

Hampshire County Council Preliminary Flood Risk Assessment 2011 - 2017



**Preliminary Flood Risk Assessment
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Foreword

I am pleased to introduce Hampshire County Council's Preliminary Flood Risk Assessment (PFRA). The PFRA is a strategic document which identifies, collates and assesses information on flood risk as well as identifying areas where additional investigation may be necessary. It has been prepared to satisfy the legal requirements of the Flood Risk Regulations 2009 and the EU Floods Directive.

This document is an important element of our ongoing work centred around flood risk management. It is essential that the potential risks created from all sources of flooding are properly assessed. It is particularly important that we, with our key partner organisations, prioritise where works are carried out to protect communities and to identify the best available methods for reducing future flood risk.

The County Council is committed to keeping Hampshire special by sustaining the quality of life enjoyed by Hampshire residents now and in the future (and supporting sustainable growth and the competitiveness of Hampshire's economy), while responding to challenges such as the effects of climate change, which will have an impact on flood risk in the future. In its plans to address these issues, and with new duties under the Flood and Water Management Act, the County Council plays an important role in ensuring that robust flood risk management processes are developed, not only within the Council but also within other relevant organisations operating in Hampshire.



Councillor Melville Kendal
Executive Member for Environment and Transport

Preliminary Assessment Report

Executive Summary

This report has been prepared by Hampshire County Council as Lead Local Flood Authority (LLFA) to assist in meeting its duties to manage local flood risk and to deliver the requirements of the Flood Risk Regulations 2009.

The initial stage of the Flood Risk Regulations requires the completion of a Preliminary Flood Risk Assessment which comprises this document (Preliminary Assessment Report) and the associated annexes.

The Preliminary Flood Risk Assessment provides a high level overview of flood risk from a variety and combination of flood sources including surface water, ground water and ordinary watercourses as well as the interaction with main rivers, the sea and reservoir flooding. Some work has already been carried out on surface water management plans in Eastleigh, Basingstoke, Rushmoor and the chalk catchment (ground water flooding risk area), which was funded by specific grants from Defra. These areas were selected on the basis of relative priority as advised by Defra at the time.

The Environment Agency has set out a national methodology and supporting mapping for the identification of areas of 'significant risk' which require further works. This work will consist of flood and hazard mapping and a flood risk assessment to standards set by European Union requirements. None of the areas identified in the high-level national assessment carried out by the Environment Agency as at 'significant risk' are within Hampshire. Therefore this report fulfils the requirements of the regulations at present.

Although there are no nationally significant flood risk areas within Hampshire, this report and the data collected will be used to identify local flood risk areas, and areas where further information is required to better determine and understand local flood risk across Hampshire. In turn, this will be used to inform the Local Flood Risk Management Strategy required under the Flood and Water Management Act 2010 and to identify additional areas where surface water management plans or other work may be required.

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I Introduction

The Flood Risk Regulations came into force in December 2009, transposing the EU Floods Directive into law. These regulations place duties on Lead Local Flood Authorities (LLFAs), defined as County and Unitary authorities, to assess flood risk from surface water, groundwater and ordinary watercourses within their respective boundaries and to publish the result of that assessment in the form of this Preliminary Flood Risk Assessment. The Environment Agency also has duties under these regulations relating to their existing responsibility for main rivers and the sea and also relating to their overview role for flood risk in general.

Flood risk is defined by Regulation 3 of the Flood Risk Regulations as "*a combination of the probability of the occurrence with its potential consequences*".

The main duty for LLFAs under the regulations is the preparation of a Preliminary Flood Risk Assessment. This is an initial screening exercise to review historic and future local flood risk from all sources of flooding. If this assessment highlights areas of significant risk, known as Flood Risk Areas which are defined using national criteria set by the Environment Agency, further investigation is required including the preparation of flood hazard and risk maps, and also flood risk management plans. It is also used to identify locations where the national criteria is not met but local flood risk highlight the need for further investigation to be carried out in the form of surface water management plans.

Defra have defined a surface water management plan (SWMP) as "a framework through which key local partners with responsibility for surface water and drainage in their areas work together to understand the causes of surface water flooding and agree the most cost effective way of managing surface water flood risk."

1.1 Aims and Objectives

The Preliminary Flood Risk Assessment consists of a Preliminary Assessment Report and Annexes identifying areas of significant historic and future flood risk. This report assesses local flood risk from all sources of flooding in order to identify Flood Risk Areas which will require further investigation. This report will also support the Local Flood Risk Management Strategy, which LLFAs are required to prepare to meet the requirements of the Flood & Water Management Act. This strategy assesses local flood risk and identifies areas for which further investigation is recommended at a local level.

The key stages in undertaking a Preliminary Flood Risk Assessment are as follows:

- Identification of relevant partner organisations and the relevant flood risk data held with each body;
- Development of suitable partnership working, collaboration and governance
- Identification and assessment of historic flood risk information including information on likelihood and consequences;
- Identification and assessment of future flood risk data including information on potential harmful consequences;
- Assessment of all information to inform on the requirement for significant flood risk areas in accordance with the National guidance.

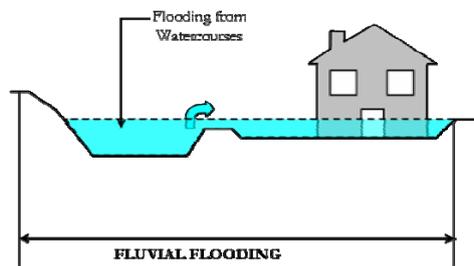
1.2 Sources of Flood Risk

Floods can originate from a variety of sources. The most severe flooding often occurs when sources combine and although flood risk from main rivers and the sea falls under the responsibility of the Environment Agency, it must still be considered if it is a contributing factor to surface water flooding. The different sources of flooding to be considered under this assessment are as follows.

1.2.1 Fluvial

Fluvial flooding (also known as river flooding) occurs when a watercourse cannot accommodate the volume of water draining into it from the surrounding land. It is generally infrequent and can be predicted to some extent.

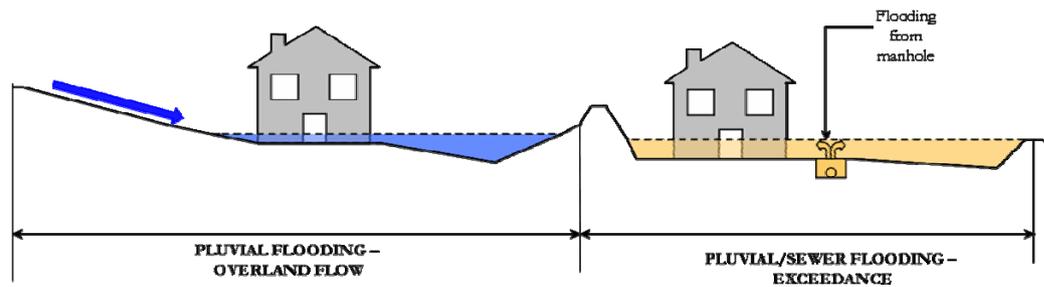
Watercourses are more likely to be overwhelmed when rainwater cannot be absorbed into the land onto which it falls. It might be very steep, water logged, or built over. Rapid melting of snow also leads to river flooding in some cases.



1.2.2 Pluvial

Pluvial flooding (also known as surface water flooding) occurs when heavy rainfall overwhelms the capacity of local drainage (both natural and man-made) and water flows across the ground. The route the water takes and the depth of flooding will depend on local features and can be difficult to predict.

Surface water flooding may also be the result of blockages in the drainage system or high river levels backing up along drainage pipes.



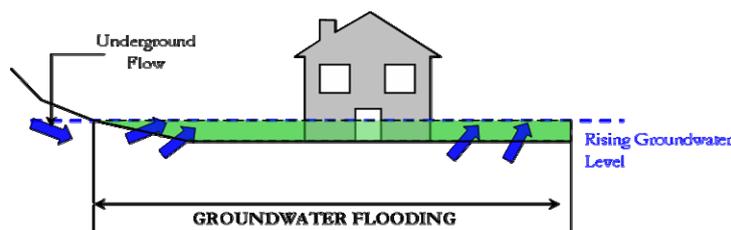
1.2.3 Sewer

Sewer flooding occurs when sewers are overwhelmed by heavy rainfall or when pipes become blocked. In urban areas, surface water flooding and sewer flooding often combine, polluting the floodwater.

1.2.4 Groundwater

Groundwater flooding occurs when water levels in the ground rise above the land surface. This type of flooding is most likely to occur in areas above an aquifer. Groundwater levels within an aquifer generally rise and fall according to an annual cycle, but periods of prolonged rainfall may cause water levels to rise above the land surface. This type of flooding can last substantially

longer than surface water flooding with water remaining above ground for weeks or even months.



1.2.5 Coastal

Coastal flooding results from high tides, waves driven by strong winds and surges of seawater caused by storms. The most severe coastal flooding often occurs when storm surges and high waves coincide with high tides.

1.2.6 Reservoir

Reservoir flooding occurs after the failure of the reservoir's walls or earth embankments. This may be caused by erosion due to seepage, overtopping of the dam or by accidental damage to the structure. Reservoir failure is extremely rare in the UK.

2 The Study Area

The study area for the Preliminary Flood Risk Assessment is the area within the administrative boundary of Hampshire County Council. Hampshire is made up of 11 District and Borough authorities; Rushmoor, Hart, Basingstoke and Deane, Test Valley, Winchester City, East Hampshire, New Forest, Eastleigh, Fareham, Havant and Gosport.

In addition to these 11 authorities, the two unitary authorities of Southampton and Portsmouth are also situated within the geographic county of Hampshire (though not within the County Council area). Hampshire is also in close proximity to the Isle of Wight unitary authority which is separated from the Hampshire coast by the Solent. Bordered to the south by the Solent, Hampshire is also bordered to the west by Dorset and Wiltshire, Berkshire to the north, and Surrey and West Sussex to the east. Figure 1 shows the geographical location of Hampshire and Figure 7 highlights the locations of each of the District and Borough Councils.

Hampshire is one of the largest counties in England, covering 3,769 square kilometres. Including the two cities of Portsmouth and Southampton, Hampshire has a population of just over 1.7 million (HCC Small area population forecasts 2009).

Hampshire is predominantly rural in land use terms with 85% of the land area being classed as rural. However, only 23% (c.300,000 people) of Hampshire's population lives in those rural areas (Urban Rural Classification, Office of National Statistics 2004). Within Hampshire's administrative area there are 251 Parish Councils.

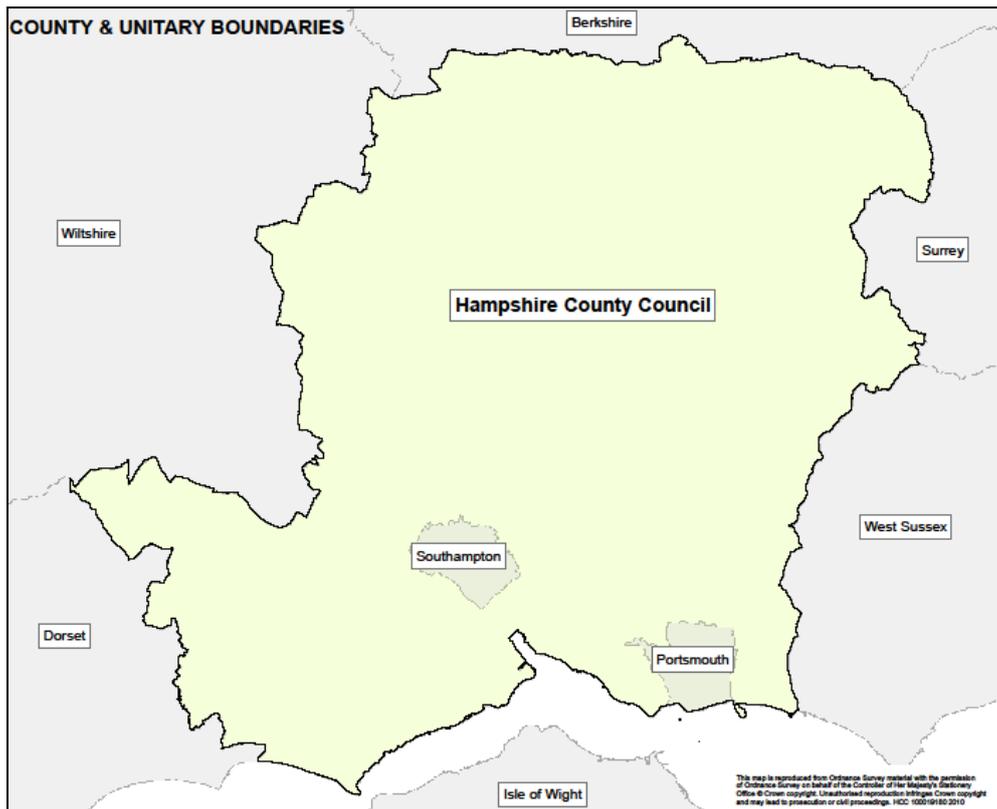


Figure 1 - Hampshire County Council Location Plan

2.1 Hydrology

Hampshire is covered by 17 separate river catchments all with slightly different characteristics according to the topology and geology of the area. For administrative purposes, these catchments are grouped into three River Basin Districts as defined by the Environment Agency under the Water Framework Directive. Hydrology is an important aspect in flood risk management as different catchments respond in different ways with speed and likelihood of flooding varying considerably in different areas. Figure 2 illustrates the different river catchments with the River Basin Districts shown in Figure 8.

