.3.1 Source control measures for surface water flooding normally aim to reduce flooding by increasing storage of flood water, reducing the rate of runoff or increasing the volume of water which soaks into the ground.

5.2.3.2 Sustainable Drainage Systems (SuDS) are often an effective means to implement source control. SuDS encompass a variety of measures such as permeable paving which allows more water to soak into the ground than traditional impermeable road and path surfaces. Other SuDS measures may include introducing ponds and wetlands that can hold flood water, or swales and detention basins which slow the movement of water and reduce the volume of runoff. An added benefit of such measures is that they can help to improve water quality before it reaches the drainage system, therefore helping to achieve the Water Framework Directive objectives. Within Hampshire SuDS will be most easily introduced with new urban developments, where they can be included in the overall design. However, whilst more challenging, they can also prove useful in existing properties or communities, for example encouraging the use of water butts, or replacing existing hard surfaces (such as car parks) with permeable paving.

5.2.3.3 The new National SuDS standards, alongside the guidance being developed by the SuDS group of the Hampshire Strategic Flood Water Management Group, will help promote source control SuDS on new and redevelopments. The new LLFA role as the SuDS Approving Body (when it commences) will give HCC more control in ensuring that SuDS are delivered.

5.2.4 Pathway control

5.2.4.1 Pathway control measures aim to manage the movement of flood water through both natural and man made drainage systems. Measures may be structural, for example involving the development of new drainage systems, or separating foul and surface water sewers, or may be non structural for example encouraging land management practices which reduce runoff. Hampshire County Council recognises that maintenance of its existing drainage infrastructure will be an important aspect of flood risk management. Such infrastructure can reduce flood risk with minimal capital investment, freeing up funds for measures elsewhere.

5.2.4.2 As the Highway Authority, Hampshire County Council manages and maintains an 8,500km highway network. This network comprises many assets, one of which is the drainage infrastructure, and this asset in turn is made up of a number of different drainage items. Some of these items are visible from the surface and number in the hundreds of thousands. They comprise gullies, catchpits, soakaways and ditches. There is also a considerable underground asset much of which has evolved, or been constructed over many decades and there is a long term (many years) project currently underway to map this part of the asset.

5.2.4.3 A considerable amount of data has been collected over recent years. However the quantity of data, the method of collection and the way in which the data was recorded has resulted in gaps and errors. To ensure accuracy each piece of data needs to be validated and ‘cleaning’ the surface asset data to meet operational

needs is well underway. Once this task has been completed, robust information will be available to support both operational and other asset management decisions.

5.2.4.4 In terms of maintaining this asset, the Highway Authority spends over £1.5million annually on cleaning and unblocking gullies and soakaways, operates routine maintenance gangs to ensure ditches and minor maintenance issues are resolved and has provided approximately £4 million this year for structural repairs. Structural maintenance programmes are now informed by FWMA priorities and where appropriate works can be coordinated to achieve joint solutions

5.2.4.5 Hampshire County Council is considering ways in which local communities can be empowered to deliver local maintenance activities. The Parish Lengthsmen Trial is an example of a pilot scheme currently underway (see below).

5.2.4.6 In the meantime the County Council's policies regarding highways maintenance can be found in the Highways Maintenance Management Plan which can be downloaded from the County Council's website.

Trial of Parish Lengthsmen

The County Council has been trialling a scheme which reintroduces the modern equivalent of 'parish lengthsmen' in a small number of areas.

Parish lengthsmen were deployed in Hampshire until the late 1960s, carrying out routine maintenance works across their allocated parishes. These tasks included minor drainage and highway repairs such as ditch cleaning and pothole repairs, hedge trimming, road sign repairs and maintenance duties. Currently all highways maintenance in Hampshire is carried out by a single maintenance contractor. However, it is now acknowledged both that there was a greater demand for highway maintenance service delivery and that the service the County Council delivers was being scrutinised more by parishes and the public alike. It was considered that satisfaction could be increased by delivering the service with more involvement from interested parties and customers. Hence a trial in two areas, each containing 10 parishes where each was allocated £10,000 (£1,000 per parish) to pilot the operation of its own lengthsman scheme.

The trial was extended in 2012 and now involves around 40 parishes but it is still operating as a trial. There is a possibility that it will be further extended in due course while its effectiveness is assessed. If it proves successful, and providing certain legal and administrative issues can be overcome, extending this across a larger number of willing parishes could offer significant benefits to the maintenance of local drainage infrastructure and help reduce localised flooding.

