Suffolk Flood Risk Management Partnership

Suffolk Flood Risk Management Strategy

"Over 5.5 million properties in England and Wales are at risk of flooding from rivers, the sea or surface water. That's one in six which means there's a high chance one of these properties is your home or business."

National Flood Forum

March 2016

Foreword
from Councillor Matthew Hicks

Councillor Matthew Hicks

I am well aware of the misery and devastation that result from flooding and commend to you this document. It sets out ways in which, working together, we can help to reduce the impact of an increasingly erratic climate.

Suffolk's first Flood Risk Management Strategy was published in February 2013 and this is an updated version that reflects new legislation and information. This Strategy is a key step in making sure that the risk of flooding in Suffolk is dealt with as a whole. Suffolk County Council leads the Suffolk Flood Risk Management Partnership, joining up the work done by flood risk management organisations working closely with communities and individuals. Flooding is something that can only be dealt with when we all work together.

I recognise that, in the past, the different organisations involved have not always worked together effectively enough in managing flooding. It is vital that we all work better not just with each other but crucially with the public. This is why the strategy details the roles and responsibilities of all major stakeholders, including landowners, households and community groups, so that there is better clarity about how everyone should be involved. The issue of flooding caused by surface runoff and from ordinary watercourses (such as streams and ditches) is now being integrated with the previous focus on river and tidal flooding. However, it is not the source of flooding but the effects that matter and we are keen to make sure that all forms are managed together and tackled according to level of risk rather than by what caused it.

The appendices to the Strategy set out in more detail, how the key organisations will undertake certain vital functions – from planning for sustainable drainage, consenting works on watercourses and investigating flood events – so that everyone is clear about what we do. The key changes to the document relate to changes to the planning legislation in relation to flood risk and drainage and our approach makes it clear that it is vital that new developments do not increase flood risk for its neighbours.

The document illustrates the flood risk and all sorts of actions to both reduce the risk of flooding and the impact when flooding does occur. The Strategy also focuses on ways in which land and property owners can assist in reducing risk in practical way; focussing not just on decreasing the probability of flooding but also its impact, making sure that properties and households can cope in the event of a serious flood. I believe also that we must focus on working with nature to manage flood risk not just rely on traditional engineering solutions and at a time of decreasing public funding, we need to be innovative in our approaches.

This strategy is a statement of intent and gives guiding principles as to how we should all work together to tackle flooding in Suffolk. It is a living document that will continue to be regularly reviewed and monitored to ensure it remains fit for purpose. I hope it will help you become better informed about Suffolk's approach to flood management.

Councillor Matthew Hicks

Suffolk County Council, Cabinet Member for Environment and Public Protection

Contents

Glossary and abbreviations

of words and phrases commonly used in flood and coastal risk management

AONB	Area of Outstanding Natural Beauty
Aquifer	A layer of porous substrate that contains and transmits groundwater
AW	Anglian Water
Asset Register	Register of structures or features which are considered to have an effect on flood risk.
Catchment	The extent of land which catches and holds rainwater.
CFMP	Catchment Flood Management Plan – strategic plans for flood management
Consenting	Process of obtaining permission to add/amend structures in/near a watercourse or flood defence structure
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FCERM	Flood and Coastal Erosion Risk Management
FDGiA	Flood Defence Grant in Aid
Fluvial flooding	Flooding from rivers
FMfSW	Environment Agency's Flood Map for Surface Water
FRMP	Flood Risk Management Plan. Strategic plan required under EU Flood Directive
Foul flooding	Flooding that is contaminated with sewage
GIS	Geographic Information System. Software that captures, stores, analyses, manages, and presents data that is linked to location.
Groundwater flooding	Flooding when water levels in the ground rise above the surface
IDB	Internal Drainage Board
JEPU	Joint Emergency Planning Unit
LDA	Land Drainage Act
LDF	Local Development Framework – planning framework
LiDAR	Light Detection and Ranging. Method for collecting high-resolution topographic data
LLFA	Lead Local Flood Authority. In England, either the unitary authority for the area, or if there is no unitary authority, the county council for the area.

Main River	A statutory watercourse – usually larger streams and rivers marked as such on the Environment Agency main river map.
Ordinary Watercourse	A statutory type of watercourse including river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) that is not classified as main river.
PFRA	Preliminary Flood Risk Assessment. A high level summary of significant flood risk describing the probability and consequences of past and future flooding, required by the Flood Risk Regulations 2009.
Pluvial flooding	Flooding from rainfall – another name for surface water flooding.
RAMSAR	Wetlands of International Importance
RBMP	River Basin Management Plan – plan for the delivery of the Water Framework Directive
RFCC	Regional Flood and Coastal Committee
Risk	Risk = probability of an occurrence x its potential consequence
SAB	SuDS Approval Body (the county council)
SAC	Special Areas of Conservation - Areas protected under the EU Habitats Directive
SCC	Suffolk County Council
SFRA	Strategic Flood Risk Assessment
SFRMP	Suffolk Flood Risk Management Partnership
SMP	Shoreline Management Plan – strategic plans for the long-term management of the coast
SRF	Suffolk Resilience Forum
SPA	Special Protection Area. Areas protected under the EU Birds Directive which support significant numbers of wild birds and their habitats.
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
Surface water flooding	Flooding caused by high intensity rainfall that generates flows over the ground and collects in low lying areas. Also known as pluvial or flash flooding.
SW	Surface Water
SWMP	Surface Water Management Plan
Water & Sewerage Companies	Companies responsible for provision of both water and drainage of waste water and sewage (e.g. Anglian Water).
WFD	Water Framework Directive

Who to contact about flooding

In an emergency especially if there is danger to life as a result of flooding you should not hesitate to ring **999**.

Environment Agency Floodline: 0345 988 1188
for flood information and warnings.

For general enquires about river or sea flooding:
contact the Environment Agency on **03708 506 506**

To report flooding from sewers and water pipes:
contact Anglian Water on **0800 771 881** (24 hours)

Flooding on the highway:
Any incidents on major trunk roads (A14, A11 and A12 south of Ipswich and through north of Lowestoft) should be directed to Highways England Information Line: **0300 123 5000**

For any other roads in Suffolk ring **08456 066 067** (office hours) or **01473 433444** (out of hours).

Non urgent reports of minor flooding or blocked drains or gullies can be completed online. See **www.suffolk.gov.uk/flooding** for details.

For all other flooding and related issues:
call **01473 260629** (office hours) or visit **www.suffolk.gov.uk/flooding**

1. Introduction

The Suffolk Local Flood Risk Management Strategy is an important tool to help everyone understand and manage flood risk within the county. Its primary focus is on 'local flooding' from surface water, groundwater or ordinary watercourses such as streams and ditches. This type of 'flash flooding', generally caused by localised heavy rainfall, appears to be increasingly common, but until recently there has been little understanding of the risks or actions to address the risks. Historically flood risk management has concentrated on river and tidal flooding.

However, for those who suffer flooding, it matters little what type of flooding is causing the problem, and 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. The strategy will not cover coastal erosion.

This is an update to a strategy first published in February 2013. New legislation, improved knowledge and further development of local policy has informed this updated edition. Further revisions may be necessary in future. The review of the strategy and its associated action plan is overseen by the Suffolk Flood Risk Management Partnership and scrutinised by a panel of local Councillors from all corners of the county.

The main aim of the strategy is to reduce the risk of flooding and the misery and economic damage that flooding causes, in a sustainable manner. Also, any flood management activities carried out will aim to enhance the built and natural environment.

The strategy document starts with information on the legislation that underpins flood risk management activities, who is involved and what part each will play in helping reduce the risk of flooding in Suffolk. It then looks at the nature of flood risks in Suffolk and what further information is needed to help build a better picture of local flood risks.

The next section describes the objectives together for managing flood risk and how we might achieve them, leading onto the action plan in Appendix 1*. In putting these objectives together we considered three options for local flood risk management:

Do nothing – potentially more properties will flood and for those already at risk of flooding they will potentially flood to a greater depth and/or more frequently.

Maintain – keep pace with climate change so that there is no net increase in flood risk; existing flood risk management infrastructure will need to be improved over time and all new development will need to take climate change into account.

Improve – take action to reduce the number of properties that would potentially flood and the potential impacts of that flooding.

After discussions with key stakeholders, we propose to take a pragmatic approach to reduce the current flood risk and ensure that we do nothing to make this worse in the future, recognising the limited resources available for flood and coastal risk management and other priorities within the county.

In the action plan we outline a range of actions, from small-scale local activities to long-term major plans and where possible we have identified who will be involved, when things might happen and how they might be paid for.

The money available for flood risk management is never going to be adequate to deal with all existing flood risks and the increasing future risk brought about by further development and a changing climate. 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.

* The Action Plan is a working document that will be regularly updated and monitored. It will be a separate document, held on the website www.suffolk.gov.uk/flooding, but is an integral part of the strategy.

1.1 History of flood risk management

The responsibility for flood risk management has changed considerably over the past 50 years.

In 1995 the Environment Agency took over the roles and responsibilities of the National Rivers Authority and responsibility for issuing flood warnings, a role previously held by the police.

1.2 Legislation

Following the extreme floods of 2007, the Pitt Review stressed the importance of implementing better legislation for the effective management of flooding, particularly from surface water. Many of the recommendations from the Pitt Review have been implemented through the **Flood and Water Management Act 2010**, which places a greater responsibility on upper tier local authorities (county and unitary councils) for surface water management issues, under their new role as Lead Local Flood Authorities. The role of the Environment Agency in respect of river and tidal flooding remains in force. The Environment Agency also has a strategic role to oversee all flood and coastal erosion risk management, ensuring it is undertaken in a sustainable manner.