2.1.1 Thames River Basin District

Loddon

The Loddon catchment covers the administrative areas of Basingstoke & Deane Borough, Rushmoor Borough and Hart District and tends to respond quickly to rainfall due to the clay beneath it although the Loddon itself is a high quality chalk river as identified within the Basingstoke and Deane Water Cycle Study. There are some relatively large urbanised areas which mean flash flooding can occur with a risk to property and people. The Loddon river has undergone many alterations over time and in places is heavily engineered, particularly within urban areas.

Kennet

This catchment only affects Basingstoke & Deane Borough and is generally underlain by a mixture of clay, limestone and sand making it prone to rapid surface water run-off and flash flooding. However due to this being a rural area there are fewer properties at risk than in the urban areas of the Loddon catchment.

Wey Addlestone Bourne

This catchment covers the northern part of East Hampshire District and is underlain with chalk and sands, reducing the likelihood of flashy flood conditions. This means that the rivers respond slower to rainfall giving more time between the time of rainfall to potential flood conditions. Much of this area is rural with Alton being the main town along the line of the river. Due to the rural nature of the catchment there are substantial floodplains and storage areas, which help to reduce the impacts of flooding.

2.1.2 South East River Basin District

Itchen

This river catchment is largely dominated by groundwater flow due to the bedrock geology that underlies the area. It covers Basingstoke & Deane Borough, Winchester City and Eastleigh Borough. The River Itchen is considered one of the best chalk streams in the world with excellent diversity and water quality, meaning it is covered by several protective designations; Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). The groundwater flowing through the chalk provides a stable flow through the catchment, making the response of river levels to rainfall in the upper section slower than the lower section of the catchment. Winchester is heavily affected by this river due to canals, mills and sluices being placed along the course of the river. Due to substantial modifications made between Winchester and the mouth of the river the flood defences already in place will be put under further strain in the future as a result of climate change and sea level rise.

Test

Test Valley is the main borough affected by the Test catchment, and is another that is highly controlled by the groundwater in the chalk. It also affects the northern part of the New Forest where several smaller tributaries join the River Test. The Test is a protected SSSI area for the same reasons as the River Itchen, making this an important area for conservation. The upper and middle sections of the catchment can be prone to groundwater flooding when levels are high after prolonged rainfall. The main areas of concern are all within Test Valley Borough, such as Andover in the north and towns which straddle the river such as Stockbridge. The lower part of the Test is predominantly clay and tends to be more heavily urbanised which leads to fast surface run-off from heavy rainfall. This in turn may lead to the flood risk increasing over time due to more frequent and intense storms.

Hamble

The upper half of the catchment within Winchester City is relatively rural and is underlain by chalk so there are few properties at risk of flooding in this area. However the lower half, in Eastleigh Borough, is highly urbanised meaning that surface water flooding often occurs due to the drainage network and watercourse being overwhelmed. There are concerns that the capacity of the existing surface water drainage system will be exceeded if further major developments take place.

Meon

This is a very small, narrow catchment which runs from East Hampshire District through the rural section of Winchester City and finally enters the Solent in Fareham Borough. The lower section is protected from tidal inflow by a tidal sluice, whilst the upper half of the river flows over chalk meaning very little fluvial flooding occurs as most rainfall is directly absorbed into the ground.

Wallington

This catchment covers a large area and also includes several smaller streams, such as the Lavant Stream. East Hampshire District, Winchester City, Fareham Borough, Gosport Borough and Havant Borough are all affected by this catchment. It is typically prone to surface water flooding

rather than fluvial flooding due to its large built up areas along the coast, though increased groundwater from the upstream chalk aquifers during the winter and spring months can also have an effect, as can tidal influences along the coastline.

Rother

This catchment is part of the Arun catchment and flows through the gentle hills of the South Downs in East Hampshire District to low lying land in West Sussex. Petersfield is the only main town in this catchment that has suffered from groundwater flooding in the past due to the underlying chalk bedrock. However the majority of this catchment is rural so few properties are at risk.

New Forest

Only New Forest District is affected by this catchment and it either drains into the Solent or Southampton Water. This catchment is largely rural with very little development, meaning few properties are at risk. The two main rivers are the Lymington River and Beaulieu River, both of which flow over relatively impermeable ground meaning there is a higher risk of surface water flooding compared to fluvial flooding. Typically this catchment is a high density system with many small watercourses which respond quickly to rainfall. The coastline watercourses can be affected by high tide levels, which is predicted to become a more prominent problem in the future due to sea level rise. Climate change may also have a high impact on the number of flash floods that occur in this catchment with a predicted increase in stormy conditions.

2.1.3 South West River Basin District

Avon

This catchment covers the west side of the New Forest District and receives significant flows from the chalk aquifers underlying Salisbury Plain. It is mainly groundwater flooding that affects this area, with flood events often being prolonged. The lower section of this catchment runs over relatively impermeable rocks and this can lead to a high surface run-off rate during the winter months. Fordingbridge and the villages that line the River Avon in the lower section of the catchment are at the highest risk of fluvial flooding. However, due to most of this catchment's being within the New Forest National Park and relatively sparsely populated, not many properties are affected.

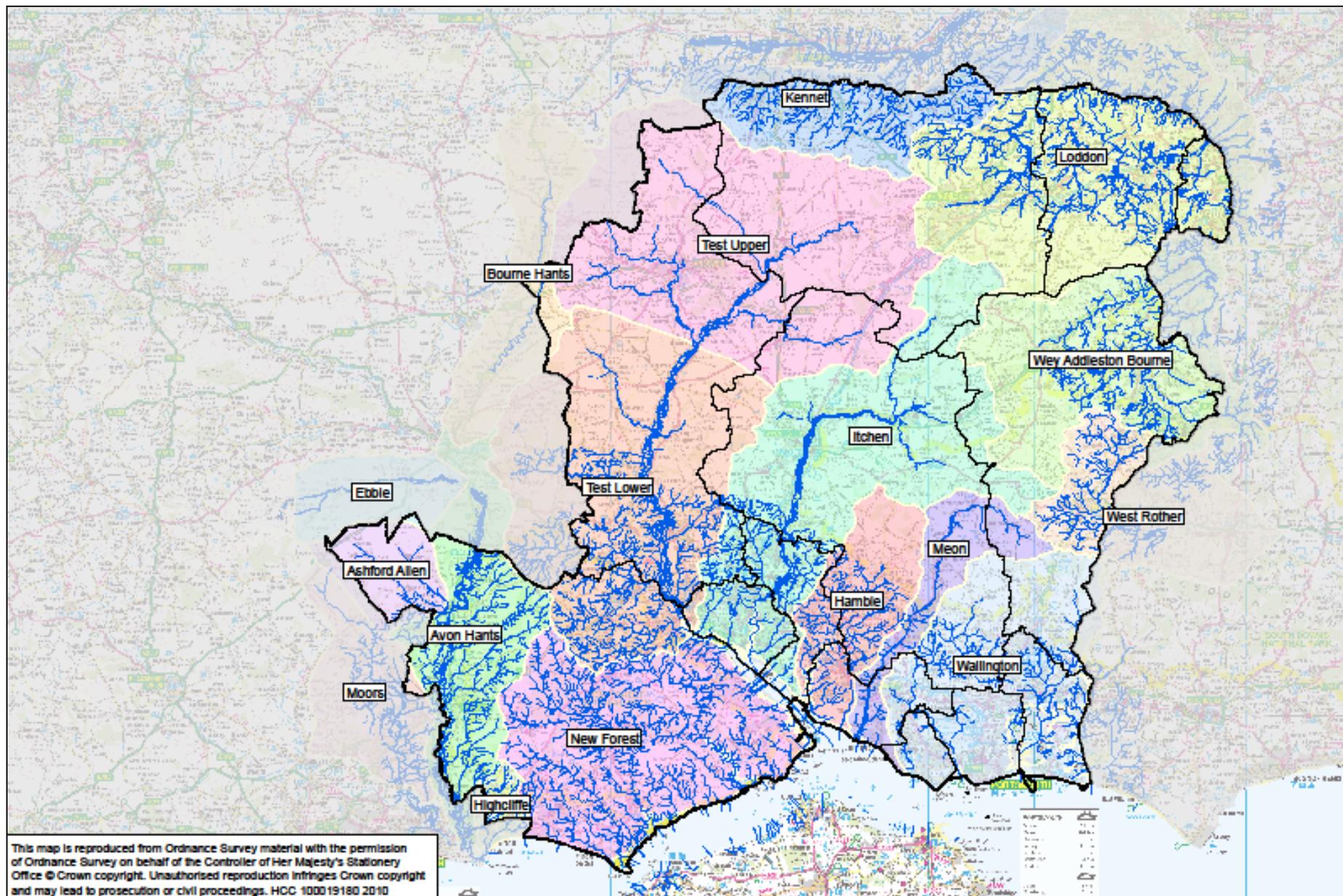


Figure 2 – River Catchments

2.2 Geology

Figure 3 illustrates the varying bedrock geology across Hampshire. When considering flooding, permeability is the critical factor affecting the rate at which water can soak into the ground and is therefore essential to consider the bedrock geology.

Permeable - Strata through which water can pass either via a network of spaces between particles or along bedding planes, cracks, and fissures. The main permeable strata in Hampshire is chalk.

Impermeable - Strata without significant pore spaces, through which fluid will not flow. The main impermeable strata in Hampshire are clays and mudstones.

Most of the groundwater flow through the aquifers is directed to the Rivers Test, Itchen and Meon. During prolonged periods of wet weather the aquifer levels rise and this is what causes groundwater flooding. This is a serious problem in Hampshire because a large proportion of the county is underlain by chalk.

The New Forest, north Basingstoke, Rushmoor, Hart and the southern coastline have a more complex geology where clays, gravels and mudstones are interbedded with each other, creating much thinner layers that alternate between permeable and impermeable. This leads to water running along the permeable layers but unable to pass through the impermeable ones. These areas tend to be less affected by groundwater flooding. However it can increase the likelihood of high surface water run-off because of a lower absorption rate.

There is a close relationship between the bedrock geology and the locations of watercourses as can be seen in Figure 2. Where land is underlain by the more permeable chalk there tends to be major rivers such as the Itchen and Test as most of the water runs through the aquifers to reach these watercourses. These areas have a low density of rivers which respond more slowly to rainfall retaining a more consistent flow. Within areas of impermeable geology such as north Basingstoke, Hart, Rushmoor, the south coastline and the New Forest there are a high density of watercourses which respond quickly to rainfall as the rain has a shorter distance to travel before entering the watercourse.