5.2.5 Receptor level management

5.2.5.1 The County Council recognises that it will not be possible to completely prevent local flooding. Therefore, when considering measures to mitigate flood risk, receptor level measures also need to be considered. These measures aim to reduce the likelihood but more often the impact of flooding on people, property and the environment.

5.2.5.2 Hampshire County Council will work with its partners to increase awareness of flood risk so that individuals and communities understand that there will always be some risk of flooding and the ways in which they can help to manage that risk. We will help people to understand how they can resist and become more resilient to flooding. This will better equip people to take measures to prevent flooding entering their properties (resistance), and recover if they are affected by flooding. The

Wallington Property Level Protection scheme (see below) provides an example of organisations and individuals working together to deliver property level protection.

5.2.5.3 When considering receptor level measures it is important that each receptor (e.g. a property) is considered on an individual basis to identify the best way of providing flood protection. For example if the receptor is a listed building and works are proposed, the measures will have to take this into consideration and listed building consent could be required.

Wallington Village Property Level Protection – working together to manage flood risk

Wallington Village in the Borough of Fareham is vulnerable to flooding from the sea, rivers and surface water and has experienced flooding in the past. In 2000 Wallington experienced the worst event in living memory with over 40 properties flooding internally. The village also experienced flooding in 2008 and 2009, but the use of sandbags prevented houses flooding internally.

In 2009 Fareham Borough Council worked with Wallington Village Community Association to apply for funding for property level flood protection. In total they received about £230,000 from Defra to provide flood protection to individual properties.

In total residents of 49 properties chose to participate in the scheme to protect their homes. These properties were surveyed to identify products suitable for each individual property. As one of 13 conservation areas within Fareham, selecting products which were not visually intrusive was an important consideration. Once selected the products, such as airbrick covers, self inflating sandbags and Flood defender barriers, were installed and residents received training in how to use and maintain them.

In parallel to the project Wallington Village Community Association updated their flood plan and have completed a test run for product deployment.

T he project was delivered by a team made up of Fareham Borough Council, the Environment Agency and Wallington Village Community Association. Working closely with the community was essential to ensure that the project met the needs of the residents and throughout the project they were given regular opportunity to provide feedback and comment.

5.3 Measures to achieve our objectives

5.3.1.1 It will not be possible to deliver all potential flood risk management measures immediately. Therefore initially the Strategy focuses on quick wins and short term measures that will deliver demonstrable benefit.

5.3.1.2 The measures and actions have been developed in conjunction with the SEA to minimise any negative impacts and provide environmental enhancements wherever possible. Further detail of the SEA review of measures is contained within the accompanying SEA document

5.3.1.3 Table 5.2 below shows the general measures that we have put in place to achieve our objectives. There are a number of measures already being

Table C1.1 in Annex C1 identifies specific responsibilities of the organisations involved in flood risk management and how HCC will engage with them to achieve the objectives of this Strategy.

delivered through the Hampshire Strategic Flood & Water Management Group that will reduce or manage flood risk, and these have also been included in Table 5.2.

5.3.1.4 The accompanying document – Hampshire LFRMS Action Plan - contains further details about how we plan to deliver these measures in specific locations.

5.3.1.5 The County Council is working hard to implement its new duties under the Flood and Water Management Act. In addition to producing this Strategy and the other measures already referred to in earlier chapters, it has established a protocol which will help determine when it carries out investigations into significant flood events, has carried out its first investigation following the unfortunate fatality at a flooded ford on the Hampshire / Berkshire border earlier in 2012, established a first phase of our flood register and is working on a number of surface water management plans. Other work is also in progress.

5.3.1.6 Firstly the County Council is exploring, with the Environment Agency, a way of securing funding for Flood Risk Management Schemes in Hampshire separate from the usual Flood Defence Grant-in Aid (FDGiA) approach. FDGiA is Defra's principal mechanism of funding flood defence capital works This will entail the County Council committing some funding to secure a guarantee of a rolling programme of funding from the Environment Agency over a three year period (as opposed to the annual bidding cycle of FDGiA). It is too early to provide further details of the 'Pathfinder' approach in this strategy but it will be addressed in any review and in the bi-annual updates of the Action Plans.

5.3.1.7 Secondly the County Council is now consenting works to Ordinary Water Courses; an element of the Act which was introduced in April 2012. While this work is essentially reactive in nature the County Council is exploring more proactive ways of working with the Environment Agency and others to publicise the Environment Agency's Living on the Edge publication which sets out the responsibilities of riparian landowners in keeping ditches, gullies and other FRM clear of debris to prevent blockages.