The Flood Risk Regulations (2009)[1] came into force in December 2009 and transpose the EU Floods Directive into law for England and Wales. The Flood Risk Regulations required a **Preliminary Flood Risk Assessment** to be produced which identifies areas where significant numbers of people are at risk of surface, ground and ordinary watercourse flooding. Where such areas exist, the regulations also require the production of hazard and risk maps and flood management plans. Within Suffolk, there are no areas that satisfy the national criteria for defining such areas, not because there is no risk, but because of the largely rural nature of the county and lack of large urban areas. The Preliminary Flood Risk Assessment for Suffolk was completed in June 2011.

The Flood and Water Management Act 2010[2] provides legislation for the management of risks associated with flooding and coastal erosion. The Act reinforces the need to manage flooding holistically and in a sustainable manner. It places a number of new roles and responsibilities on Suffolk County Council, which is designated a 'Lead Local Flood Authority'. The preparation of this Local Flood Risk Management Strategy is just one of the duties placed upon the county council.

"Flood risk and water use remain key issues for all communities. Britain needs to plan now for more erratic, unpredictable and extreme weather patterns in the future".

Lord Chris Smith, Chairman of the Environment Agency, July 2012.

A national Flood and Coastal Erosion Risk Management strategy[3] has been produced by the Environment Agency which sets out the principles that will guide local strategies and the activity of all flood authorities.

The Act defines various bodies as 'risk management authorities'. These are:

- a Lead Local Flood Authority;
- the Environment Agency;
- a district council for an area where there is no unitary authority;
- an internal drainage board;
- a water company;
- a highway authority.

The powers and duties in the Act are summarised on the next page. More details on how they will be discharged are in Chapter 2.

Planning legislation:

The National Planning Policy Framework[4] was published in March 2012 by the Department of Communities and Local Government. The aim is to reduce development in flood risk areas and

1. http://www.legislation.gov.uk/uksi/2009/3042/contents/made
2. http://www.legislation.gov.uk/ukpga/2010/29/contents
3. https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england

reinforces the requirement for sustainable surface water management in new developments. It reinforces the responsibilities of Maritime Local Authorities in respect of Coastal Change Management Areas (CCMAs).

Coast Protection Act (1949):

This provides the legal framework for the protection of the coast against erosion and encroachment by the sea within the boundaries set out in Schedule 4 of the Act. It gives Maritime Local Authorities (e.g. Suffolk Coastal and Waveney District Councils) powers to undertake coast protection works on their frontage.

Other legislation:

Flood and coastal risk management is affected by a range of other national and local legislation, policies and non-statutory plans, the most significant of which are listed below:

- The Climate Change Act (2008).
- The Conservation of Habitats and Species Regulations (2001).
- The Civil Contingencies Act (2004).
- The Strategic Environmental Assessment (SEA) Directive (2001).
- The Land Drainage Act (1991).
- The Water Framework Directive/Water Environment Regulations.
- Marine and Coastal Access Act.
- The Countryside and Rights of Way Act (2000).
- The Wildlife and Countryside Act (1981).
- Water Resources Act (1991).

Key powers and duties within the Flood & Water Management Act 2010

Responsibility	Details
Preparation of an Asset Register	Lead Local Flood Authorities (LLFAs) have a duty to maintain a register of structures or features which are considered to have an effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection. The content of the register are set by the government.
Power to designate flood risk management structures	LLFAs, as well other flood management authorities have powers to designate structures and features that affect flooding or coastal erosion in order to safeguard assets that are relied upon for flood or coastal erosion risk management. Further details in Section 2.9.
Investigation of flood incidents	LLFAs have a duty to coordinate the investigation and recording of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigations carried out. Further information with respect to this duty is provided at Section 2.6.
Prepare a Local Strategy for Flood Risk Management	LLFAs are required to develop, maintain, apply and monitor a local strategy for flood risk management in its area. The local strategy will build upon information such as national risk assessments and will use consistent risk based approaches across different local authority areas and catchments.
Works powers	LLFAs have powers to undertake works to manage flood risk from surface runoff and groundwater, consistent with the local flood risk management strategy for the area.
Consenting changes to Ordinary Watercourses	If riparian owners wish to culvert an ordinary watercourse or insert any obstructions, consent is required from the LLFA, except within Internal Drainage Board (IDB) areas. For further details see Section 2.7.

4. https://www.gov.uk/government/publications/national-planning-policy-framework--2

Regional and local plans:

- **River Basin Management Plan Anglian River Basin District (December 2009)**[5] – the plan for the delivery of the Water Framework Directive in the River Basin District. Its focus is to improve the ecological and geomorphological qualities of water bodies (sea, rivers, streams, lakes, etc).
- **Catchment Flood Management Plans**[6] are high level strategic plans through which the Environment Agency, working with key decision-makers within a river catchment, identify and agree policies for sustainable flood risk management. These were produced in 2010. The action have been reviewed and incorporated into the Flood Risk Management Plans. There are four plans covering the river catchments across Suffolk:
  - Broadland Rivers.
  - East Suffolk.
  - Great Ouse.
  - North Essex.
- **Shoreline Management Plans (SMPs)**[7] are strategic plans for the long-term management of the coast. There are three plans covering the Suffolk coast:
  - The Kelling to Lowestoft SMP.
  - The Suffolk SMP, covering Lowestoft to Felixstowe.
  - The Essex and South Suffolk SMP, which covers the Stour and Orwell estuaries.
- **Strategic Flood Risk Assessments** are undertaken by District/Borough Councils as part of the strategic planning process and where available their Local Development Frameworks/Local Plan.
- **Suffolk Community Risk Register**[8] is produced by the Suffolk Resilience Forum and identifies the major risks in Suffolk (including inland and coastal flooding), their likelihood and impacts. There are plans for emergency response and recovery for specific risks.
- **Ipswich Borough Council's Drainage and Flood Defence Policy**[9] – states how the Borough controls development in areas of flooding and is referred to in Local Planning documents. It provides guidance on the roles of drainage bodies and council services, sets standards for sustainable drainage for new developments and explains how the Borough manages local flood risk. The document will be updated following the adoption of the Suffolk Local Flood Risk Management Strategy.

1.3 The Local Flood Risk Management Strategy

The production of this local strategy is a statutory requirement under the Flood & Water Management Act. It follows the publication of a National Flood & Coastal Erosion risk Management Strategy which sets out principles that must guide all flood and coastal risk management activities.

The Local Flood Risk Management Strategy will be a statutory document, which will impact on the activities of all flood risk management authorities – i.e. local authorities, the Environment Agency, highways authorities and Internal Drainage Boards.

These bodies will all have a 'duty to act consistently with the local strategy' when undertaking their flood and coastal erosion risk management functions and have a 'duty to have regard for the strategy' when discharging other duties that may affect flood and coastal risk (for example spatial planning and development).

Water companies will also have a 'duty to have regard for the local strategy' for all relevant functions.

5. http://www.environment-agency.gov.uk/research/planning/33106.aspx
6. https://www.gov.uk/government/collections/catchment-flood-management-plans
7. http://www.environment-agency.gov.uk/research/planning/105014.aspx
8. http://www.suffolkresilience.com/
9. https://www.ipswich.gov.uk/sites/www.ipswich.gov.uk/files/Ipswich_Flood_Defence__Drainage_Policy_rev_Aug_20091.pdf

These guiding principles, that underpin this local strategy, are:

- **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.**

The requirement to produce a Local Strategy is predominantly concerned with the management of surface, ground and ordinary watercourse flooding (= local flooding) but will clearly link to flooding from rivers and the seas. The strategy will not cover coastal erosion risks.

Who produced it?

The production of the Local Strategy has been overseen by the Suffolk Flood Risk Management Partnership.

The strategy has been formally adopted/ endorsed by all councils and other risk management authorities in the county and this review will go through a similar process.

1.4 The Suffolk Flood Risk Management Partnership

The Flood and Water Management Act requires Suffolk County Council to take a leading role in managing local flood risks, working in partnership with other relevant authorities and the public.

The Suffolk Flood Risk Management Partnership, made up of key risk management authorities and the Suffolk Resilience Forum, is fundamental to the delivery of a coordinated and consistent approach to flood and coastal risk management, and working alongside the public to make a real difference in the county.

This partnership was set up on 2009 following the publication of the Pitt Recommendations to share

The Partners are:

- Suffolk County Council
- Forest Heath District Council
- St Edmundsbury Borough Council
- Babergh District Council
- Mid Suffolk District Council
- Ipswich Borough Council
- Suffolk Coastal District Council
- Waveney District Council
- Environment Agency
- Anglian Water
- Ely Group IDB
- East Suffolk Group of IDBs
- Waveney, Lower Yare & Lothingland IDB
- Broads Authority
- Highways England
- Suffolk Resilience Forum
- Essex & Suffolk Water
- National Farmers Union

expertise and local knowledge and work jointly to understand and reduce flood risk across Suffolk. It has links to a number of other relevant groups and key players in managing flood and coastal risks, including:

- **Anglian Regional Flood & Coastal Committees** (Eastern & Central) brings together councillors appointed by Lead Local Flood Authorities (LLFAs) and appointees with relevant experience. Their role is to approve the annual programme of work ensuring there are coherent plans for risk-based investment that optimises value for money and benefits for local communities in areas of flood and coastal erosion risk.
- **Developers** have a vital role in delivering sustainable drainage as promoted by the Flood and Water Management Act National Policy Planning Framework, as well as the wider planning proposals in relation to flood risk outlined in this strategy. It is crucial that future development takes proper regard to all sources of flooding and wherever possible deliver reductions in flood risks, both on and off site.
- **East Anglian Coastal Group** and its associated subgroups oversee the production and delivery of Shoreline Management Plans and share coastal expertise.
- **Local Community Emergency groups** set up coordinate parish-level emergency actions in the event of major emergencies, including flooding.
- **Local Estuary/Coastal Groups** formed by residents, landowners and other interested parties to represent local interests and assist in the management of flood and coastal risks.
- **Local Government Association** and its **Coastal Special Interest Group.** These groups provide support to local authorities in exercising their duties as flood and coastal risk management authorities and links to national policy makers.
- **Marine Management Organisation** has a key role in coast protection via licensing of activities on the shoreline and developing marine plans that overlap with terrestrial spatial plans.
- **Natural England** and other national and local environmental and conservation bodies will help deliver flood risk management in a way that also delivers wider environmental benefits.
- **Neighbouring Lead Local Flood Authorities** An informal grouping of all Lead Local Flood Authorities from across the eastern counties has been created for mutual assistance and to share expertise. It is possible that this type of grouping may be given more formal status alongside coastal groups in the future.
- **Network Rail**
- **Riparian Owners** The many land and home owners whose land adjoins a watercourse have certain rights and responsibilities in relation to flood risk management. These people are key players in the management of local flood risk, particularly in the many rural areas of Suffolk. The National Farmers Union and the Country Land and Business Association are important bodies representing agricultural and landowning interests and are the main route by which we can influence many riparian owners.
- **Suffolk Coast Forum** A forum comprising relevant local authorities, estuary groups, Environment Agency, Natural England, the Marine Management Organisation and ports authorities to take a strategic role in coastal management. It will provide an important link with the Suffolk Flood Risk Management Partnership in integrating inland and coastal flood management.
- **Suffolk Joint Flood Scrutiny Panel** comprising elected members from county and all district authorities whose role is to scrutinise the work of the Suffolk Flood Risk Management Partnership and the flood management activities of its partners.
- **Suffolk Planning Officers group** comprises lead planning officers from all planning authorities across the county.
- **Town & Parish Councils** are the key route to the general public and local information. They have a key role in encouraging local self-help groups to prepare for flooding and other

emergencies and as a conduit for passing information to and from the public to the county council.

- **Utility providers** have a key role in ensuring their key infrastructure is protected from flood risk.

1.5 What is the nature of flood risk within Suffolk?

Flooding is a natural phenomenon, the adverse effects of which can be made worse by poor management of the landscape and environment. The problems can be made worse if we fail to do anything about the risk.

Although current projections for future climate change predict an overall decrease in rainfall it is likely to occur in more intense stormier conditions at certain times of the year. Combined with the predicted rise in sea level there will be an increased risk of tidal, river and surface water flooding.

Taken from UK Climate Change Predictions 09[10]

Rainfall and the consequential flooding by its very nature is unpredictable in location and severity, and dealing with these uncertainties will be challenging, particularly in the case of surface water flooding. However, flood risk is something that can be understood and its effects are generally more predictable, although blockages in drainage systems may cause unusual and even less predictable flooding.

The nature of flood risk within Suffolk is extremely varied and widespread across the county. Suffolk has an extensive coast and estuaries, a network of rivers and low lying land, which combined with a number of urbanised areas, means it is at risk of flooding from a range of different sources.

The main sources of flood risk within Suffolk include:

Surface water flooding, also known as pluvial flooding or flash flooding, occurs when high intensity rainfall generates runoff which flows over the surface of the ground and ponds in low lying areas. It is usually associated with high intensity (typically greater than 30mm/hr) or prolonged rainfall and can be exacerbated when the ground is saturated or when the drainage network has insufficient capacity to cope with the additional flow. Until recently, the risk from surface water was poorly understood, with little information available about the mechanisms of surface water flooding and the associated risks.

Based on current information Suffolk has over 150,000 properties predicted to be affected by surface water flooding during an extreme rainfall event with a one per cent (1 in 100) chance of happening each year and a flooding depth of 0.3 metres. This risk is widespread across the county (see Figure 4.1 on page 39).

Groundwater flooding occurs when water levels in the ground rise above the ground surface. Flooding of this type tends to occur after long periods of sustained heavy rainfall and can last for weeks or even months. The areas at most risk are often low-lying areas where the water table is more likely to be at a shallow depth and flooding can be experienced through water rising up from the underlying aquifer or from water flowing from springs.

River flooding, also known as fluvial flooding, occurs when a watercourse cannot accommodate the volume of water that is flowing into it or when flood defences are overtopped or breached. Rivers are categorised into **main rivers** and **ordinary watercourses**. Main rivers are usually large watercourses but also include smaller watercourses of strategic drainage importance. All other smaller watercourses, ditches and streams are classified as ordinary watercourses.

Suffolk has a number of main rivers (see Figure 2.5) and associated tributaries including, the Waveney, Blyth, Alde, Ore, Deben, Orwell, Stour, Gipping, Lark and River Little Ouse which all pose a threat of river flooding, in addition to the vast network of ordinary watercourses.

10. http://www.ukcip.org.uk/

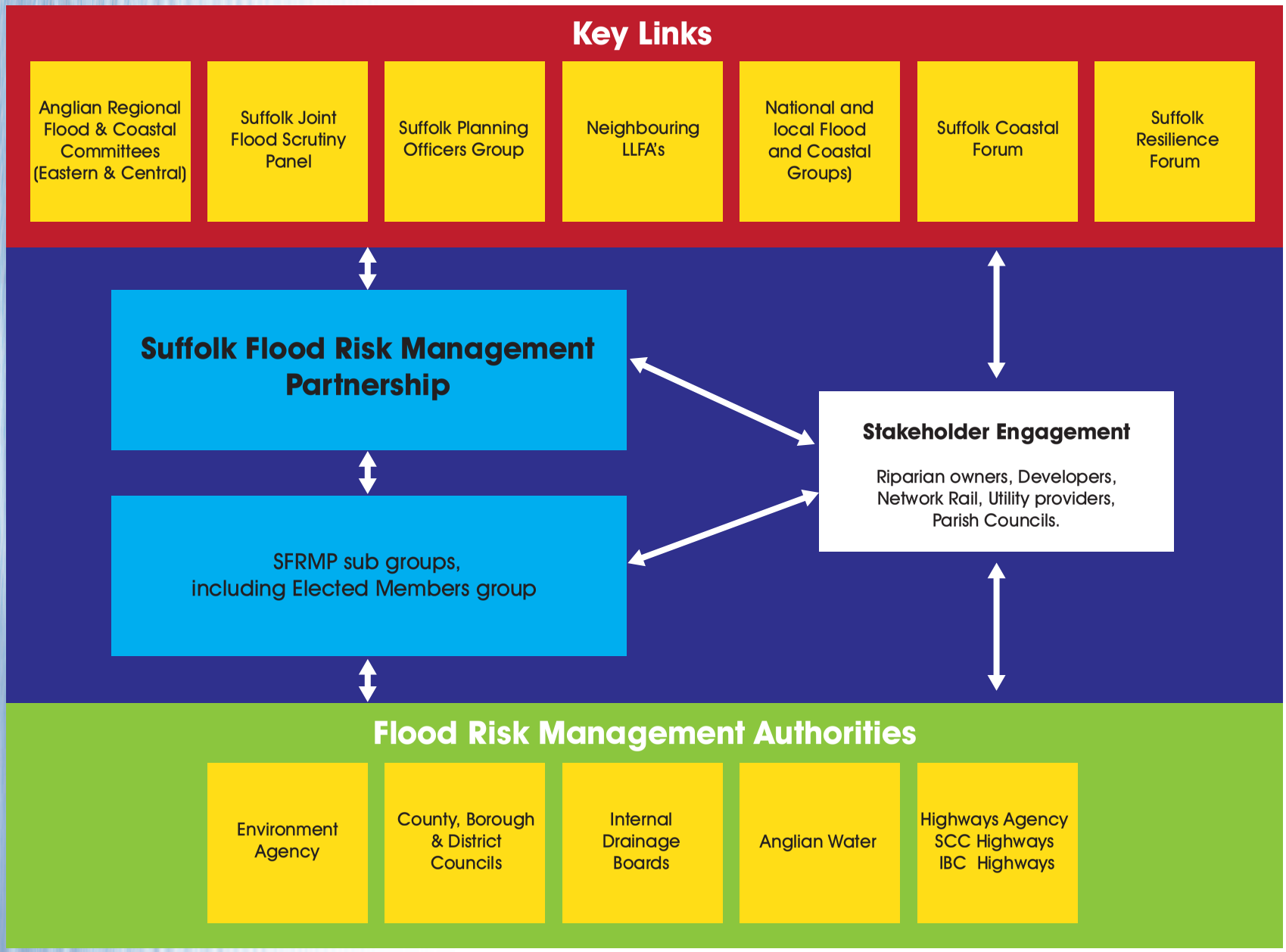


Figure 1.1: Relationships between groups involved in flood and coastal risk management

The north west of the county is part of the Fens – an extensive drained area partly below sea level, extending into the counties of Cambridgeshire, Lincolnshire and Norfolk. Chapter 3 will deal with this unique area as a whole.

Coastal or tidal flooding usually occurs during storm surges when there is an increased risk of high sea levels causing overtopping or breaching of coastal flood defences leading to flooding inland. The greatest risk of coastal flooding is experienced when there is a combination of high tides and a storm surge, which is when a low pressure system causes a localised rise in sea level and wave height. Many parts of Suffolk's coastline and estuaries are prone to coastal flooding, as illustrated by the severe floods in 1953.

Based on Environment Agency flood maps, there are some 38,000 properties at risk of river/tidal flooding in Suffolk.

Coastal erosion, the wearing away of land and the removal of beach sediments by wave action, tidal currents or water percolation into soft cliffs, occurs in a number of locations along Suffolk's coast and estuaries. Whilst this risk falls outside the responsibility of the Lead Local Flood Authority and the scope of this strategy, liaison with the maritime local authorities responsible will be important. There may, in the future, be areas where erosion will lead to increased flood risk.

Reservoir flooding results from the complete or partial failure of a reservoir structure. There is one large open reservoir in Suffolk (Alton Water) that poses a slight risk to a small number of properties. There are also two flood storage reservoirs in Stowmarket and numerous smaller on-farm water storage reservoirs which pose little or not flood risk..

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it, or when pipes within the network become blocked. This type of flooding is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network, causing flooding. Water Utility 'DG5'[11] registers show a total of 250 flood events reported by water companies over the last decade. These events occurred in a number of locations, largely within urbanised areas.