It is essential that the bedrock geology is assessed and understood as the way flooding occurs and the possible mitigation options will vary dramatically depending on the area's underlying bedrock geology.

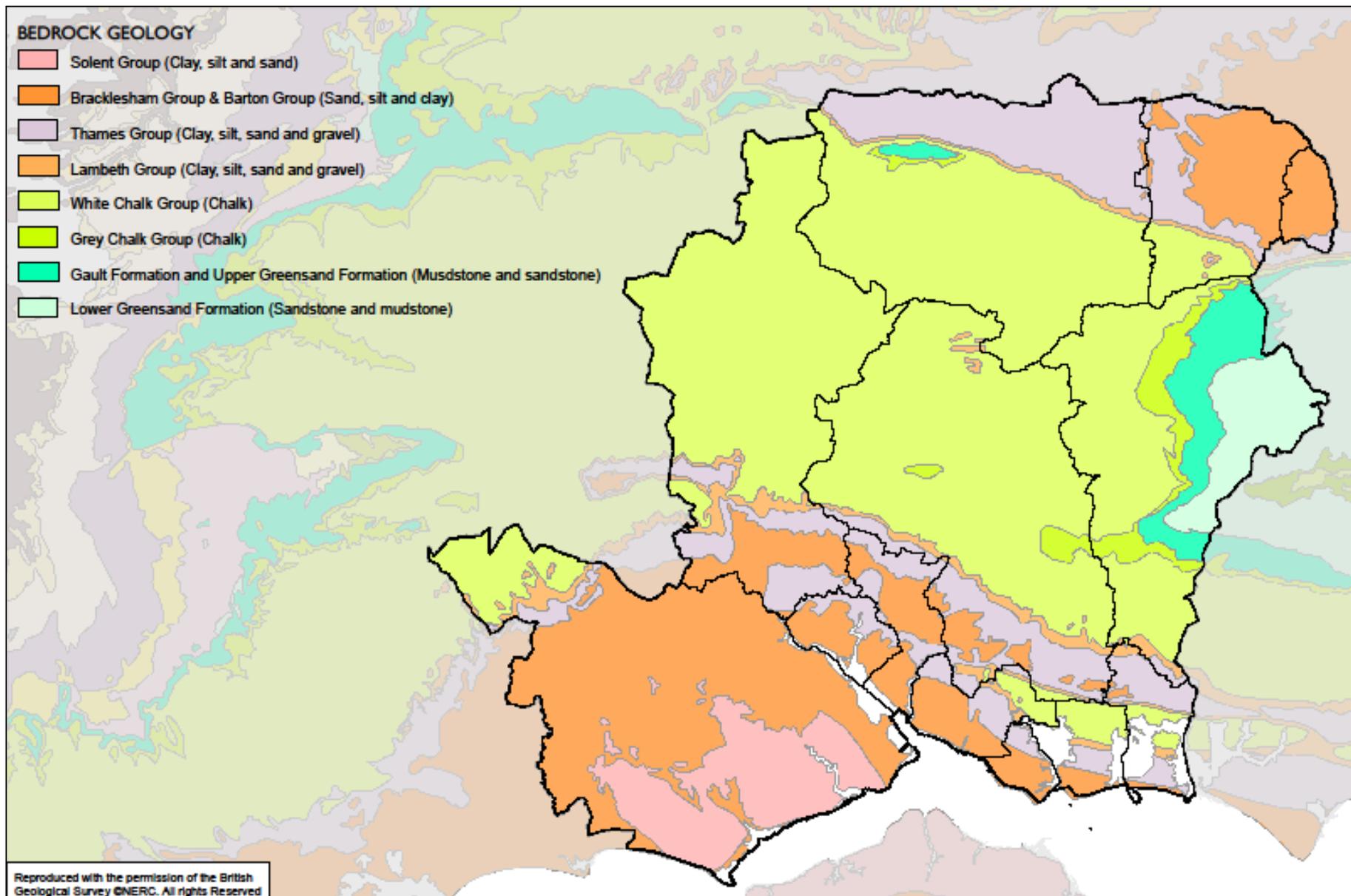


Figure 3 – Geology of Hampshire

2.3 *Environmental and Heritage*

Over 80% of the county is classed as rural under the 2004 rural/urban classification (Office of National Statistics 2004). There is a clearly defined difference between the urbanised southern part of Hampshire and the central rural areas.

This area includes two National Parks namely the New Forest National Park and newly designated South Downs National Park. It also includes three Areas of Outstanding Natural Beauty which cumulatively cover a total area of 1,445 sq km, which is about 38% of the total county area (Hampshire County Council Integrated Character Assessment 2010)

Hampshire has a remarkably rich and varied landscape and a great diversity of habitats from ancient woodlands and wildflower meadows, to heathlands and chalk streams, river valleys and coastal habitats. Hampshire also includes the New Forest – the greatest area of semi wilderness left in lowland England. Whilst Hampshire's lowland heaths account for almost 30% of the total UK resource it is also one of the most wooded counties in England and holds 5% of the UK's ancient semi-natural woodland. The chalk fed rivers of the Itchen, Test and Meon are internationally recognised for their rich and diverse habitats. (Hampshire Biodiversity Information Centre)

All these habitats support an impressive array of wild plants and animals. Hampshire has the greatest diversity of species of any county in England.

Britain's most valuable wildlife habitats – designated as Sites of Special Scientific Interest (SSSIs) and protected by law – cover 14.5% of the county, about twice the national average. A further 8.7% of Hampshire is covered by county Sites of Importance for Nature Conservation (SINCs). Outside these specially recognised areas much of Hampshire's rural landscape, and many urban areas, are also rich in biodiversity (Hampshire Biodiversity Information Centre). The designated areas are as shown in Figures 4 – 6.

Hampshire's historic environment has been formed by the physical impact of human activity from earliest prehistory to the late twentieth century. It includes archaeological sites, historic buildings, historic landscape and townscape, historic parks and gardens, and battlefield sites. It is a defining part of Hampshire's identity. The historic environment is valued in its own right, and also supports recreation, education and tourism.

Hampshire has a rich archaeological heritage with nearly 800 Scheduled Monuments, 372 of which are located within areas identified by the Environment Agency as susceptible to surface water flooding. Scheduled Monuments are nationally significant sites that are protected by law and any work affecting them and their setting may require Scheduled Monument Consent so the advice of English Heritage must be sought. In addition, there are a further 1000 archaeological sites countywide that although not Scheduled are of national significance, nearly 400 of these are located within the identified pluvial flood risk areas.

As well as these nationally significant sites there are many thousands of other known archaeological sites county wide, at least 1200 of which are located in the pluvial flood risk areas..

As well as the large number of archaeological sites, Hampshire also has over 14,000 listed buildings and 58 registered parks and gardens. There are also a large number of buildings and designed landscapes that are not designated.

All of the above sites are logged on the Historic Environment Record and this should be checked prior to any works being undertaken as well as seeking advice from Hampshire County Council Archaeological advisors.

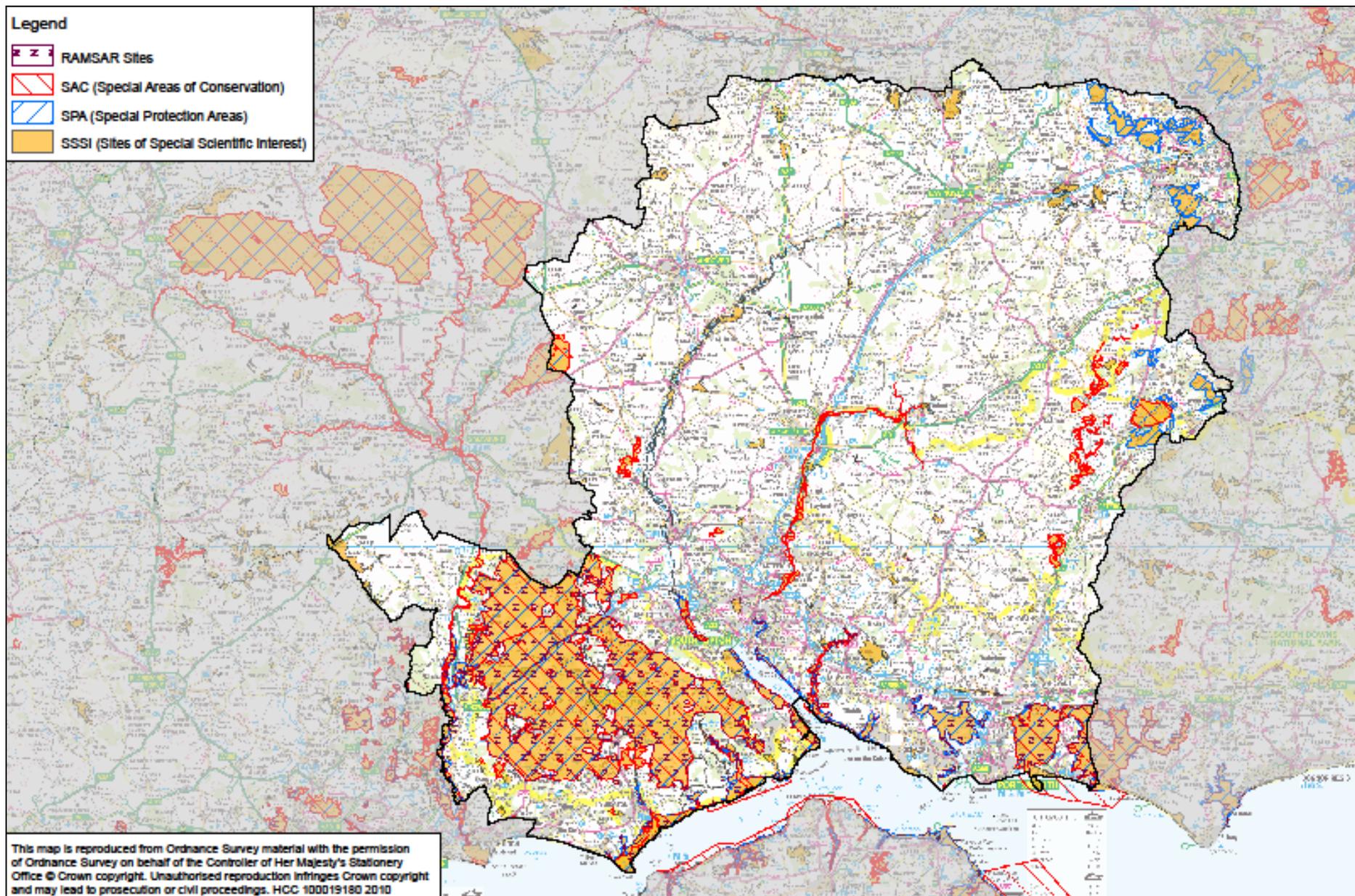


Figure 4 – Areas of Environmental Significance – International Designations.