5.3.1.8 Thirdly the County Council is working with the voluntary sector through the Total Environment pilot programme to trial some innovative ways of addressing flood risk at the very local level and to bring together many different issues in combination with flood risk.

5.3.1.9 Fourthly, the County Council, working through the LRF, is encouraging and providing support for the preparation of local flood and emergency plans.

Supporting the preparation of local flood/emergency plans

The County Council's Emergency Planning Unit, working through the Local Resilience Forum, is playing a proactive role in supporting parish councils and local communities in the preparation of local emergency plans and flood plans. An awareness raising event was held in October 2011 and the County Council has prepared guidance and a template for parishes to use to prepare such plans. The County Council has also helped initiate interest in the matter by producing a Members briefing pack on flooding – a bespoke pack of information for each Hampshire district which sets out important local information on flooding in each district area. Further information is available on the EPU's website at http://www3.hants.gov.uk/emergencyplanning/cx-emergency_planning_community_emergency_plan

The Emergency Planning Unit is also currently supporting a number of Flood Action Groups that have established themselves in response to rising groundwater levels and is sharing lots of good practice from around the County.

5.3.1.10 Finally, the County Council is currently going through a process of improving its own highways drainage maintenance records and schedules. Significant effort is going into improving the accuracy and comprehensiveness of the data held by the County Council on some 300,000 individual drainage assets in order that maintenance schedules can be made more effective. In addition the County Council has been trialing a scheme to reintroduce the modern equivalent of 'parish lengthsmen' in a small number of areas to carry out routine maintenance works.

Table 5.2 Measures planned to achieve our objectives

Objectives	HCC Actions to deliver the objective
Improve our knowledge and understanding of local flood risk in Hampshire	This Strategy provides clear explanation of the types of local flooding and who is responsible for local flooding. It includes an annex which details what to do in a flood, and how to prepare for a flood. It includes a ward risk assessment that provides a solid evidence base for prioritising future activities. The County Council has developed the first phase of its flood register, and has developed a reporting and investigation procedure that will ensure future incidents improve the understanding of flooding. The County Council will ensure that the public is aware of this register and procedure through our public consultation and awareness events. The County Council is developing a consistent approach to the recording and designation of structures. During the biannual update of the action plans, Hampshire County Council will seek up to date flood incident information from the RMAs and use this data to ensure the HCC flood incident database (used to record flood incidents reported to HCC) is up to date. Where data is not available at the detail or resolution required, the County Council will work with all RMAs to advise them of the duty to cooperate. Specifically, the County Council will work with the LRF, water companies, and Fire and Rescue Service to find a way to align their reporting databases with the County Council's to ensure data compatibility. The County Council will hold regular scrutiny and briefing events on the issue of local flooding. Hampshire County Council is developing its highways drainage asset database to ensure it is up to date, fully mapped and made available to contractors through consultation with the Highways Authority – this will help prevent damage to existing drainage infrastructure when works are undertaken by 3rd parties. A programme of surface water management plans for each district in Hampshire is being undertaken, with all SWMPs being completed in 2015. Each SWMP will identify issues at a local district level, allowing district authorities and communities to identify problems and empower them to take action.

Objectives	HCC Actions to deliver the objective
Work in partnership with other flood risk management authorities (RMAs) to deliver the Strategy and LFRMS Action Plan	All RMAs are part of the LFRMS steering group, and the Hampshire Strategic Flood & Water Management Group , so provide oversight and scrutiny of this Strategy. The Strategy has been developed through a series of workshops with the RMAs, and with the support of the Regional Flood and Coastal Committees. Hampshire County Council will continue to facilitate the Hampshire Strategic Flood and Water Management Group. Hampshire County Council is working with the Fire and Rescue Service to ensure that flood resilience is a routine part of the services community resilience outreach work. As part of Hampshire County Council's role as LLFA it is taking an overview for all forms of flooding in Hampshire, not just local flooding. HCC is currently delivering a number of partnership projects with RMAs and a number of other authorities to understand and manage the risks from coastal erosion and flooding. The LLFA will undertake investigations of significant flooding events following the procedure set out in Annex J, and will share investigation reports with other RMAs and with the public.
Maintain, and improve where necessary, local flood risk management infrastructure and systems to reduce risk	The County Council provides guidance and administers a new process for consenting of new structures and maintenance of existing structures. Hampshire County Council will develop a risk based approach to the maintenance of assets based on the risk assessment undertaken by the Strategy. The preparation of the Register and Record (as required by the FWMA) may also guide the maintenance approach. Hampshire County Council will maintain a database of assets so that responsibility can be established in the case of a problem or a failure to maintain. Hampshire County Council will work closely with the Environment Agency to take a proactive role in making riparian owners and public bodies aware of their responsibilities around maintaining drainage infrastructure. Hampshire County Council will develop a prioritised asset maintenance plan to ensure that we actively manage our assets to reduce the risk of local flooding. Hampshire County Council is piloting or leading a number of initiatives that will enable local communities to manage and improve infrastructure and systems: • Parish Lengthsman scheme, delivered through the Hampshire Total Environment Initiative.