Highway flooding can be defined as flooding caused by heavy rainfall or overflowing from blocked or overloaded drains, soakaways and gullies causing water to pond within the highway network or from a lack of formal drainage system. During the Preliminary Flood Risk Assessment process, highway flooding reports were collected from around 250 different locations (with 15 years of data) and this data is included in the overall evidence base of flood information.

It is frequently difficult to establish a single precise cause for flooding and a holistic approach needs to be taken.

1.6 Factors increasing flood risk

Flood risk is a combination of probability and consequence; as there are a number of factors which will lead to higher probability of flooding in the future and more serious potential consequences, this will result in an increase in the risk of flooding across Suffolk.

The factors leading to an increase in flood risk include:

- The prediction that climate change[12] will lead to more frequent and more severe extreme weather and rising sea levels, and therefore to more extreme floods with more serious consequences.
- The deterioration in the condition and performance of existing drainage infrastructure and flood defence structures over time will increase future flood risk, as can coastal erosion in areas close to the boundary between erosion and flood risk areas.
- New development and changes in land use may lead to an increase in impermeable surfaces and general loss of vegetation cover, therefore causing increased levels of runoff during heavy rainfall events.

11. A water-company held register of properties which have experienced sewer flooding due to hydraulic overload

12. http://www.ukcip.org.uk/

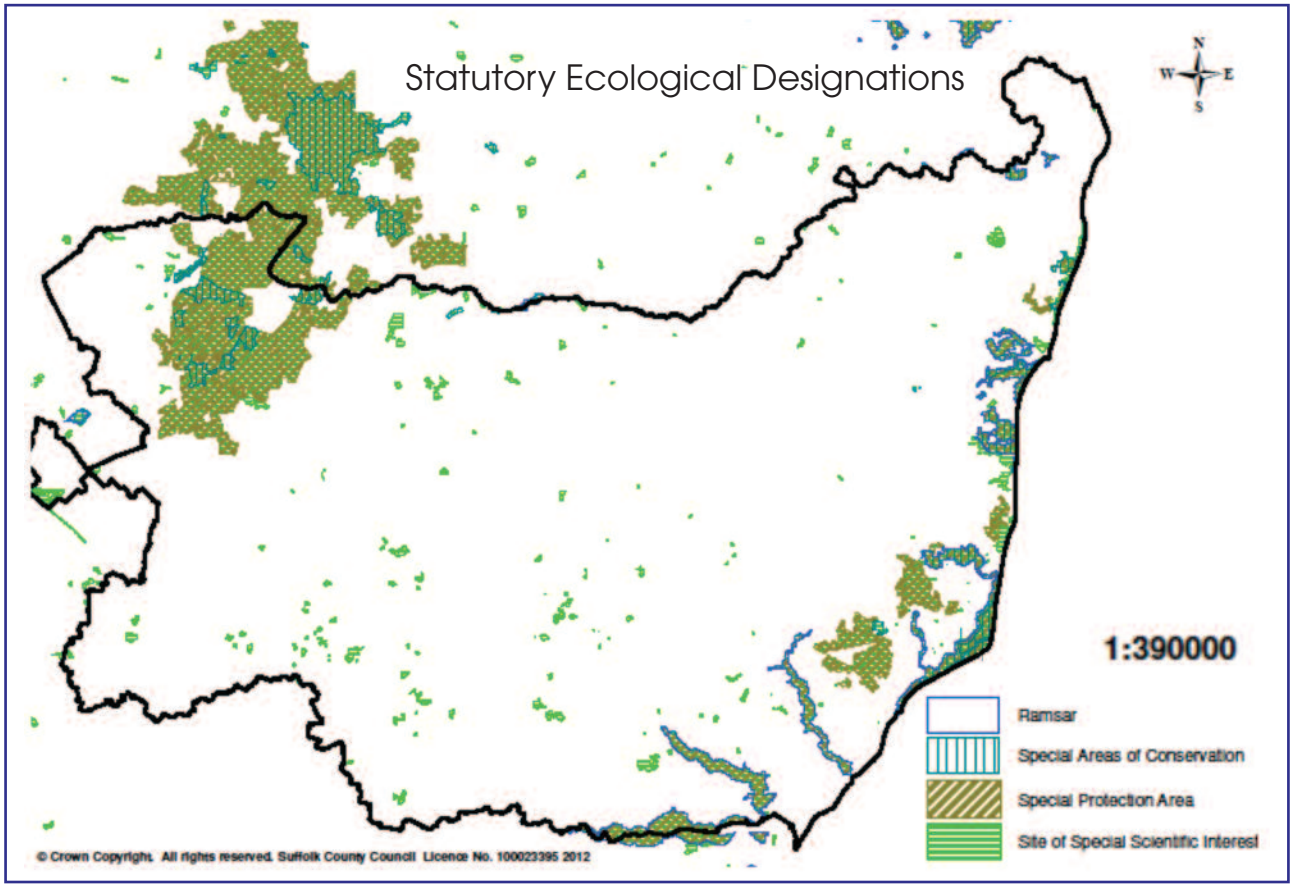


Figure 1.2 Map showing main natural environmental designations in Suffolk

1.7 Suffolk's natural environment

Suffolk has a number of nationally and internationally important sites designated for the conservation of biodiversity, in addition to locally important ecological areas. Figure 1.2 (above) highlights the major protected areas[13]. For further information and maps see **www.natureonthemap.naturalengland.org.uk/**

In addition there are also a large number of locally designated wildlife sites and areas which are important to improving biodiversity in Suffolk[14].

Flood and coastal risk management has the potential to impact on these sites either in a positive or negative way and all activities need to take due consideration of the natural environment, aiming to enhance biodiversity and water quality.

1.8 What happens next?

This strategy and its associated Action Plan will be a working document that will be amended as necessary.

A review of the achievements of the Suffolk Flood Risk Management Partnership since the publication of the first Strategy in 2013 is detailed in Chapter 8.

13. For information, other designations and maps see http://www.suffolkbiodiversity.org/wildlife-sites.aspx/
14. hhttp://www.suffolkwildlifetrust.org/species-and-habitats/county-wildlife-sites/

2. Flood management authorities and their responsibilities

2.1 The key players in flood and coastal management in Suffolk

Suffolk County Council, as the Lead Local Flood Authority, 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 road drainage.

There are a number of key organisations who together manage flood and coastal erosion risks in Suffolk. These are:

The **Environment Agency** is responsible for managing flood risk from main rivers, reservoirs and the sea, and also has a strategic overview role over all flood and coastal erosion risk management and national flood funding. It also has a key role in providing flood warnings to the public and protecting and improving the environment..

Anglian Water is both a water and sewerage company, responsible for the provision of foul and surface water drainage across the whole of Suffolk and providing water to the majority of the county. **Essex & Suffolk Water** provides water only, mainly in the north east of the county.

Highways England and **Suffolk County Council Highways** are responsible for managing drainage and flood risk on public roads and highways within the county. For trunk roads (A11 from Newmarket to Thetford; A12 through north Lowestoft; A12 south from Ipswich to Colchester and the A14) the responsibility lies with Highways England and for all other public roads, responsibility lies with the County Council.

Within Suffolk there are seven **District or Borough Councils** (see Figure 2.1) who, in addition to their planning role have powers to undertake flood risk management work on ordinary watercourses outside of Internal Drainage Board areas. Suffolk Coastal and Waveney District Councils are

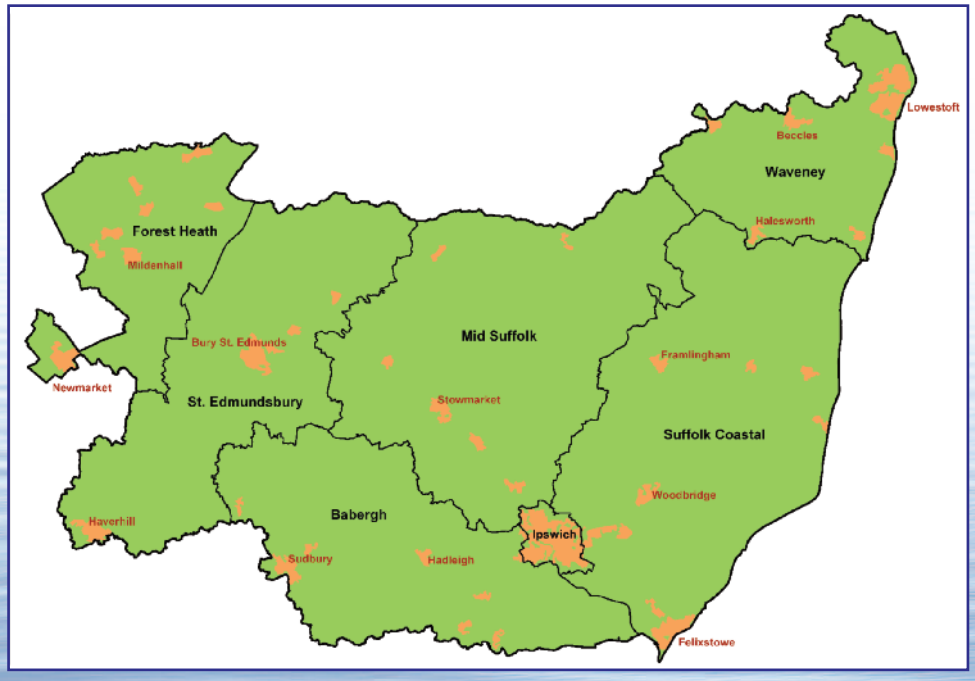


Figure 2.1: district council boundaries

Maritime Local Authorities responsible for managing risks from coastal erosion in their areas. Additionally, in certain specific areas district councils have responsibility for coast defences in areas at risk of flooding – such as south Felixstowe.

There are three groups of **Internal Drainage Boards** located within the county. Internal Drainage Boards were set up in areas of special drainage need with the primary function to manage water levels in their areas to minimise flood risk and supply water to people, property and agriculture. See Figure 2.2 below for details of the areas for each Internal Drainage Board has responsibility.