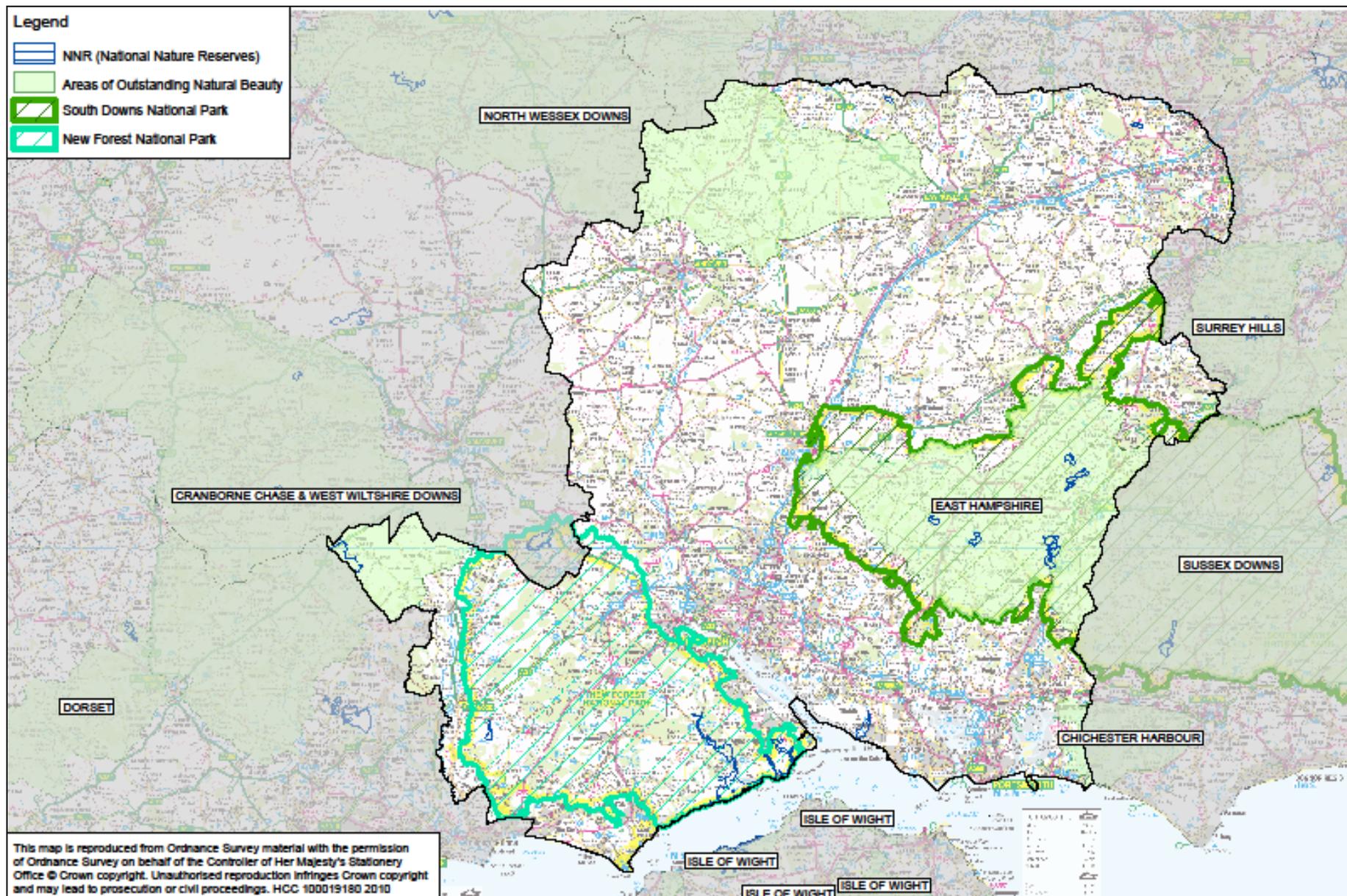


Figure 5 – Areas of Environmental Significance – National Designations.

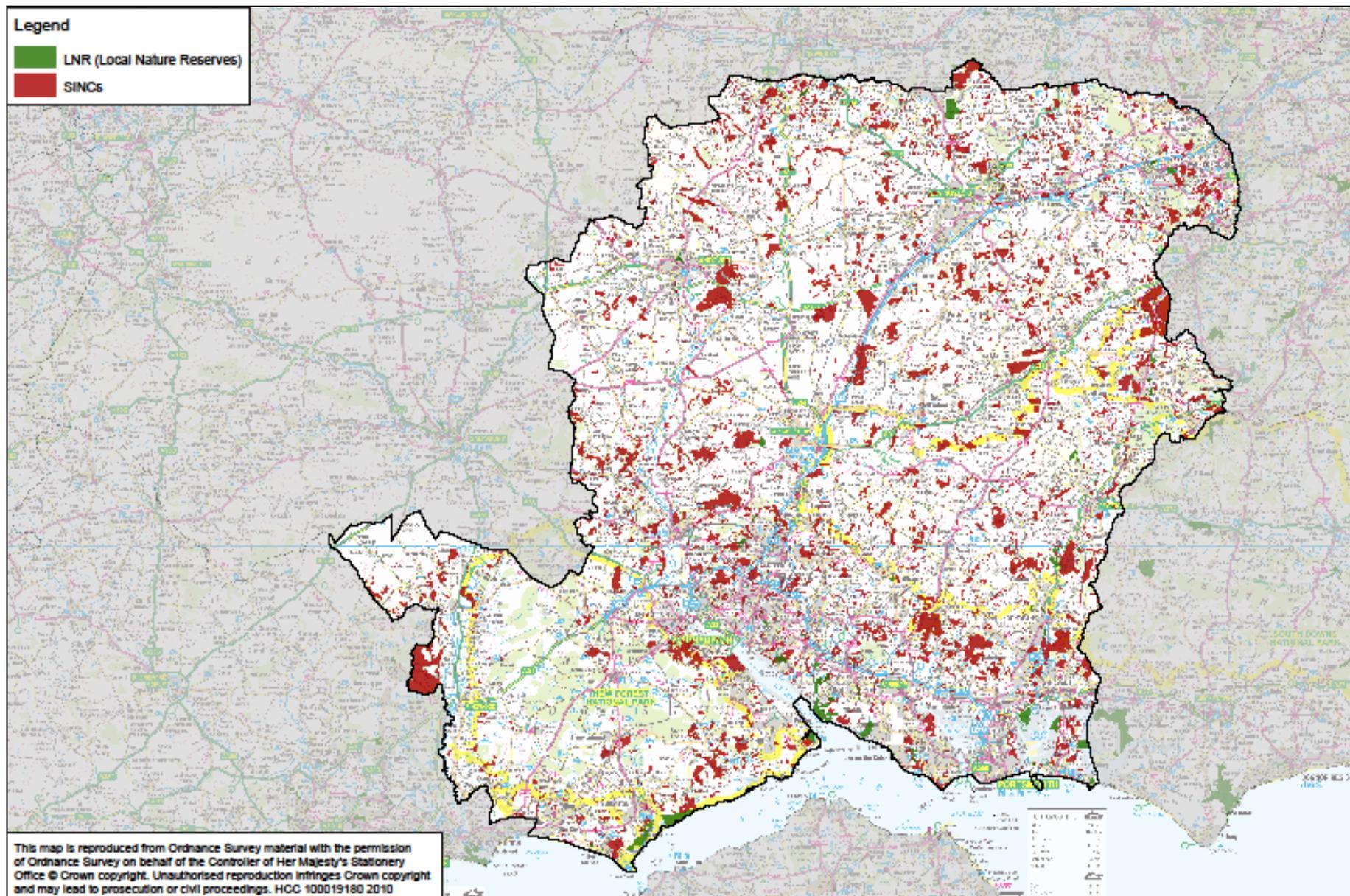


Figure 6 – Areas of Environmental Significance – Local Designations.

3 Flood Risk Management Authorities and their Responsibilities

The key organisations are listed below with a brief description of some of their responsibilities and areas of expertise in relation to Flood Risk Management.

3.1 Hampshire County Council (and other LLFAs)

Traditionally, county councils take responsibility for Highway drainage although their remit with respect to flooding and flood risk management is changing rapidly.

Sir Michael Pitt stated in his report on the 2007 floods that “the role of local authorities should be enhanced so that they take on responsibility for leading the coordination of flood risk management in their areas”. This intention was developed in the Flood Risk Regulations and the Flood and Water Management Act, both of which designated upper tier authorities, including Hampshire County Council, as ‘Lead Local Flood Authorities’.

In addition to the ‘lead’ role, there are a number of other responsibilities for LLFAs which include the preparation of a local strategy for flood risk management, investigating flood incidents, maintaining a register of assets and features, and other roles which will develop as the Act becomes fully enabled.

3.2 Second Tier Authorities

Hampshire contains 11 second tier Authorities, as shown on Figure 7. These are designated as ‘local drainage authorities’ under the Land Drainage Act 1991 and as Risk Management Authorities under the Flood and Water Management Act.

District and Borough Councils have a number of permissive powers under the Land Drainage Act for prevention and mitigation of flood damage from ordinary watercourses as well as responsibilities for managing flood risk enshrined in planning legislation.

To enable them to deliver this function they have powers to:

- Implement works to prevent, mitigate or remedy flood damage subject to consent by the Environment Agency;
- Serve notice on owners requiring them to remove obstructions from ‘ordinary watercourses’ in order to secure a proper flow.

They also now have a duty to co-operate with LLFAs to develop local flood risk strategies and to share flood risk information.

As well as these permissive powers and duties, some councils have kept records of flood events and carried out both maintenance and new works within their area although the extent of these activities varies considerably between councils due to variations in the technical resource and capacity available.

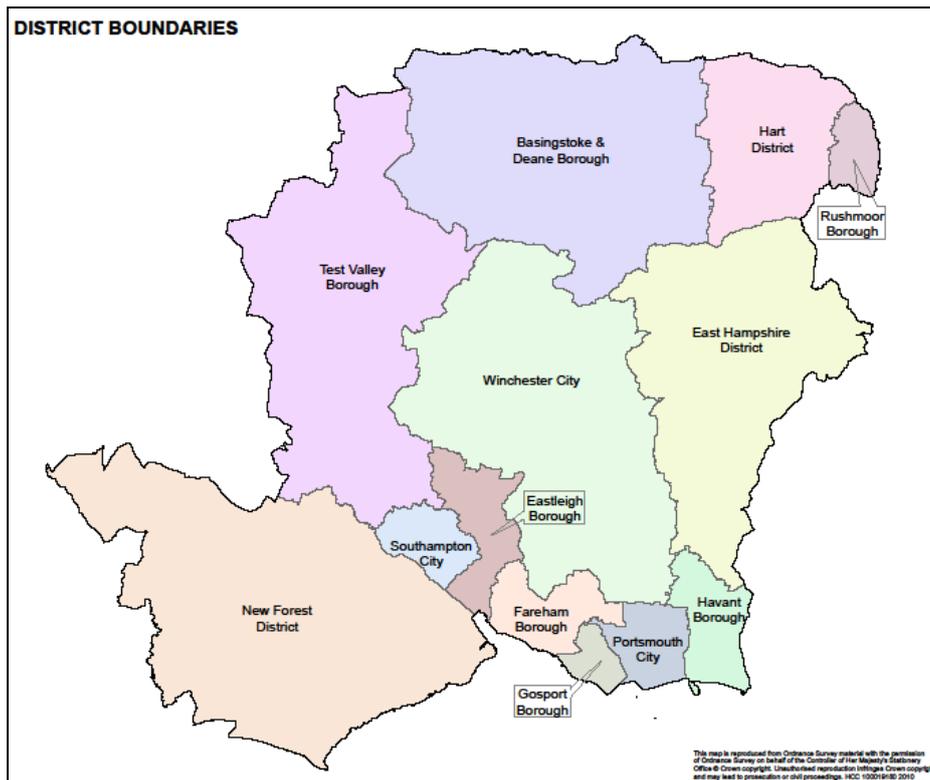


Figure 7 – District and Borough Boundaries

3.3 Environment Agency

Generally the Environment Agency has a supervisory role over all aspects relating to flood defence with a more specific role to:

- Exercise powers to carry out improvements or maintenance to designated ‘main rivers’.
- Act as a regulating authority for works and activities in and alongside main rivers
- Influence, through the planning process, land use and development particularly within flood plains.
- Produce flood risk mapping and manage historical flood records and data.
- Install and operate flood warning systems
- Protect and conserve of the natural environment whilst carrying out flood risk management activities.

Hampshire County is included within three of the Environment Agency’s published Catchment Flood Management Plans (CFMPs) which consist of the Thames, Southern and South West regions. The Southern region has been re-named as the South East since the publication of this document. CFMPs give an overview of the flood risk across each river catchment. They recommend ways of managing those risks now and over the next 50-100 years.

The Environment Agency also produce River Basin Management Plans (RBMPs) for each river basin district within the UK in accordance with the European Framework Directive. For Hampshire, these River Basin Districts consist of Thames, South East and South West as shown in Figure 8. The RBMPs aim to protect and improve the water environment in the river basin. They describe the main issues and set out the actions needed to meet the objectives for each river basin district. RBMPs are produced on a six yearly cycle with the current plans due to be reviewed in 2015.