Objectives	HCC Actions to deliver the objective
	• Local Flood resilience planning and supporting local implementation. Hampshire County Council have a call-off contract with Community Action Hampshire and Groundwork Solent, requiring the two organisations to undertaken local flood resilience planning and support practical implementation of schemes by the local community.
Ensure that local planning authorities take full account of flood risk when allocating land and considering permitting development (by avoiding development in inappropriate locations and minimising flood risk wherever possible)	Hampshire County Council is working with Districts/Boroughs to prepare SuDS guidance and developing its SAB procedures that will ensure that new development will not increase runoff entering water bodies. Hampshire County Council will have a statutory duty to approve all flood risk assessment and drainage strategies for new developments when the SAB duty enacted in the Flood and Water Management Act is commenced (scheduled for April 2014). The County Council will ensure that planning authorities are made aware of the risk of local flooding, and will recommend that district and borough councils develop policies that ensure that the type and quantity of development is commensurate with the risk of flooding as determined through this Strategy. Hampshire County Council, as the Minerals and Waste Authority is a statutory consultee on planning applications, and will review significant planning applications in areas of high risk to advise the planning authority where the development is inappropriate or unacceptable with respect to local flood risk policies.
Engage with local communities to increase public awareness and reporting of flooding and promote appropriate individual and community level planning and action Improve and support community level flood response and recovery	The LFRMS Action Plan identifies where risk management authorities will work with local communities in the highest risk areas to promote local capital schemes to reduce the risk of flooding. Hampshire County Council will engage with local communities and businesses across the risk envelope to encourage and support them to take appropriate local action to prepare for flooding. This will include encouraging the preparation of community flood plans in high risk areas. Hampshire County Council will use the media interest created during high profile flood events to remind people of their routes for reporting lower impact flooding and why it is important to do so. The risk management authorities will support the formation of local flood action groups where they do not already

Objectives	HCC Actions to deliver the objective
	exist in the highest risk areas. Hampshire County Council officers will meet regularly with District Authority Community Planning Officers to discuss key issues emerging from community or neighbourhood plans. The mailbox (fwm@hants.gov.uk) opened to allow public consultation on this Strategy will remain open to allow people to continue to report flooding through this means. Hampshire County Council is playing a proactive role in supporting parish councils and local communities in the preparation of local emergency plans and flood plans.
Identify national, regional and local funding mechanisms to deliver flood risk management interventions.	The Strategy includes a funding strategy and funding guidance that identifies the primary sources of local flood risk management funding. The Strategy also identifies how to maximise other non flood related outputs to secure contributions from other secondary sources of funding. Hampshire County Council is working with the Environment Agency to develop a shared budget and procurement process to implement joint flood risk mitigation schemes. Hampshire County Council is working to develop a property resilience grant to support and help implement local flood protection action for individual properties.
Develop strategy, policy and a LFRMS Action Plan to manage these risks, providing balanced social and environmental benefits for the economic investment	The Strategy includes an LFRMS Action Plan that is based on a detailed assessment of risk from local sources of flooding and considers river and coastal flooding. The LFRMS Action Plan detail is commensurate with the level of risk and the cost of flooding. The actions and measures to reduce risk have been tested through the Strategic Environmental Assessment (SEA) scoping process to ensure that where possible they achieve multiple benefits and maximise opportunities to deliver social and environmental benefits.HCC will undertake further environmental assessments as part of SWMPs and the GWSWMP, and where necessary Environmental Impact Assessments (EIAs) to consider environmental and social impacts in a level of detail not appropriate at this strategic level.

5.4 LFRMS actions and wider benefit

5.4.1.1 The LFRMS presents an opportunity to achieve wider benefits beyond the core purpose of managing local flood risk. Hampshire County Council has therefore sought to incorporate environmental and social benefits throughout the development of the Strategy and Action plan. HCC has undertaken both an SEA and HRA in conjunction with development of the Strategy. Developed in parallel with the LFRMS, the SEA was able to provide a systematic appraisal of the potential environmental impacts of the strategy. This gives assurance that the Strategy outcomes would not be detrimental to the environment and has allowed incorporation of options for environmental enhancement.