The **Broads Authority** manages the Norfolk and Suffolk Broads, with responsibility for conservation, planning, recreation and navigation. The Broads area has the status of National Park, thus the Broads Authority is responsible for planning for its area.

Suffolk Resilience Forum (SRF) is a multi-agency group that provides strategic, tactical and operational guidance and support on the planning for the multi-agency response to a major incident. It is not a statutory body nor does it have powers to direct its members; however, it is the agreed forum that coordinates multi-agency emergency preparedness, including risk assessment, contingency planning, training and exercise to enhance Suffolk's preparedness for emergencies.

The **Joint Emergency Planning Unit (JEPU)** provides an enabling service for all Suffolk local authorities (county, district and borough) to prepare for emergencies – such as flooding - and acts as a focal point for local authorities when dealing with other response agencies as part of the Suffolk Resilience Forum.

2.2 Responsibility for flooding

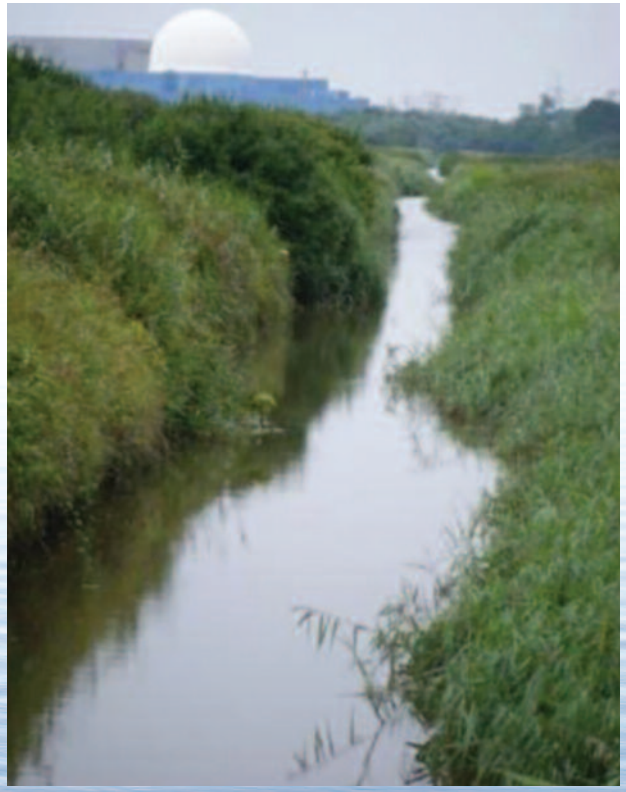
As discussed in the previous chapter, flooding can come from a number of different sources and the responsibility for managing the risk from these different sources falls with different Risk Management Authorities; a simplified illustration of this can be seen in Figure 2.3 on page 17. (NB. coastal erosion is not included).

The following sections provide more information about the powers and responsibilities that these Risk Management Organisations have and how, collectively, they will discharge them.

But flood risk management is not something that can be left solely in the hands of statutory organisations and forgotten by everyone else. **Households, businesses and landowners** have their part to play too. Even if this strategy was being devised at a time of substantial public sector budgets, the organisations would still not be able to prevent all floods or solve all concerns. That is why the powers and responsibilities of Suffolk's citizens are also recorded in this section.

2.3 The powers and responsibilities of Flood Risk Management Authorities

The Flood and Water Management Act identified certain organisations as **risk management authorities** (see page 5) which have responsibilities around flooding, both new ones, from the Flood



Typical IDB drainage channel, near Sizewell

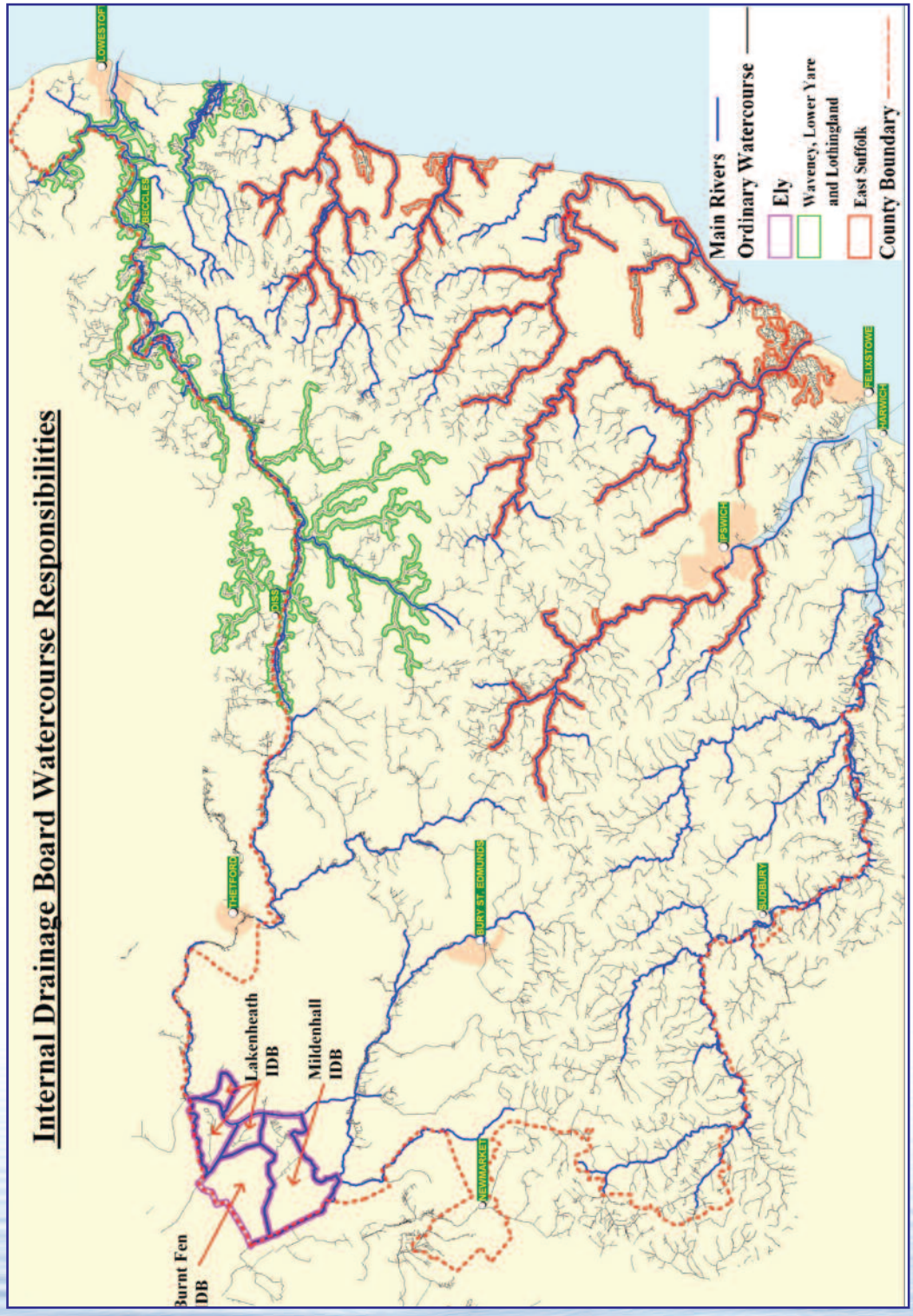


Figure 2.2: Internal Drainage Board Watercourse Responsibilities[15]

15. For details and local maps –

Ely Group: http://www.elydrainageboards.co.uk;

East Suffolk Group: http://www.wlma.org.uk/index.pl?id=144

Waveney, Lothingland & Yare: http://www.nicholsons-uk.com/LinkClick.aspx?fileticket=ccrryiuTPX4%3d&tabid=623&mid=1465

If it is not clear why flooding is occurring, enquiries should be directed to Suffolk County Council as the Lead Local Flood Authority.