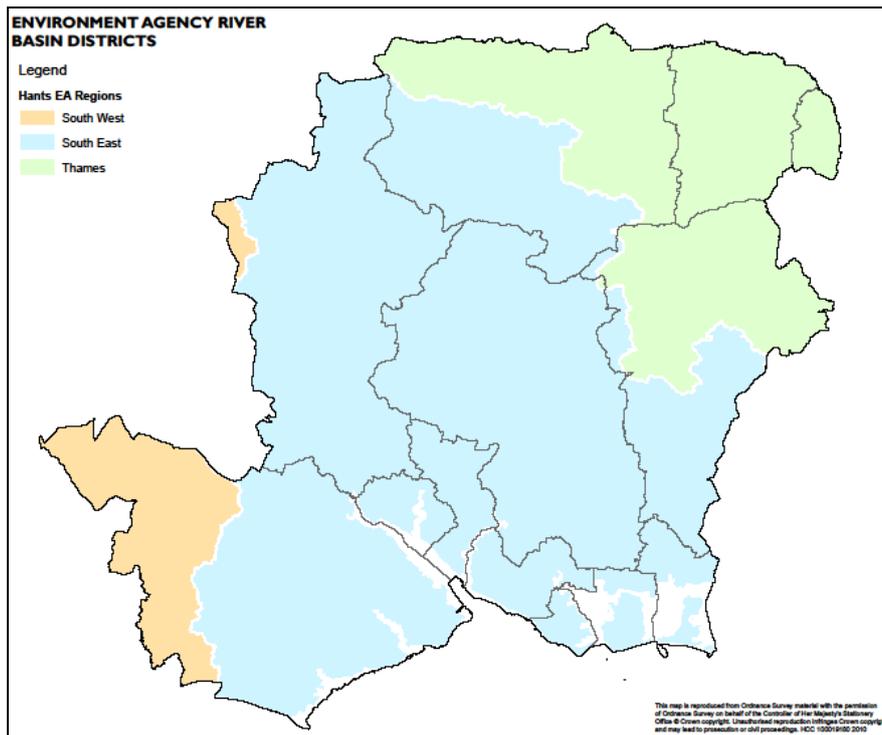


Figure 8 – Environment Agency River Basin Areas

3.4 Water Companies

There are several water companies in Hampshire with responsibility for public water supply and sewerage. Every five years, water companies in England and Wales are required to produce a Water Resources Management Plan that sets out how they aim to meet predicted demand for water over a 25-year period.

Water Companies have a more formal role in the management of surface water as they are a statutory consultee for Sustainable Drainage Approvals. They are also required to co-operate and share flood risk information with the LLFA. Within Hampshire there are three water companies with a responsibility for sewerage and six companies with water supply responsibilities as shown in Figure 9.

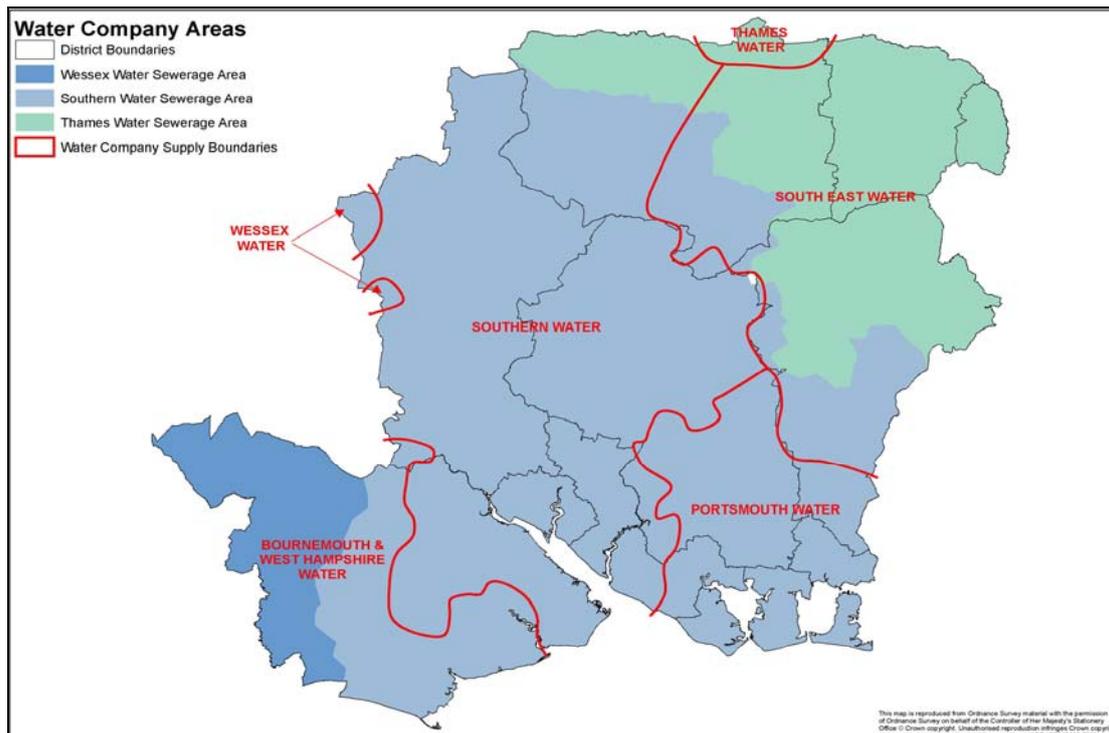


Figure 9 – Water Company Boundaries

3.5 Riparian Owners

Landowners with a watercourse passing through or adjacent to their land (riparian owners) retain the duties and responsibilities for these watercourses set out in the Land Drainage Act 1991.

3.6 Other

There are other organisations with a very limited responsibility for flood risk on their private property. These groups will be identified as part of the Flood Risk Assessment process where their landholdings are shown to be at risk.

3.7 Governance

As the LLFA the County Council must work alongside a number of partner and stakeholder organisations in fulfilling its responsibilities, to ensure effective and consistent management of local flood risk and to contribute to the provision of a coordinated and holistic approach to flood risk management across the county

The County Council has sought to engage stakeholders and partners from the following organisations in the preparation of the Preliminary Flood Risk Assessment:

- the eleven district and borough councils in Hampshire
- the Environment Agency
- water companies covering Hampshire
- the Hampshire Association of Local Councils (HALC)
- the Hampshire and Isle of Wight Planning Officers' Group
- Hampshire Fire and Rescue Service
- Hampshire Constabulary

A diagram illustrating the working arrangements and structure in Hampshire is provided in Figure 10 and a brief description of the role of each group or partnership is provided below.

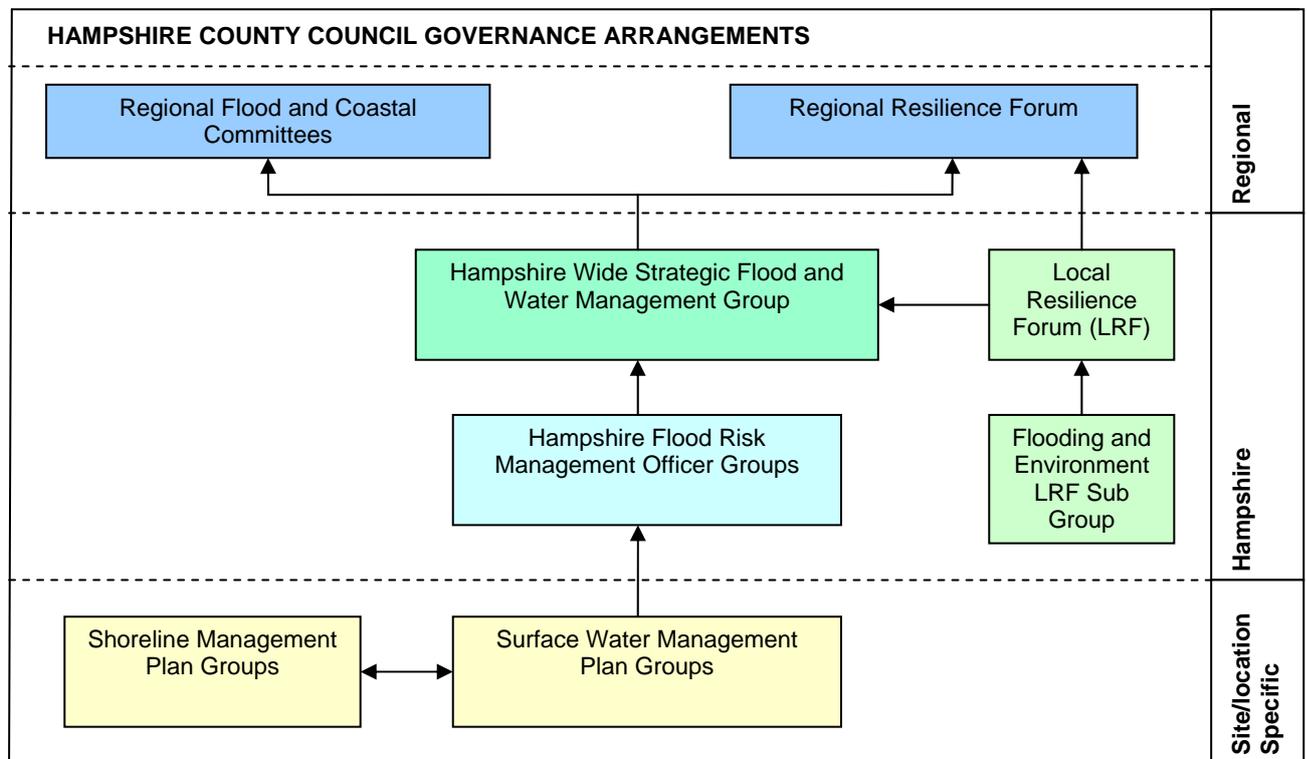


Figure 10 - Hampshire County Council Governance Arrangements

Regional Flood and Coastal Committees

The Regional Flood and Coastal Committees guide the Environment Agency’s flood and coastal erosion risk management activities in their region including raising the local levy and scrutiny of the Local Flood and Coastal Erosion Risk Management Strategy and Preliminary Flood Risk Assessments prepared by LLFAs. Hampshire is covered by three Committees; Southern, Thames and Wessex.

Local Resilience Forum and Sub Group

The LRF is responsible for the development, maintenance and testing of plans and procedures for major emergencies and incidents in Hampshire, including flooding. Flooding and Environment LRF Sub-Group is an umbrella role for all related issues such as Pitt, review flood plans and reservoir inundation.

Hampshire Strategic Flood and Water Management Group

The Hampshire Strategic Flood and Water Management Group is chaired by Hampshire County Council as the Lead Local Flood Authority and comprised by partners and stakeholders in order to ensure a holistic and joint approach in discharging responsibilities under the Flood and Water Management Act and Flood Risk Regulations.

Hampshire Flood Risk Management Officer Group

This group is a multi agency technical group which oversees the development of surface water management plans, the Preliminary Flood Risk Assessment and other technical aspects of the Flood and Water Management Act. It enables all stakeholders to meet and discuss any issues within the relative organisations and to support the Strategic Flood and Water Management group.

Surface Water Management Plans Groups

The surface water management plan groups are multi-agency groups set up for each area in which surface water management plans are being undertaken so that the relevant organisations can meet to discuss and develop the plan for their areas and to ensure that they are fit for purpose. They report back to the Flood Risk Management Officer Group ensuring consistency across all SWMPs carried out within the Hampshire County Council area.

Shoreline Management Plans Groups

Shoreline Management Plans (SMPs) cover discreet areas of coast across Hampshire. SMPs develop policies outlining how the shoreline should be managed in the future. The SMPs and SWMPs are mutually informative.

3.8 Scrutiny and Approval Process

The Preliminary Flood Risk Assessment is critical in the initial assessment of flood risk and will be used to identify areas where further investigation should be undertaken which in turn will inform the Local Flood Risk Management Strategy. As such, it is essential to ensure this process is undertaken with the appropriate level of detail and that all members of the partnership are signed up to the recommendations.