5.4.1.2 The SEA assessed the impacts of the LFRMS objectives, the LFRMS activity themes (shown in table 5.1) and the Action plan, it found that:

- All the LFRMS objectives have a positive impact on the natural and built environment, although some impacts on the receptors are likely to be indirect.
- Many of the activity themes are likely to have positive effects, but that some could potentially have negative impacts on biodiversity, cultural heritage, landscape, natural processes and amenity depending on design and location of the actions. The SEA highlighted that at this stage the impact of the measures was difficult to assess and therefore further investigation (at a project level) would be required
- The impact of most of the ward specific action plans could not be determined fully as further information and investigation is required, through the development of SWMPs, the GWSMP and Environmental Impact Assessments. Actions relating to raising awareness of flooding and improving monitoring and reporting were likely to have positive impacts on human health.

5.4.1.3 Some of the wider benefits the Strategy could contribute to include helping to achieve compliance with the Water Framework Directive and Habitats and Birds Directives. The SEA identifies opportunities to achieve these wider benefits, one example being the use of green infrastructure which can both help reduce flood risk whilst contributing to water quality objectives and creating habitat and amenity space. Green infrastructure measures are included within the actions proposed in this strategy and a number of green infrastructure initiatives are already under way in Hampshire, as shown in the box below.

5.4.1.4 The SEA and HRA have identified potential environmental and social impacts and enhancements which could be part of the Strategy, however as strategic level desk based reviews they are inherently uncertain. The SEA therefore highlights the need to carry out further data collection and animalises of the environmental effects of specific measures and actions. For example the SEA has not addressed any impacts likely to result during the implementation of any built solution because such detailed project level issues would be more appropriately considered as part of a Environmental Impact Assessment undertaken at a project level.

5.4.1.5 An example of another environmental element which will require more detailed study is the potential effects of LFRMS measures on international sites. The HRA screening stage concluded that the Strategy will have no significant effects on

internationally important sites, however further HRA will be required for individual schemes to determine the potential impacts to international sites within Hampshire.

5.5 Funding

5.5.1.1 Hampshire County Council has set out a range of measures to help achieve the flood risk management objectives set out in this Strategy. The measures include changes to internal systems and processes, improved internal and external communications with relevant interested parties, promoting local capital schemes and helping communities become better prepared for flooding. Delivery of these measures is dependent upon the availability of funding, be it ongoing revenue for systems improvements or project-based finance to support one-off capital schemes.

5.5.1.2 The funding available will be closely linked to the types of measures that are implemented and the outcomes that these provide. Measures that offer wider benefits like public amenity, cultural heritage or biodiversity alongside the flood risk objectives are more likely to attract funding from alternative sources outside the dedicated flood risk funding sources.

5.5.1.3 Flood Defence Grant-in Aid (FDGiA) has historically been the most important source of funding for flood risk management and coastal erosion schemes. This capital funding from the Government is provided by the Department of Environment, Food and Rural Affairs (Defra) and administered by the Environment Agency, although funding approvals are also subject to the consent of the relevant Regional Flood and Coastal Committee [13](RFCC). FDGiA is available to projects relating to any source of flooding. Defined 'Outcome Measures' are used to determine which applications will receive funding, and how much.

5.5.1.4 In 2011 Defra introduced the partnership funding approach. This means that whilst it may be possible to fund some projects using only mainstream dedicated flood risk funding sources, there will be other projects that require a range of funding sources to make up the total sum needed. The ability of Hampshire County Council to leverage contributions (both financial and in kind) from local partners could make the difference between whether or not locally important projects can be delivered. Successful fundraising is dependent on relationships, timing and effort. Understanding what types of outputs and outcomes are needed to qualify for various funding sources is critical in order to persuade potential funders to commit to a project.

5.5.1.5 Local Levy is raised by the RFCC by way of a levy (precept) on County and Metropolitan Councils, Unitary Authorities and London Boroughs. Funds raised using this existing RFCC local levy will count as a local contribution in terms of the

[13] Hampshire straddles three RFCC areas: Wessex, Thames and Southern.

FDGiA process, even though the levy is supported by funding through the Department of Communities and Local Government. Local Levy funding can be used to support flood risk management projects that do not attract 100% national funding through FDGiA, thus enabling locally important projects to be undertaken.