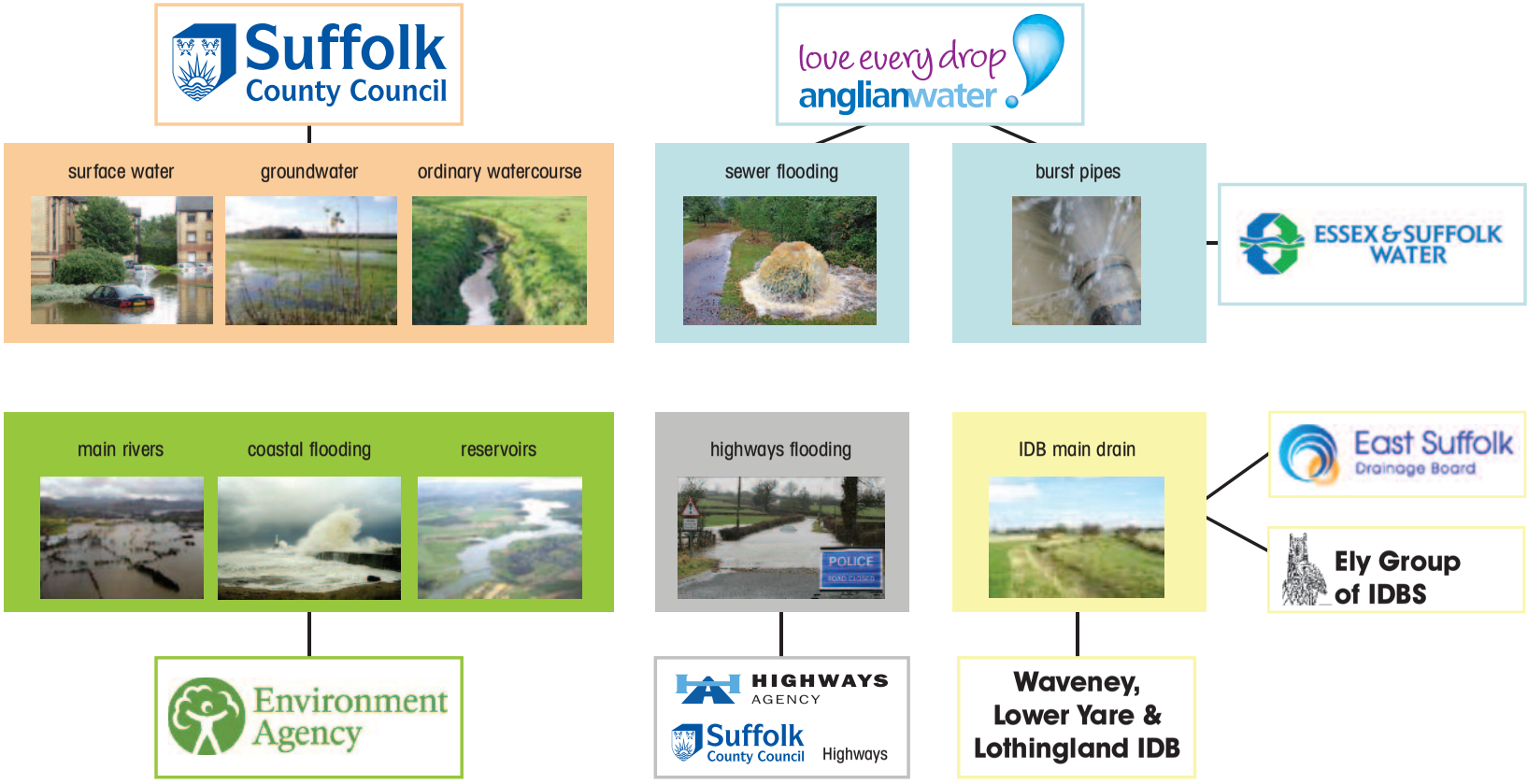


Figure 2.3 Overview of responsibility for flood risk management within Suffolk.

The Flood Risk Management Authorities in Suffolk are:

- Suffolk County Council
- Anglian Water
- Internal Drainage Boards
- District and Borough Councils
- Environment Agency
- Highways Authorities

and Water Management Act, and longstanding ones from previous legislation.

These authorities have all of the following duties and powers:

- Duty to co-operate with other risk management authorities in the exercise of their flood and coastal erosion risk management functions, including sharing flood risk management data.
- A duty to aim to contribute towards the achievement of sustainable development in the exercise of flood or coastal erosion risk management functions and to have regard to the Ministerial guidance on this topic.
- Duty to be subject to scrutiny from the lead local flood authority's democratic processes. In Suffolk we have a Joint Flood Scrutiny Panel comprising councillors from the county council and all district/borough councils.
- A duty to exercise flood or coastal erosion risk management functions in a manner consistent with the national and local strategies.
- Power to take on flood and coastal erosion functions from another risk management authority when agreed by both sides.
- Power to designate structures and features that affect flooding.

In addition, all authorities have a universal duty to comply with **environmental legislation** and the **Water Framework Directive**. They have a duty to take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation of Sites of Special Scientific Interest. (Wildlife & Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000). All authorities are required to have regard for the requirements of the Habitats Directive in the exercise of their functions (regulation 9(5)).

Co-operation between these risk management authorities will take place through the **Suffolk Flood Risk Management Partnership**. This will entail collaboration on recording flood assets, assisting with flood Investigations, providing local knowledge regarding flood risk and sustainable drainage relating to new development, sharing information and data and working together to ensure public enquiries are dealt with swiftly by the appropriate organisation.

2.4 How flood risk powers and duties will be used in Suffolk

NB. A duty is something that an authority is legally obliged to do; a power can be used if appropriate but does not have to be used.

2.4.1 Leadership

The **Environment Agency** has a national strategic role when it comes to flood and coastal erosion risk management. It is required to publish the **National Strategy**[16] which provides a national framework for all forms of flood and coastal erosion risk management.

The National Strategy identifies the following strategic actions for the Environment Agency:

- Use strategic plans like the Catchment Flood Management Plan and the Shoreline Management Plan to set the direction for Flood and Coastal Erosion Risk Management.
- Support the creation of Flood Risk Regulations reports (Flood Risk Management Plans) by collating and reviewing the assessments, plans and maps that Lead Local Flood Authorities produce.

16. https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england

- Providing the data, information and tools to inform government policy and aid risk management authorities in delivering their responsibilities.
- Support collaboration, knowledge-building and sharing of good practice including provision of capacity-building schemes such as trainee schemes and officer training.
- Manage the **Regional Flood and Coastal Committees** (RFCCs) and support their decisions in allocating funding for flood defence and flood resilience schemes.
- Report and monitor on flood and coastal erosion risk management.
- Administer grants to risk management authorities to support the implementation of their flooding or environmental powers.

The Flood and Water Management Act 2010 identified **Suffolk County Council** as the **Lead Local Flood Authority** for the county of Suffolk.

In addition to duties that fall on all risk management authorities, the county council has the following responsibilities:

- Strategic leadership of local risk management authorities. The Suffolk Flood Risk Management Partnership is led and managed by the county council and provides an important forum to co-ordinate all aspects of flood risk management in the county.
- Responsibility for development, maintenance, application and monitoring of a strategy for local flood risk management.
- A duty to investigate and publish reports on significant flooding incidents as appropriate (see section 2.6 for details), to identify which authorities have relevant flood risk management functions and what they have done or intend to do.
- A duty to maintain a register of structures or features (asset register) which have a significant effect on flood risk in their area.
- Decision making responsibility for whether works on ordinary watercourses that may affect water flow and flood risk can take place. Internal Drainage Boards also have this role on ordinary watercourses within their areas and the Environment Agency has this duty on main rivers and tidal defences.
- Power to do works to manage flood risk from surface runoff or groundwater. This includes powers under s25 Land Drainage Act 1991 to require a person impeding the proper flow of water in an ordinary watercourse to remedy that condition.

2.4.2 Understanding practical management of flood and coastal risks – who does what

The **Environment Agency**'s operational role includes emergency planning and managing flooding from main rivers, reservoirs and the sea. Its emergency planning role, and that of other risk management authorities, is outlined in section 2.10.

Main Rivers are watercourses shown on the Environment Agency's statutory Main River map, see Figure 2.5. The Environment Agency has permissive powers to carry out works of maintenance and improvement on Main Rivers. This can include any structure or appliance for controlling or regulating flow of water into or out of the channel. The overall responsibility for maintenance of Main Rivers, however, lies with the **riparian owner**.

Coastal Flooding: The Environment Agency is the lead organisation with strategic overview for all flood and coastal erosion risk management around the coastline of England, including tidal flood risk. The Environment Agency leads in the development of Shoreline Management Plans and works with partner organisations, including local authorities to put them into practical action. The Environment Agency supports this by giving Grant-in-Aid funding for coastal defence schemes and overseeing the work carried out.

Reservoirs: The Environment Agency is the enforcement authority for the Reservoirs Act 1975 (the Act) in England. The Act applies a safety regime to large raised reservoirs, which are those reservoirs capable of holding more than 25,000m^3 of water above ground level. The full requirements of the Act only apply to 'high-risk' large raised reservoirs, which are designated and mapped to understand the full extent of what is at risk. The owners and operators of high-risk reservoirs must have a supervising engineer appointed at all times, have their reservoir inspected periodically, and carry out any essential safety works identified by their inspecting engineer. The Environment

Figure 2.5: Main river map of Suffolk

Agency is responsible for ensuring that reservoir owners and operators comply with the requirements of the Act and for establishing and maintaining a register of reservoirs, and making this information available to the public. There is no legal requirement under the Reservoirs Act 1975 for reservoir owners and operators to produce flood plans, as this Section of the Act has not been enacted by the government. However, it is good practice to have such plans in place

An **Internal Drainage Board** (IDB) is a public sector operating authority, empowered under the Land Drainage Act 1991 in areas of special drainage need in England & Wales to carefully manage water levels within defined drainage districts for land drainage, flood risk management, irrigation and environmental benefit. IDBs operate in catchment areas that are not in county or district council boundaries, and undertake routine maintenance of main drains, pumping stations and other critical water control infrastructure under permissive powers, the overall responsibility for maintenance being with the riparian owner.

Principle operations include weed cutting, de-silting, tree management, mowing of bank-side vegetation and structural inspection, repair and replacement of fixed water control assets.

Suffolk County Council as Lead Local Flood Authority has powers to do works to manage flood risk from surface runoff or groundwater. However, in most cases the responsibility for maintenance of ordinary watercourses lies with the riparian owner or owners, and the role of the council is to provide advice and support to riparian owners to encourage them to undertake such works in a suitable manner that will not result in environmental damage.

The County Council has powers under s23, Land Drainage Act 1991 prohibits the obstruction in a watercourse and have powers to have obstructions removed. However, advice and persuasion will normally be employed to secure such action before resorting to the use of legal powers.

The County Council also has powers under s25 Land Drainage Act 1991 to require a person impeding the proper flow of water in an ordinary

watercourse to remedy that condition. However, advice and persuasion will normally be employed to secure such action before resorting to the use of legal powers.

The County Council is also a highway authority with responsibility for road drainage and flooding – see below.

District and Borough Councils have no responsibilities under the Land Drainage Act - except when it is a landowner. However, they are responsible for maintenance of some parks and public spaces and have responsibility for street cleaning. Good maintenance practices can help to reduce flood risk, for instance by ensuring that drainage channels are kept clear and that rubbish and leaves are not tidied into watercourses. For new public spaces which are under the control of a management company, these activities should be included in the management contract.

All **Highways Authorities** are Risk Management Authorities according to the Flood and Water Management Act and must adhere to all the responsibilities of risk management authorities.