The first internal review of the Preliminary Assessment Report is undertaken in accordance with the County Council's internal review procedures. The Preliminary Assessment Report will undergo scrutiny at a dedicated meeting of the Environment and Transportation Select Committee where there is an opportunity for our partners to contribute. The document will then be signed-off by the relevant Executive Member of Hampshire County Council before being submitted to the Environment Agency during June 2011.

Under the Flood Risk Regulations, the Environment Agency has been given the responsibility to collate, assess and publish all of the Preliminary Flood Risk Assessments before submission to the European Commission. It is required to undertake a technical review, analysing the significant flood risk areas and collating them on a river basin level. When satisfied the Environment Agency will recommend submission of the Preliminary Flood Risk Assessment to the relevant Regional Flood and Coastal Defence Committee for endorsement. Once the RFCC has endorsed the Preliminary Flood Risk Assessment the Environment Agency will finally sign it off before its submission to the European Commission on or by the 22nd December 2011.

3.9 Communication

Hampshire County Council has put in place a communications plan to ensure that Hampshire's residents are informed and made aware of the roles and responsibilities of the Lead Local Flood Authority and its partners. The aims of this are to build up a picture of flood risk areas in the county, to foster two-way communication between residents and the local authorities, to ensure communities know what precautions they can take and how to act responsibly to reduce risks, and to increase understanding of the effects and limitations of flood risk management.

The County Council aims to target all relevant audiences including residents, businesses, landowners, parish and town councils, district and county councillors, partner organisations and local MPs in Hampshire to inform them and raise awareness of flood risk issues. This will be done through a number of channels including the following:

- press
- online
- social media
- council publications
- direct liaison with town and parish councils, MPs and county councillors

4 Methodology and Data Review

4.1 Information Availability

In order to complete an appropriate Preliminary Flood Risk Assessment, it is essential to ensure that all relevant flood risk information has been located, collated and assessed.

There is a considerable amount of information related to flooding held by different organisations, both within the county and also at a national level. This takes various forms, including formal records, reports, mapping and local knowledge.

In order to determine what information is available and identify the data owner a questionnaire was sent to all the relevant stakeholders including local authorities, the Environment Agency and the water companies. In addition, engagement with the public was undertaken to capture information on known local flooding problems.

A review of all information available in the public domain was also carried out. The main source of information for members of the public is the Environment Agency 'what's in your backyard' service which does provide some detail on flood risk.

The public can sign up to the Environment Agency flood warning system although this is not yet sufficiently developed to consider pluvial flood risk and is heavily geared towards fluvial risk.

A summary of the key datasets used as part of this assessment is described below:

4.1.1 Local Authority Data

Within Hampshire, data has been collected on localised flooding incidents. This includes both sites that flood as a result of extreme weather conditions and those where areas have limited drainage or flood protection measures. Flooding from all sources is accounted for.

This data is largely subjective as few records exist and much of the information comes from local knowledge gathered over a period of time. The District Councils were asked to comment on this data, corroborating the details as well as providing additional localised flood risk sites. District Councils hold data collected for the Strategic Flood Risk Assessments, used for planning purposes, and this information was also collected and assessed.

The data is mapped on the County Council's computerised Geographic Information System (GIS). The GIS data itself contains only minimal details on the cause and effect of the flooding but it is linked to a database in which more detail is recorded on each site where known. Recording and storing this in a consistent format enables us to assess and compare the risk of all sites across the county.

4.1.2 Water Company Data

The water companies hold a variety of information relating to their apparatus and function. This includes apparatus location plans, the DG5 register (which records flood incidents relating to capacity overload) and sometimes modelling information where detailed investigation or schemes are undertaken.

The DG5 register is the most useful indication of flooding incidents even though the data can only be provided at a high level either by street or postcode. This information is provided as either an excel file or GIS shape file. A data sharing agreement is required to ensure the information is used correctly.

4.1.3 Environment Agency Data

The Environment Agency has made a number of datasets available for the purposes of flood risk management.

The Areas Susceptible to Surface Water Flooding Map was produced in July 2009. It was produced using a simplistic modelling technique based on a single rainfall event, namely a storm with a 1 in 200 chance of occurring in any year, highlighting areas that could be affected by surface water flooding within three different bandings; less, intermediate and more. It does not take into account buildings, drainage or ground permeability. This map should not be used with base mapping of more than 1:50,000 and is not designed to be a detailed representation of areas that could flood.

The Agency produced a more detailed Flood Map for Surface Water issued in November 2010. This uses a more sophisticated modelling technique based on a number of different assumptions for ground permeability, drainage capacity and flow routing around structures. It was created using both a 1:30 and 1:200 annual probability and separates the level of flood risk into areas that could experience flooding in excess of 100mm and 300mm. It should not be used with base mapping of more than 1:25,000 and is not designed to identify individual properties at risk.

Environment Agency guidance suggests that the Areas Susceptible To Surface Water Flooding (2009) map would be more representative of flooding in areas where there is minimal drainage capacity and flat areas with a longer storm duration with the Flood Map for Surface Water (2010) being more suitable in other areas. However, the Environment Agency have stated that local information on flooding should be used to identify the most suitable mapping for specific locations.

Although this data is extremely useful in identifying areas perceived to be at a high risk of future flooding, it requires verification using historic and localised flooding as a base point. This verification process has been carried out within Hampshire, and the Flood Map for Surface Water (2010), particularly within rural areas, is considered to be most suitable and accurate for identifying areas that could be at risk of flooding and that require further investigation.

4.2 Data Limitations

There are a number of limitations with all of the above datasets and these are summarised below.

4.2.1 Inconsistent Recording Systems

Each of the above datasets has used a different methodology to collect and record flood data which has led to difficulties in the analysis and comparison of data. It is intended that for future flooding incidents, a standard template will be developed by the LLFA in conjunction with other risk management authorities to record incidents to enable the same data to be provided from all parties and to the same standard wherever possible.

4.2.2 Incomplete Datasets

Much of the flooding data has been collected from individuals or as a result of public reports so there will be discrepancies in the amount of data collected from each area and the trigger point for which flooding is recorded.

4.3 Quality Assurance, Security and Data Restrictions

All data collected is subject to quality assurance measures to monitor and record its quality and accuracy. Where feasible, this information is collected or converted into GIS data, which allows the different datasets to be compared. This also allows them to be stored on the corporate GIS system (providing it would not be in breach of data licensing agreements) which is managed to

ensure information is as up to date as possible and allows the relevant people access to the information.

Data security is essential given the range of data confidentiality requirements. As part of the quality assurance records all data classed as sensitive or restricted is highlighted and stored on secure local servers. The quality assurance record also includes information on update requirements and any specific requirements on data usage.

Hampshire County Council as a local authority, is subject to the Freedom of Information Act meaning that if a request is made for this data, it has to be provided within a certain timeframe. The only data that can be withheld is that containing personal or financial information. If data is requested that is held by a third party, the person requesting it is directed to that data owner and the County Council does not release it. This is particularly pertinent to data provided by the water companies.

5 Past Flood Risk

5.1 Introduction

Flooding within Hampshire can occur for a number of reasons. With an extensive coastline, Hampshire is susceptible to coastal flooding. There are a number of communities extremely close to sea level which are most susceptible to tidal influence and potential sea level rise.

Hampshire also has numerous river networks which ultimately discharge into the sea. With a combination of high tides and high river levels, there is a high potential for river or surface water flooding where rivers in flood are unable to discharge into the sea due to high tides, onshore winds and low atmospheric pressure.

There is also a large area of chalk bedrock within central Hampshire and this is particularly susceptible to groundwater flooding caused when water held within aquifers under the ground reaches ground level following periods of heavy rainfall.

One particular issue linked with groundwater flooding is the emergence of 'winterbournes'. These are channels that run dry through the summer but become watercourses from the groundwater stored in the aquifer that is forced to the surface during winter. Because they are dry in summer, and sometimes over a longer period dependant on rainfall levels throughout the year, they can be forgotten and poorly maintained giving rise to a potential flooding problem when the water returns. They only occur in areas of chalk bedrock and as such are a key cause of groundwater flooding in Hampshire.

Surface water flooding is also a problem in Hampshire both within urban areas, where there is a high concentration of properties that could be at risk, and in rural areas where there is minimal drainage. In both cases, critical transport routes can be affected. Surface water flooding is not as well understood or managed when compared to other forms of flooding, especially as it is not confined to flood plains and is very dependant on the location of rain storms. One of the key purposes of the Floods Directive and the Flood and Water Management Act is to improve the understanding and management of surface water flooding thereby reducing the risk of this type of flooding in the future.

5.2 Historic Flooding

In 2000 – 2001, there was exceptional rainfall within Hampshire with return periods ranging from 1:50 to 1:200. Following this exceptional rainfall flooding occurred in 76 parishes with flooding at 713 properties to varying extents. Flooding was primarily caused by high groundwater levels and springflows in the Upper and Middle Test, Itchen, Meon, Wallington and Lavant valleys. Flooding incidents in the lower reaches of these valleys were more commonly associated with rainfall runoff from saturated ground. This was also the main trigger in the New Forest and

Hamble catchments although springflows from local minor aquifers also contributed to flooding in some locations.

Since this flood event, there have been a number of other substantial flood events in varying locations across the County. These tend to be attributable to surface water flooding or the interaction of surface water and river flooding. There are also some areas along Hampshire's coastline which are susceptible to coastal flooding given their low lying nature and whilst these are identified and logged as part of this report, they will undergo a more detailed assessment through the shoreline management plans.

Figure 11 shows the distribution of known flooding incidents across Hampshire. It should be noted, however, that this only shows known incidents of flooding and gives no indication of the severity of flooding. Nor does it identify incidents of flooding not captured through the above data collection process.

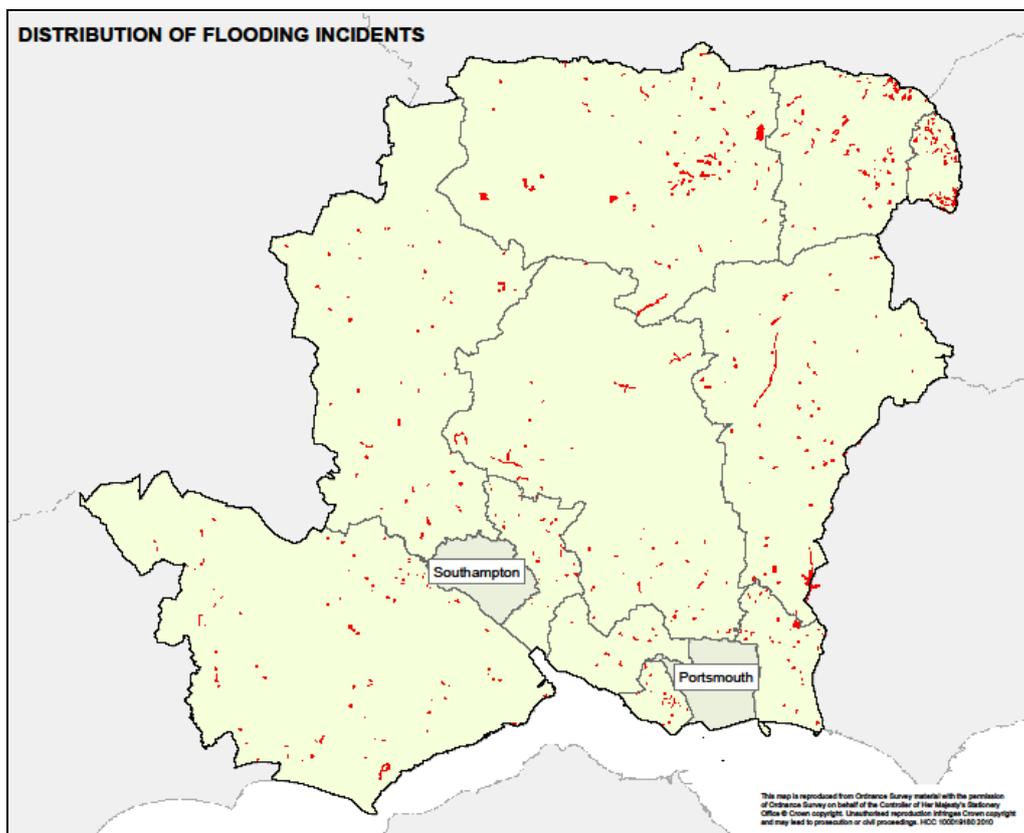


Figure 11 – Flooding Incidents within Hampshire

5.3 Consequences of Past Floods

In order to assess the risk of flooding, probability and consequence must be assessed. Probability should be assessed as an annual probability of that flood re-occurring, i.e. the return period, and is relatively straightforward to determine providing the date the flooding occurred is known.