5.5.1.6 In December 2010 Defra announced £21million worth of grants to provide additional funding specifically to support councils with LLFA status (in addition to existing Formula Grant arrangements) to perform new roles and duties under the Flood and Water Management Act and Flood Risk Regulations.

5.5.1.7 In addition to funding specifically available to Hampshire County Council in it's flood risk management role, the council also has its own funding for other capital projects and revenue programmes. Such funding could contribute towards flood risk management activities, particularly where measures or schemes can be identified which create multiple benefits across a number of council responsibilities.

This section summarises the types of funding available to deliver the measures of this Strategy, further detail of potential funding sources is outlined in Annex F

5.5.1.8 There are a wide range of other funding sources not specifically linked to flood risk management which it may be possible to access. These include Lottery funding, Landfill Tax, charitable trusts, developer contributions and private beneficiary funding. Those sources considered to have the highest potential suitability are described in Annex F.

5.5.1.9 Hampshire County Council anticipates that the majority of funding available to deliver the Strategy will come from dedicated flood risk management sources, supplemented by other alternative sources of funding identified as being potentially suitable based on the type of measure, anticipated outputs/outcomes, and the size of the funding gap (i.e. the element of a project's cost which cannot be funded through one or more of these dedicated sources). Successful delivery of the Strategy measures will require innovative ways of working and funding, based on teamwork and trust. Collaborative working and joint funding across partner organisations will be key to maximising the return on investment in flood risk management.

6 Next steps

6.1 Development of the Strategy

6.1.1.1 This Strategy is based on the latest published information available at the time of its preparation. It will be updated, in consultation with other organisations and individuals involved in managing flood risk. The Strategy should be considered a 'live' product which will evolve over time as new information becomes available and flood events occur. The Strategy will also be supplemented by bi-annual update of the LFRMS Action Plan, preparation of further Surface Water Management Plan and by the County Council using the Strategy to seek to influence the preparation of Local Plans and the plans and strategies of other bodies.

6.2 Working in partnership

6.2.1.1 Hampshire County Council will continue to work in partnership with the other RMAs and other interested parties, including local communities to deliver the aims and objectives of this Strategy. We know that the most cost effective measures to improve local flood risk management can only be determined and delivered through true partnership working. This will include the use of partnership funding in order to enable schemes to go ahead.

6.2.1.2 One of the ways in which the RMAs can work together is in delivering the Actions outlined in section 7 of this Strategy and the individual area Action Plans. It is vital for successful flood risk management that there is joint working at the local level. This was a key theme raised during the public consultation on the draft strategy. The Action Plans recommend the creation of 'delivery teams'. In practice this will not mean the creation of new teams or groups of people. Rather the objectives of delivery teams are likely to be met through improved co-ordination of existing working arrangements. The key principle is that of RMAs and communities working in partnership more effectively than they may have done in the past.

6.2.1.3 Hampshire County Council has a responsibility to coordinate all the risk management authorities where there are integrated sources of flooding. This is largely achieved through HCC facilitating the Hampshire Strategic Flood & Water Management Group. Where the risk assessment or action plans have identified the need for a delivery team, in practice, this will be established through the creation of task-and-finish groups operating under the auspices of the Hampshire Strategic Flood & Water Management Group. The County Council has re-engineered the constitution and objectives of this Strategic Group in order to facilitate this. Hampshire County Council will be responsible for forming these task-and-finish groups as appropriate, and for identifying the responsibilities of different partners. The groups will not necessarily only be made up of Risk Management Authorities but may also comprise community groups, local businesses and local landowners as needs dictate.

6.3 Monitoring

6.3.1.1 Hampshire County Council will review the Strategy against its aims and objectives annually and present a monitoring report to the Hampshire Strategic Flood and Water Management group. This will be published on the HCC website. The County Council will also continue to gather information and investigate significant flood events as appropriate.

6.3.1.2 The environmental performance of the LFRMS will be monitored throughout its lifetime using the monitoring framework proposed by the SEA. This monitoring framework will be reviewed on a biannual cycle to coincide with the Action plan.

6.4 Review of Strategy

6.4.1.1 This Strategy and the supporting LFRMS Action Plan will remain live documents over the Strategy period.

6.4.1.2 The Strategy is valid to 2028, and is not planned for full update until 2017, following the review of the Hampshire PFRA. However, the Strategy may need to be updated within this period if:

- There are significant flood events that challenge the conclusions of the risk assessment
- There are significant changes to any of the datasets that underpin the risk assessment
- There are significant policy changes that amend the roles and responsibilities of the Flood Risk Management Agencies
- The annual monitoring identifies that the Strategy is not achieving its objectives
- There is a change in funding availability which has a significant effect on the actions proposed in this Strategy.