In addition, under the Highways Act, a Highways Authority has a duty to maintain the highway. This includes ensuring that highway drainage systems

Responsibility for roadside ditches

One of the biggest misconceptions is that the County Council, as highway authority, is responsible for roadside ditches. This is rarely the case. The highway authority is permitted to use roadside ditches for the drainage of the highway but unless constructed specifically for the drainage of the highway the maintenance of these is normally the responsibility of the adjoining landowner. Whoever owns the land adjoining, above or with a watercourse running through it is, in legal terms, a 'riparian owner'. They must keep the banks clear of anything that could cause an obstruction and increase flood risk. He is also responsible for maintaining the bed and banks of the watercourse and the trees and shrubs growing on the banks. Structures, such as culverts, trash screens, weirs and mill gates must be kept clear of debris to let water flow through without obstruction. If access to do this is only possible from the highway itself the owner should consult with the County Council to establish who is best placed to carry out the work.

are clear and that blockages on the highway are cleared, where reasonably practicable. As part of this duty, roads are regularly inspected and maintained.

The highway authority can deliver works that they consider necessary to protect the highway from flooding. These can be on the highway or on land which has been acquired by the highway authority in the exercise of highway land acquisition powers for that purpose.

Highway Authorities may divert parts of a watercourse or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from a highway.

Highways authorities are able to adopt Sustainable Drainage Systems (SuDS) that serve the highways.

Waveney and Suffolk Coastal District Councils and the **Environment Agency** are identified by the Flood and Water Management Act as **coastal erosion risk management authorities**. Their responsibilities include:

- Developing and delivering Shoreline Management Plans
- Delivery of coastal erosion risk management activities. This includes the construction of defences including the removal/addition of beach material.
- Maintenance a register of assets and other features that help to manage coastal risks.
- Assisting communities in planning for the future and taking appropriate steps to adapt to changing coastal erosion risks.
- Controlling/consenting third party activities on the coast.

Water companies: There are two types of water companies working in Suffolk. Essex & Suffolk Water, mainly located in the north east of the county is a water supply company, while Anglian Water is both a water supplier and sewerage undertaker.

a) Water Supply Companies are not Risk Management Authorities and do not have the same obligations. However the Reservoirs Act 1975 has been amended to state the following:

- All owners and operators with reservoirs over 25,000m^3 must register their reservoirs with the Environment Agency as they are subject to regulation.
- All undertakers must prepare a reservoir flood plan.
- All incidents at reservoirs must be reported.

b) Water and Sewerage Companies: The water industry is highly regulated and the quality of customer service and the prices they are able to charge their customers are regulated by Ofwat, the Water Services Regulation Authority. The water industry operates on five-yearly cycles called Asset Management Plan (AMP) periods. Prices are set by Ofwat at the beginning of each period, following submissions from each company about what it will cost to deliver their business plans.

Water and sewage companies have the following responsibilities around flood risk management:

- Respond to flooding incidents involving their assets.
- Provide, maintain and operate systems of public sewers and works for the purpose of effectually draining an area.
- Have a duty to co-operate with other relevant authorities in the exercise of their flood and coastal erosion risk management functions.
- Must have a regard to national and local flood and coastal erosion risk management strategies.
- May be subject to scrutiny from lead local flood authorities' democratic processes.
- Have a duty for the adoption of private sewers.
- Consultee (but not a statutory consultee) to the planning authority when the drainage system is proposed to connect with the public sewer.

Water and Sewerage Companies are responsible for flooding from their foul and surface water sewers, and from burst water mains. Flooding is reported into 24 hour operational call centre on **03457 145 145**. The call centre agent will check that the flooding incident involves their assets. If it does not, then they will redirect the call if necessary. If assets are identified, a job is raised and dispatched to field teams. If flooding is present or evidence of flooding is present, details will be recorded on a 'Flooding Form' and investigated as appropriate which may lead to recording the property on the Flooding Register.

The Flooding 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 overloading of the sewerage system or due to blockages caused by fat, oil, grease or other unflushable items.

Investment in the alleviation of sewer flooding is closely allied to the Flooding register and where repeat blockages occur. Priority is given to frequent internal flooding problems where a cost beneficial and sustainable solution is available.

An essential flood risk management duty is defined under Section 94 of the Water Industry Act 1991, which states that Water and Sewerage Companies have a duty to provide, maintain and operate systems of public sewers and works for the purpose of effectively draining our area. They also have a

Keep It Clear is Anglian Water's campaign to help reduce blockages in sewers that can cause flooding and pollution incidents. Fat, oil, grease and unflushable items such as wipes and sanitary products should be disposed of in the bin, and not down the drain.

Keep it Clear has been established in a number of towns across Suffolk, and overall a 52% reduction in blockages has been the result of this campaign.

For more information, relating to either homes or businesses, please visit www.keep-it-clear.co.uk

duty under the same Act relating to premises for 'domestic sewerage purposes'. In terms of wastewater this is taken to mean the ordinary contents of lavatories and water which has been used for bathing, washing and cooking purposes and for surface water the removal from yards and roofs. However, there is no legal duty or responsibility relating to highway drainage, land drainage and watercourses, with the exception that Water and Sewerage Companies can accept highway drainage by agreement with a highway authority.

Currently, foul and surface water drainage from new developments can be connected to public sewers and a Water and Sewerage Company has no powers to prevent new connections to its network, even if it believes it could cause flooding to customers. This is why Anglian Water comments on planning applications even though they are not a statutory consultee.

2.4.3 Understanding the roles of those who are not statutory flood risk management authorities

Utility and Infrastructure Providers such as Network Rail, energy companies and telecommunication companies are not risk management authorities. However they have a crucial role to play in flood risk management as their assets can be important consideration in planning for flooding. Moreover they may have assets such as culverts, information about which needs to be shared with flood risk management authorities. They already maintain plans for the future development and maintenance of the services they provide, and it is important that they factor in flood risk management issues into this planning process. This will ensure that their assets and systems are resilient to flood and coastal risks and that the required level of service can be maintained in the event of an incident. Utility and infrastructure providers may wish to invest time and resources into developing and delivering the local flood risk management strategy, to realise the significant benefits for them and their customers that follow from flood risks being effectively managed.

Property Owners and Residents

It is the responsibility of householders and businesses to look after their property, including protecting it from flooding. While in some circumstances other organisations or property owners may be liable due to neglect of their own responsibilities, there will be many occasions when flooding occurs despite all parties meeting their responsibilities. Consequently it is important that householders whose homes are at risk of flooding take steps to ensure that their house is protected. These steps include to:

- check whether their household is at risk from flooding from the river, coast or local flood sources.
- ensure that preparations have been made in the event of a flood.
- take measures to ensure that their house is protected from flooding, either through permanent measures such as sealants in the wall, or temporary measures such as floodsax or flood guards.
- take measures to make sure the house is resilient to flooding so that if it does occur it does not cause too much damage.
- where possible, take out flood insurance.

Information on whether households are at risk can be provided by the Environment Agency[17]

All households in Flood Zones 2 and 3 (areas at risk from coastal or main river flooding) should have been contacted notifying them of this and, unless they have chosen to opt-out, will receive flood warnings.

Riparian Ownership

Landowners, householders and businesses whose property is adjacent to a river or stream or ditch are likely to be **riparian owners** with responsibilities. If a property backs out onto a river, stream or ditch then the property owner is likely to be a riparian owner, owning the land up to the centre of the watercourse. The Land Registry may be able confirm this. In the case of highway ditches, the adjacent landowner is normally deemed to have riparian responsibility for the whole of the watercourse to the top of the roadside edge.

Riparian owners have a right to protect their property from flooding and erosion, but in most case will need to discuss the method of doing this with the Environment Agency or County Council. Riparian owners are responsible for maintaining

17 http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=ufmfsw#x=357683&y=355134&scale=2

and clearing debris (even if this is not from their land) from the watercourse or ditch, as well as vegetation on the banks, in order to keep these clear and prevent flooding. They have responsibility for ensuring there is no obstruction, diversion or pollution to the flow of the watercourse. Full details can be found in the Environment Agency's document[18] 'Living on the Edge'.

When undertaking watercourse maintenance, riparian owners, like statutory agencies, need to be mindful of their obligations in respect of environmental legislation and the requirements of the Water Framework Directive. Riparian owners also need to be mindful of the need to gain consents for certain works - see Section 2.7.

Parish Councils and Communities

Flooding events can affect whole communities with households which do not suffer from internal flooding still potentially being trapped as roads are blocked or having to help support and provide shelter to neighbours who have suffered from flooding.

Communities know better than anyone the level of flood risk that they face and can make important contributions to helping manage the levels of flood risk – see Section 2.10 on emergency preparedness.

District and County Councillors have a key role in helping the Parish Councils and communities understand their role and ensuring affected communities are properly represented in discussions about local activities.

2.5 Planning

In order to manage flood risk into the future, there is a clear role for planning authorities to ensure developers manage flood risk associated with new developments.

The local planning authorities are the District and Borough Councils and the Broads Authority. Their planning function affects Flood Risk Management in three key ways:

- Considering flooding concerns in developing local plans.
- Ensuring developers plan for residual flood risk (Minimum standards are described in Defra's Non Statutory Technical Standards for SuDS and use of flood resilient measures) on new developments and that the development does not increase flood risk elsewhere (see also section below on sustainable drainage).
- The National Planning Policy Framework identifies the planning authority to undertake an Integrated Coastal Zone Management approach to coastal issues and locations.

When considering flooding concerns in developing local plans the Planning Authority needs to do the following:

- Produce a Strategic Flood Risk Assessment. This should consider not just fluvial and coastal flooding, but also local flood risk issues. Where Critical Drainage Areas have been identified these will need to be included.
- Develop a Local Plan that carefully considers flood and coastal erosion risks. This is a statutory planning document which planners can then use torecommend refusal of planning permission within the floodplain. Consequently, the Strategic Flood Risk Assessment (SFRA) should support the local plan, the Preliminary Flood Risk Assessment and Surface Water Management Plan (where applicable). This should allow the local plan' to assess and record the flood risks for new developments and steer development to areas of lowest flood risk. Equally in maritime districts, there is requirement to assess risks from coastal erosion and permanent tidal inundation and where appropriate designate coastal risk management zones where permanent development will not be permitted.
- Planning authorities should only approve development where it can be demonstrated that the proposal satisfies all the following criteria:

  (a) it does not increase the overall risk of all forms of flooding in the area through

18. https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

the layout and form of the development and use of appropriate SuDS;

(b) it will be adequately protected from flooding;

(c) it is and will remain safe for people for the life time of the development and;

(d) it includes water efficiency measures such as rainwater harvesting or use of local land drainage water where practicable.