Consequence is far more complex and needs to include a wide range of information although this can be considered under three general areas as identified below;

- human health - this includes property flooding and critical services such as hospitals, nursing homes etc
- the economy – this includes non-residential or commercial properties, infrastructure and agricultural land.

- the environment and heritage – consequences of pollution and the impact on designated environmental and heritage sites.

Although the consequences can be identified for floods that have occurred relatively recently through an assessment of the flood extent, it is not as straightforward to assess the overall priority each consequence would have. For its own purposes Hampshire County Council has developed a risk matrix to utilise the information consistently available from flood events using a methodology consistent with PPS25, planning policy statement for flood risk and including criteria relating to human health and the economy. This allows an initial assessment of flood risk which can then be looked at in more detail to include consequences to the environment and heritage.

The Preliminary Flood Risk Assessment requires details of past flooding incidents with significant adverse consequences to be recorded in Annex 1 for submission to Europe. The specification for sites that are entered into this annex are informed from guidance issued by the Environment Agency and from the requirements set out by Europe. Only sites that were of a scale that registered nationally should be entered into this annex and then only if sufficient information on the consequences of the event are recorded.

Although there are records of past flood events within Hampshire, the level of information required for reporting to the European Commission is extensive and the only flood event with sufficiently detailed information is the 2000-01 groundwater flooding. This event will be reported as a significant flood event within Annex 1 of this Preliminary Flood Risk Assessment. Although other flood incidents will not be reported to Europe, they will still be recorded, assessed and used to influence the Local Flood Risk Management Strategy.

6 Future Flood Risk

6.1 Introduction

The Environment Agency has historically provided a substantial amount of information about the potential risk from river and coastal flooding. This has been primarily for use in flood risk assessments required under PPS25. Following the Pitt review, a substantial amount of work has been undertaken to translate this information and experience into producing potential flood risk maps relating to surface water flooding. Two different surface water flood risk datasets are available for use at present as defined in section 4.1.3, each with their own advantages and limitations.

6.2 Locally Agreed Surface Water Information

Upon analysis of the available flood risk data, Hampshire County Council, the District Councils, the Environment Agency and the water companies have agreed that three datasets are considered to best represent flood risk in Hampshire. These datasets are illustrated on Figures 12 and 13 and consist of:

- Area susceptible to surface water flooding (figure 12)
- Flood Map for Surface Water 1:200 (figure 13)
- Localised Flooding Incidents (figure 13)

The Environment Agency has produced a ‘Susceptibility to Groundwater Flooding’ map. However, due to the extreme groundwater flooding that occurred in Hampshire in 2000-01, partners agreed that the existing records are likely to be more accurate than the modelling information. Groundwater is also extremely complex to model so it is unlikely to provide sufficient accuracy at this time.

Although these datasets have been agreed as the most suitable at this time, it is recognised that this list will require review as new information emerges.

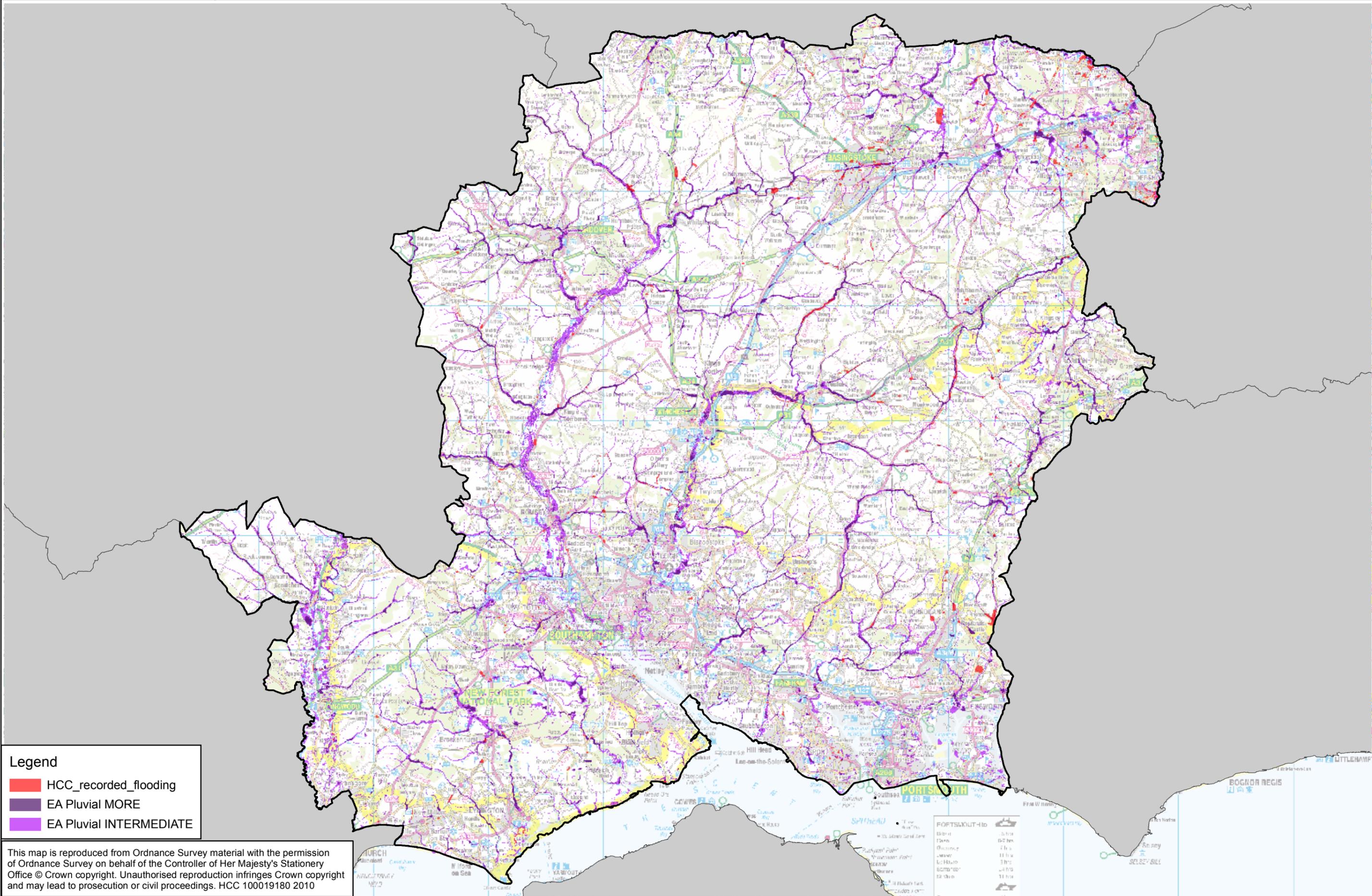


Figure 12

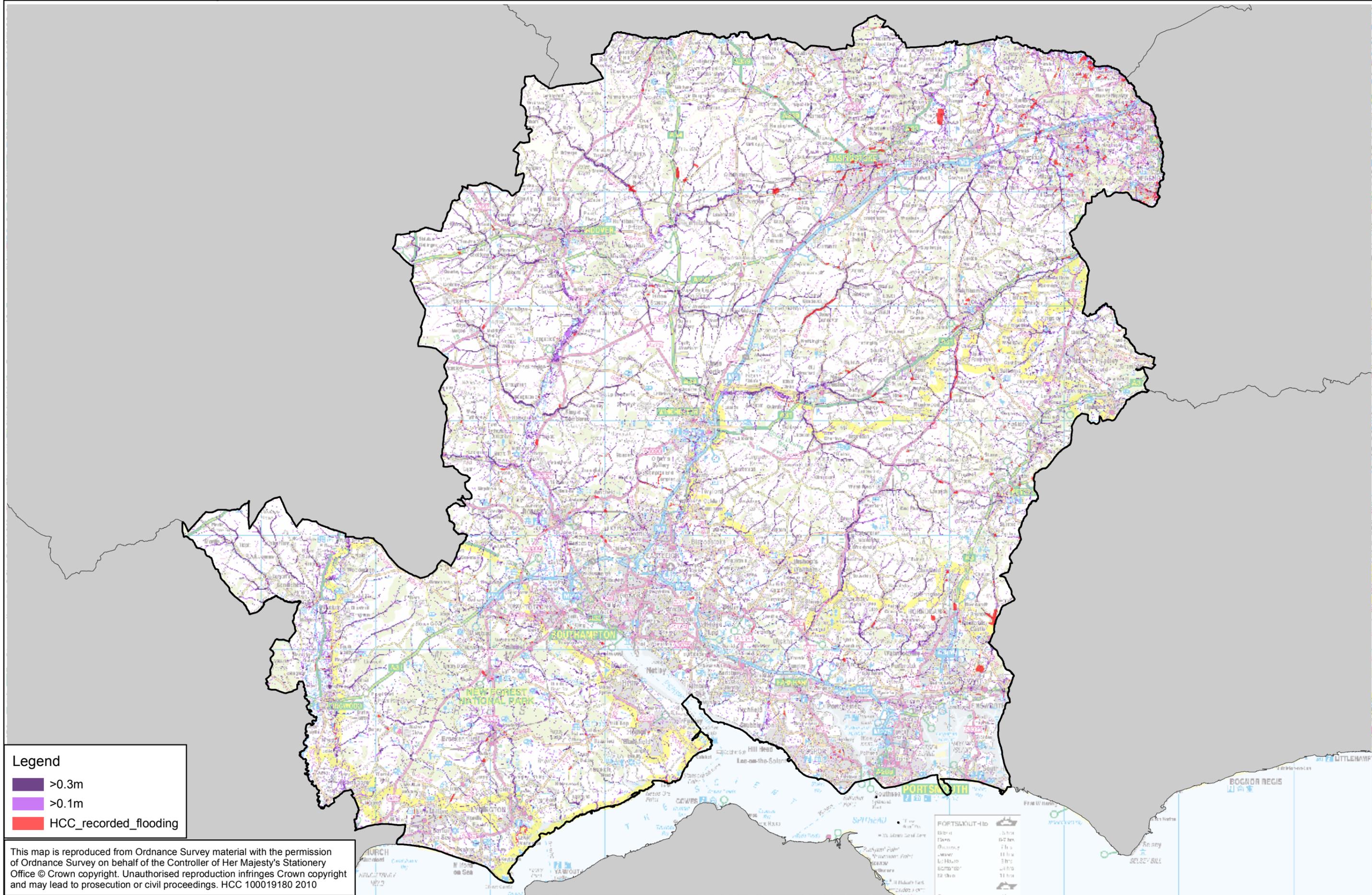


Figure 13

This modelled information should be cross-referenced to datasets / network maps showing existing drainage capacity in order to validate the modelling and identify where additional capacity could be required. However, given the variety of drainage systems across the County and the number of organisations with drainage assets within the Hampshire County Council area, it is extremely difficult to assess the drainage capacity at the present time. Despite this, it is recognised that for extreme flooding events such as the 1:200 annual probability, drainage capacity would have a minimal impact on flooding and as such would not significantly affect this assessment. Drainage capacity information is being collected on a risk prioritised basis and will be included within the next Preliminary Flood Risk Assessment submission in 2017.

6.3 Potential Consequences of Future Flooding

When looking at the potential consequences of future floods, the same general categories are used as for past floods. The difference in the assessment is that they are potential consequences determined through modelling and more investigation is required in assessing the validity of the modelling information and the potential impact.