6.5 Review of LFRMS Action Plan

6.5.1.1 The LFRMS Action Plan will be reviewed biannually or as otherwise agreed with the strategic group. The review of the LFRMS Action Plan will

- Assess if measures have been delivered that mitigate risk
- Assess if there have been any material impact that changes the risk prioritisation of high, moderate and low risk wards

7 Conclusions and recommendations

7.1 Conclusions

7.1.1.1 This Strategy is the Local Flood Risk Management Strategy for Hampshire. It identifies, at a strategic level, the priority flood risk areas for the administrative county of Hampshire. These areas have been identified using published data sources and supplemented by data collected from partner organisations and local communities. The methodology used allows an objective analysis of comparative risk in different areas to be devised. It seeks to apply a monetary value to the risk based on a number of specified assumptions about the nature, extent, type and duration of identified flood events.

7.1.1.2 The Strategy has been prepared in partnership with other Risk Management Authorities, district, borough and local councils, neighbouring authorities, key interested parties and local communities. Whilst providing an overview of local flood risk in Hampshire, the Strategy does not confine itself to those aspects of flooding which are the responsibility of the County Council in its role as a Lead Local Flood Authority. It also tries to identify the interactions between different causes of flooding.

7.1.1.3 Considering flooding in a broad context, the Strategy also links to land use planning, the principles of sustainable development and the need to ensure that measures to mitigate flood risk deliver multiple benefits. It seeks to ensure that flood risk management is not viewed in isolation, but within a wider context. Against this background, the Strategy deliberately tries to consider how flood risk can be reduced or mitigated in realistic and achievable way.

7.1.1.4 Tables 4.4 to 4.7 of the Strategy identify the wards with the highest potential flood risk in Hampshire. The full outputs of the risk assessment are presented in Annex E. The wards with the highest risk of flooding from combined local sources (taking all data sources into account) are:

- Droxford, Soberton and Hambledon (Winchester District)
- Fareham East (Fareham District)
- Penton Bellinger (Test Valley District)
- St Mary's (Test Valley District)
- Popley East (Basingstoke and Deane District)

7.1.1.5 It is recommended that the Hampshire Strategic Flood & Water Management Group leads on the implementation of the measures identified in the ward Action Plans.

7.2 Recommendations

7.2.1.1 The LFRMS Action Plan accompanying this main Strategy document sets out both county wide measures and ward specific actions which may be pursued to mitigate and reduce the identified risk in high risk wards. The ward specific action plans set out where those measures might be delivered and which RMA might best take the lead in delivering them. In many cases a number of organisations will be required to work together to deliver the action. The roles and responsibilities of those involved in local flood risk management are outlined in Annex C1 of this document. The key

actions required by the different organisations and individuals involved can be summarised as outlined in the following paragraphs.

7.2.1.2 ***Actions for all:***

- Pay due regard to this Strategy where relevant in drawing up local plans and strategies and making decisions which have flood risk management implications
- Consider flooding in its wider context, particularly in terms of the downstream effects of decisions made in specific locations and wider catchment effects
- Aim to secure 'multiple benefits' (especially environmental and ecological) and deliver sustainability and Water Framework Directive benefits wherever possible in the decision making process for delivering flood risk management infrastructure. This is likely to involve developing increased understanding of environmental impacts and mitigation measures at a project level.
- Ensure adequate maintenance is undertaken of Flood Risk Management assets and infrastructure for which individual authorities, bodies and organisations are responsible.

7.2.1.3 ***Hampshire County Council actions*** are set out in full in table 5.2, they include (but are not limited to):

- Building an evidence base to improve understanding of local flood risk
- Working with partners to develop this Strategy and related plans and guidance
- Managing and maintaining assets that help manage flood risk
- Encouraging other organisations, groups and individuals to consider and manage flood risk
- Developing the funding strategy for local flood risk management
- Ensuring the findings of the Strategic Environmental Assessment are taken into account, particularly the need to undertake more detailed project level environmental assessments before implementation of LFRMS actions and measures.
- Steering the Hampshire Strategic Flood & Water Management Group to implement the measures set out in the ward Action Plans.

7.2.1.4 The main actions required from the ***Borough and District Councils are:***

- Take this LFRMS into account when preparing local plans, making decisions over land allocation for development, considering planning applications and identifying local infrastructure requirements
- Tailor local planning policies to address the flood risk issues in their areas
- Consider the need to designate significant flood risk features
- Continue to undertake work to ordinary watercourses where needed

7.2.1.5 ***Parish and Local Councils, Local Community Groups and flood groups***, particularly in the identified communities at risk, should:

- Prepare community flood plans
- Consider whether they are able to take on any role in the inspection / maintenance of flood risk management infrastructure
- Take the lead in locally publicising information to help individuals manage their own flood risk

7.2.1.6 ***The Environment Agency*** is responsible for managing flood risk from main rivers, large reservoirs and the sea, and has a strategic overview of all flood and coastal erosion risk management. It also plays a key role in providing flood warnings to the public and supporting emergency responders when flooding occurs. The Environment Agency's flood warning service is called 'Flood Warning Direct' (FWD). Individuals can sign up to the service and the Environment Agency runs targeted campaigns including digital media and 'Floodwise' to encourage residents to sign up. The Environment Agency will continue to work with Hampshire County Council to develop this Strategy.

7.2.1.7 ***The Water Companies*** serving Hampshire are responsible for foul flooding, or flooding from sewers. They will continue to work with Hampshire County Council to develop this Strategy, and ensure that actions required to manage flooding from sewers are delivered.

7.2.1.8 ***Developers*** should:

- Take this Strategy into account when making decisions over land acquisitions
- Design and layout sites to make the best use of natural drainage and topography
- Ensure SuDS are used, wherever possible, to provide multiple benefits

7.2.1.9 ***Riparian landowners*** should:

- Ensure water is able to flow freely through their land without obstruction
- Undertake regular maintenance and clearing of water courses and related flood risk management infrastructure for which they are legally responsible

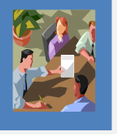
7.2.1.10 ***Individuals and households*** should:

- Sign up to Environment Agency flood warning services (Flood Warning Direct) where available and appropriate
- Take proportionate steps to make their properties more resilient to flooding

The Environment Agency will continue to work with Hampshire County Council to develop this Strategy.

The main actions required from the Borough and District Councils are:

- Take this LFRMS into account when preparing local plans, making decisions over land allocation for development, considering planning applications and identifying local infrastructure requirements
- Tailor local planning policies to address the flood risk issues in their areas
- Consider the need to designate significant flood risk features
- Continue to undertake work to ordinary watercourses where needed



Individuals and households:

- Sign up to Environment Agency flood warning services where available and appropriate
- Take proportionate steps to make their properties more resilient to flooding

Hampshire County Council actions are set out in full in table 5.2, they include (but are not limited to):

- Building an evidence base to improve understanding of local flood risk
- Working with partners to develop this Strategy and related plans and guidance
- Managing and maintaining assets that help manage flood risk
- Encouraging other organisations, groups and individuals to consider and manage all forms of flood risk
- Developing the funding strategy for local flood risk management
- Ensuring the findings of the Strategic Environmental Assessment continue to be taken into account
- Establish delivery team or teams, or improve coordination between existing initatives to implement the measures set out in the ward Action Plans

The actions we need to take to achieve co – operative management and reduction of Local Flood Risk in Hampshire to benefit people, property and the environment

Riparian landowners should:

- Ensure water is able to flow freely through their land without obstruction
- Undertake regular maintenance and clearing of water courses and related flood risk management infrastructure for which they are legally responsible

The Water Companies will continue to work with Hampshire County Council to develop this Strategy.

Parish and Local Councils, Local Community Groups and flood groups

- Prepare community flood plans
- Consider whether they are able to take on any role in the inspection/maintenance of flood risk management infrastructure
- Take the lead in locally publicising information to help individuals manage their own flood risk

Developers should:

- Take this Strategy into account when making decisions over land acquisitions
- Design and layout sites to make the best use of natural drainage and topography
- Ensure SuDS are used, wherever possible, to provide multiple benefits

Everybody should:

- Pay due regard to this Strategy where relevant in drawing up local plans and strategies and making decisions which have flood risk management implications
- Consider flooding in its wider context, particularly in terms of the downstream effects of decisions made in specific locations and wider catchment effects
- Aim to secure ‘multiple benefits’ (especially environmental and ecological) and deliver sustainability and Water Framework Directive benefits wherever possible in the decision making process for delivering flood risk management infrastructure.
- Ensure adequate maintenance is undertaken of Flood Risk Management assets and infrastructure for which individual authorities, bodies and organisations are responsible.