The Environment Agency have carried out an initial assessment of the consequences of future flooding to inform the identification of national flood risk areas that require submission to Europe. This was done using the Flood Map for Surface Water (1:200) to identify the areas that could be at risk of flooding to a depth in excess of 300mm. The UK was then covered with 1km grid squares and a property count of all properties at risk along with identification of any critical infrastructure within each square was carried out.

The Environment Agency then identified each square considered to have significant harmful consequences, based on the criteria below, and combined squares in close proximity (multiples of five touching squares within a 3x3 grid) to create the clusters shown in Figure 14. The potential consequences to environment and heritage were not considered as part of this assessment and has been left for the LLFA to assess and to determine if these impacts should highlight additional areas of future flood risk with potential harmful consequences.

‘Significant Harmful Consequences’ is considered by the Environment Agency to be;

- ≥ 200 people or,
- ≥ 20 businesses or,
- ≥ 1 critical service

This methodology should be considered as an initial assessment and local knowledge is required to validate this information.

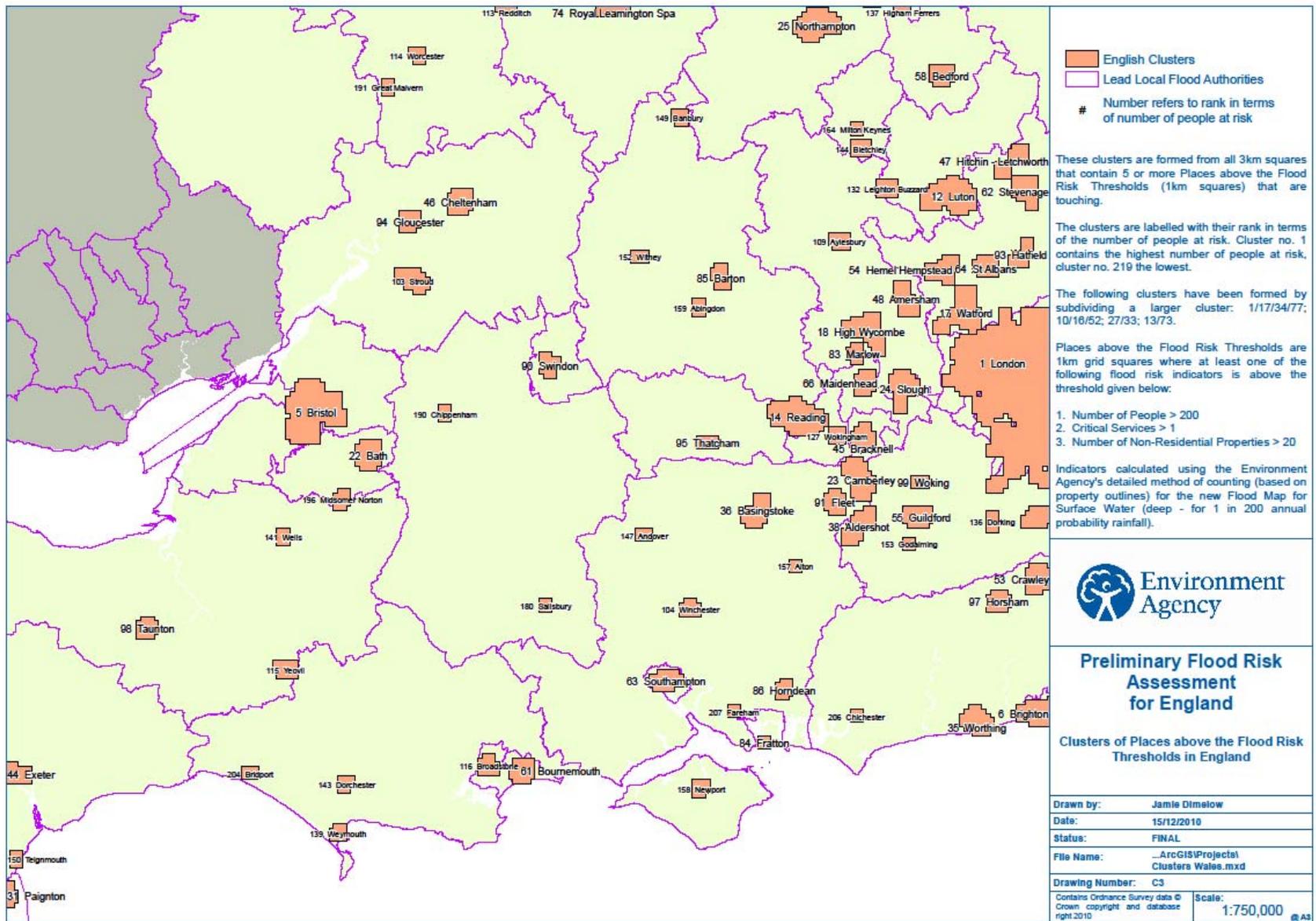


Figure 14 – Clusters of Places above the Flood Risk Thresholds in Hampshire

6.4 Climate change and long term developments

The following text on climate change (6.4.1 – 6.4.5) has been provided by the Environment Agency to ensure consistency between Preliminary Flood Risk Assessments produced by different LLFAs and to simplify the European reporting process.

6.4.1 The Evidence

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 of our 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.

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.

We 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't be sure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) 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%.

6.4.2 Key Projections for South East River Basin District

Environment Agency guidance requests text for a single River Basin District be included in the Preliminary Flood Risk Assessment. Since the South East Basin represents 68.9% of Hampshire (by geographical area), this is the text that has been used. The other River Basin Districts within Hampshire are Thames (23.5%) and South West (7.6%) as identified in figure 8.

For the South East River Basin if emissions follow a medium future scenario, UKCP09 projected changes by the 2050s relative to the recent past are

- Winter precipitation increases of around 18% (very likely to be between 2 and 39%)
- Precipitation on the wettest day in winter up by around 16% (very unlikely to be more than 34%)
- Relative sea level at Portsmouth very likely to be up between 10 and 40cm from 1990 levels (not including extra potential rises from polar ice sheet loss)
- Peak river flows in a typical catchment likely to increase between 11 and 24%
- Increases in rain are projected to be greater at the coast and in the west of the district.

6.4.3 Implications for Flood Risk

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability.

Wetter winters and more of this rain falling in wet spells may increase river flooding, especially in the rapidly responding catchments draining the South Downs and Weald. 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 the unexpected.

Rising sea or river levels may increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

There is a risk of flooding from groundwater in the district. Recharge may increase in wetter winters, or decrease in drier summers.

Where appropriate, we need local studies to understand climate impacts in detail, including effects from other factors like land use. Sustainable development and drainage will help us adapt to climate change and manage the risk of damaging floods in future.

6.4.4 Adapting to Change

Past emission means some climate change is inevitable. It is essential we respond by planning ahead. We can prepare by understanding our current and future vulnerability to flooding, developing plans for increased resilience and building the capacity to adapt. Regular review and adherence to these plans is key to achieving long-term, sustainable benefits.

Although the broad climate change picture is clear, we have to make local decisions against deeper uncertainty. We will therefore consider a range of measures and retain flexibility to adapt. This approach, embodied within flood risk appraisal guidance, will help to ensure that we do not increase our vulnerability to flooding.

6.4.5 Long Term Developments

It is possible that long term developments might affect the occurrence and significance of flooding. However current planning policy aims to prevent new development from increasing flood risk.

In England, Planning Policy Statement 25 (PPS25) on development and flood risk aims to "ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall."

Adherence to Government policy ensures that new development does not increase local flood risk. However, in exceptional circumstances the Local Planning Authority may accept that flood risk can be increased contrary to Government policy, usually because of the wider benefits of a new or proposed major development. Any exceptions would not be expected to increase risk to levels which are "significant" (in terms of the Government's criteria).

6.4.6 Major Developments and Flood Risk

Managing flood risk is an important issue for any development. The location, layout and design of developments - in that order - are vital factors determining both the likelihood and consequences of flooding.

PPS25 requires Strategic flood risk assessments (SFRA) to be carried out by local planning authorities as part of a local development framework (LDF). New development must be considered in the light of these assessments. SFRA should consider the risk of flooding from all sources, taking into account climate change.

It is also a requirement of PPS25 that site-specific flood risk assessments (FRAs) are undertaken by applicants when a planning application is submitted in a flood risk area.

Given both of these requirements, every effort is made to ensure that new or proposed developments within Hampshire County Council's area will not increase local flood risk and where practicable, actually reduce local flood risk.

7 Identification of Flood Risk Areas

As discussed in section 6.3, the Environment Agency has carried out a national assessment of potential flood risk to determine areas which should be submitted to Europe as 'Flood Risk Areas'.

Although Figure 14 identifies flood risk clusters considered to be of significant risk, the Environment Agency have specified that only those with populations in excess of 30,000 people at risk should be submitted to Europe at this stage and the areas below this threshold should be assessed by each LLFA and used to identify areas for which Surface Water Management Plans are required which would then inform the local strategy.

Within Hampshire there are eight areas considered to have a substantial potential flood risk and these are detailed together with the Environment Agency estimation of the number of people potentially at risk and also where they rank on a national scale.

National Rank	Cluster Location	No. of People potentially at risk
23	Camberley / Farnborough	11955
36	Basingstoke	9021
38	Aldershot (including parts of Surrey)	8429
86	Horndean	4296
91	Fleet	3980
104	Winchester	3477
147	Andover	2279
157	Alton	2104

The ranking of these areas are determined through a basic national assessment carried out by the Environment Agency. The next stage will be for a more detailed assessment to be carried out incorporating local knowledge and information on areas that have experienced flooding previously. This information will inform the developing Flood Risk Management Strategy, and will in turn be used to help determine which, if any, further Surface Water Management Plans are required. This process may also lead to other areas, not been identified by the Environment Agency but for which substantial local information is available to justify the level of local flood risk, being included in these investigations.

The table above includes Farnborough, Aldershot and Basingstoke. These areas are already under investigation as part of existing surface water management plans funded by Defra. The remaining areas shown in the table will be investigated as resources permit, to inform the Flood Risk Management Strategy and are likely to be fully investigated and action plans prepared as appropriate, prior to the next Preliminary Flood Risk Assessment submission.

8 Conclusion

Flooding is a natural process that cannot be prevented entirely but there are many things that can be done to reduce both the risk of flooding and also to reduce the impact flooding has on the wider community. The Preliminary Flood Risk Assessment is a first step in flood risk management and by identifying the different partner and stakeholder organisations and the information held within each organisation, it has been possible to develop a strategic view of both past, current and future flood risk across the county. The different groups that have been

set up as part of this work have enabled all parties to come together to discuss the flood risk in Hampshire and to identify where future investigation and works should be prioritised in order to reduce flood risk and improve the quality of life for the most number of people.

The initial areas defined through this report, namely Farnborough, Basingstoke, Aldershot, Horndean, Fleet, Winchester, Andover and Alton, will undergo further investigation to identify the specific surface water problems and potential mitigation and adaptation measures, which may be developed into the form of formal Surface Water Management Plans, but all the information will feed into the Local Flood Risk Strategy that will co-ordinate the policy and local decisions to assist in reducing flood risk in these areas and eventually across the whole county.

9 Next Steps

It is important that the Preliminary Flood Risk Assessment is viewed as an initial, interim and strategic assessment of flood risk. It is a starting point for the preparation of a more detailed local flood risk management strategy which assesses flood risk at a local level and identifies where additional investigations and/or surface water management plans are required.

This Preliminary Flood Risk Assessment will be updated as floods are identified and their flooding mechanisms and consequences are understood. Also, as the understanding of surface water flooding grows, additional information may become available to assess future flood risk especially in relation to climate change. Any new information of this type will require the Preliminary Flood Risk Assessment and risk sites to be re-assessed and the priorities for Hampshire reviewed on a risk basis.

Section 17 of the Flood Risk Regulations states that LLFAs must prepare a revised Preliminary Assessment Report by the 22nd June 2017, and carry out subsequent reviews every 6 years. Notwithstanding this Statutory requirement for formal review, the information within this document will continue to be updated, collected and assessed as resources permit, prior to the preparation and submission of a formal review in 2017.

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Annex I – Past Floods

Annex 2 – Future Floods

Annex 3 – Review Checklist