- Promote development in areas of lowest probability of flooding through embedding the sequential approach referred to in the National Planning Policy Framework within the Local Plan.
- Safeguard land for critical infrastructure.
- Develop action plans, where necessary, to support sustainable spatial planning and ensure all plans are integrated and firmly linked to local strategies.
- Ensure that neighbourhood plans fully consider flood risk issues.

Co-operation and early discussions with the developer, the Planning Authority and the Lead Local Flood Authority, Environment Agency and Anglian Water will be essential, particularly on major developments, where the Lead Local Flood Authority is a Statutory Consultee on surface water matters. The Environment Agency is a statutory consultee for major developments if the site falls within Flood Zone 2 or 3.

Where appropriate, planning authorities are requested to advise clients of the need discuss with the Lead Local Flood Authority whether a land drainage consent is required for alterations or new structures within an ordinary watercourse and with the Environment Agency for any alterations or new structures within a main river.

Associated with the powers to regulate water level management activities within their operational area, IDBs provide comments to local planning authorities on developments in their district and when asked, make recommendations on measures required to manage flood risk and to provide adequate drainage solutions.

2.5.1. Sustainable Drainage

A ministerial statement issued on 18th December 2014, described the expectation that local planning policies and decisions on planning applications of 10 homes or more or equivalent non-residential or mixed development should ensure sustainable drainage sytems are put in place unless demonstrated to be inappropriate. Suffolk County Council, as Lead Local Flood Authority, is a statutory consultee on surface water drainage in the planning process, for major development, as set in schedule 5 of the Town and Country Planning Order.

In considering planning applications for major developments (more than 10 dwellings or 0.5ha) Local Planning Authorities should consult with the county council on the management of surface water disposal. The Local Planning Authority will need to satisfy themselves that the proposed minimum standards of operation for SuDS are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance of the SuDS for the lifetime of the development. The county council will provide technical advice on the surface water strategies and design for individual developments. It will also offer advice on Local Plans, site allocations, and masterplans.

The county council have produced a protocol (see Appendix C), to inform Local Planning Authorities and developers on the surface water disposal process, the responsibilities of each risk management authority, and how to submit a successful applications. In addition, a Local Surface Water Drainage Guide has been produced (see Appendix A), and endorsed by the Suffolk Flood Risk Management Partnership, to outline the various design criteria and the local interpretation.

To assist in the validation of planning applications, a proforma[18] has been produced which directs the

19. https://www.suffolk.gov.uk/roads-and-transport/flooding-and-drainage/guidance-on-development-and-flood-risk/

developer through the design process and is an aid to the local planning authority at validation stage.

All appropriate risk management authorities will work with developers to encourage planned developments to make the most of their drainage assets. One key element is to define who will be adopting, and thus maintaining in perpetuity, the various parts of the development, as this will help determine the detailed criteria for design.

2.5.2 Neighbourhood planning

Neighbourhood planning provides a powerful set of tools for local people to ensure that they get the right types of development for their community. However, the ambition of the community must be aligned with the strategic needs and priorities of the wider local area. This must include the management of flood and coastal risks. Information held by local authorities and used in the preparation of their Local Plans should be sought as a starting point for neighbourhood plans.

2.6 Understanding flood incidents

To assemble an accurate picture of flood risk across Suffolk requires the collection of precise and useful records from actual flood incidents occurring across the county.

Officers from risk management authorities are not in a position to know about every flooding incident that occurs, particularly those which do not lead to flooding within properties. However, records of flooding incidents which affected roads or entered the curtilage of properties are important to record. They can indicate that there has been extensive flooding in relatively regular rainfall events which would warn that the properties are at risk in

more extreme rainfall events. This information is crucial in building up cases for flood defence and flood resilience schemes which will require strong evidence of the flood risk to properties. Residents, business owners, Parish Councils and local community groups have a key role in providing this information to the county council.

The guiding principles for SuDS in Suffolk will be:

- **Early consideration of sustainable flood and coastal risk management in production of Local Plans and master planning – promoting and protecting 'blue and green corridors'.**
- **Wherever possible, the use of multifunctional, above ground SuDS that deliver drainage, enhancement of biodiversity, improvements in water quality and amenity benefits.**
- **Ensuring that land owners realise both the importance of reducing flood risk and how properly designed sustainable drainage systems can be an asset to their development.**
- **Ensuring no increase in flood risk from new development wherever possible and contributing to reducing existing risk if feasible.**
- **Ensuring water flows around properties when the design capacity of drainage systems is exceeded by extreme rainfall.**

Floods can be reported via the Highways Reporting Tool (**http://highwaysreporting.suffolk.gov.uk/**) or phone **0345 606 6171**.

Suffolk County Council logs all reported flooding incidents in the county onto a GIS system. This data, alongside the national flood risk maps, helps to prioritise where flood risk management activities should take place.

In the event of a report of flooding, the level of investigation carried out is determined by the consequences of that flooding, with highest priority given where there is a risk to life and where properties are flooded internally. Under the FWMA the decision whether or not to carry out and publish a formal investigation of a flooding incident is at the discretion of the Lead Local Flood Authority and the comprehensiveness of any investigation is adjusted to reflect the significance of the incident and the resources available. In the event of very widespread, significant flooding affecting large areas of Suffolk, our ability to investigate every incident in detail is likely to be limited. See Appendix D for details (www.suffolk.gov.uk/flooding).

The aim is for Flood Investigation Reports to bring all useful information together in one place, providing an understanding of situations, outlining possible causes of flooding and potential long-term solutions. Investigations will outline, if relevant, which authorities or individuals have an involvement in a flood incident and outline their responsibility or actions, if any. Investigations will involve consultation with the relevant risk management authorities, landowners and private organisations involved, all of whom we expect to co-operate with us and provide comments. Further recommendations will also be made to highlight potential flood risk management actions. Reports will provide a clear understanding of flooding situations, but our duty to investigate does not guarantee that problems will be resolved as there are no powers available to force other authorities into action. Decisions about next steps must be made by the parties involved.

Flood Investigation Reports will be available to anyone on request within 3 months of an incident being reported to Suffolk County Council. However, there are cases where this timeframe will be extended (e.g. if widespread flooding occurred across the county or in very complex situations). The SFRMP will monitor the progress of any proposed actions arising from the investigation.

An investigation will normally be carried out where any of the following criteria are met:

- where there was a risk to life as a result of flooding or where those affected are particularly vulberable due to age or infirmity preventing easy relocation to safety;
- where internal flooding of one property (domestic or business) has been experienced on more than one occasion;
- where internal flooding of five properties has been experienced during one single flood incident;
- where a major transport route was closed for more than 10 hours as a result of flooding;
- where critical infrastructure was affected by flooding (including care homes, hospitals, etc)
- and where there is ambiguity surrounding the source or responsibility of a flood incident.

2.7 Consenting work on watercourses

It is necessary to regulate the activities in watercourses that might result in increased flood risk, environmental damage or deterioration in Water Framework Directive status. An activity could

be refused consent if the flood risk or environmental harm was unacceptable, or in the instance of deterioration in the WFD status of a water body, there was no derogation in place

Anyone wishing to undertake work in, over, under or near a main river, flood or sea defence, or make changes to any structure that helps control floods, must submit plans to the Environment Agency and apply for a Flood Defence Consent. Details are available on https://www.gov.uk/flood-defence-consent-england-wales. They are also likely also require Coast Protection Act 1949 Consent from Suffolk Coastal or Waveney District Councils whichever is the relevant Maritime Local Authority and / or Planning Permission.

Under the Land Drainage Act 1991 Suffolk County Council is responsible for ordinary watercourse regulation or land drainage consent in areas that are not managed by the Internal Drainage Boards within Suffolk. As with the flood defence consent above, construction or alterations within a watercourse requires consent.

For information about the need for consents and the consenting process see Appendix B **http://www.greensuffolk.org/about/SFRMP/**

Where obstructions or alterations are made without consent, or in a manner contrary to a consent, the consenting body has powers to enforce their removal or take remedial action.

2.8 Keeping a Register of key flood risk assets

Flood Risk Assets are structures or features which are considered to have an effect on flood risk. An example could be an embankment protecting properties and therefore decreasing flood risk, or an undersized culvert in a residential area, which may actually increase flood risk during high rainfall. Suffolk County Council is required to ensure there are records of all significant assets available for use by risk management authorities and for inspection by the public at all reasonable times. It will take many years before this register is sufficiently comprehensive to be of real value in flood risk management. Steps are underway to develop a register within the county council and to link up existing registers held by other authorities. Unlike major assets associated with fluvial or tidal flooding or coastal erosion, there has often been much confusion over the ownership and maintenance responsibility of local flood risk assets. This is likely to be due to local drainage infrastructure commonly being hidden underground or along land boundaries, where landowners do not realise or acknowledge that they have any responsibility. The Asset Register is a way to address this problem and ensure that residents are aware of assets in their area and have information to enable them to contact the assets' owners when there are problems. There are no

Principles applied to issue of ordinary watercourse consents

- The guiding principle when considering structures in watercourses will be to resist piping and culverts and, indeed, to remove pipes to restore open watercourses wherever possible.
- The consideration of an application for consent will take into account the fact that while a pipe may allow the flow of water, it may not be able to provide the storage capacity of an open watercourse in times of heavy rain and may be more difficult to maintain.
- The consent will consider and control the impact of the structure to up and downstream flows as well as assessing the impact on water quality and ecology. Where relevant, applicants will need to demonstrate compliance with environment legislation and the Water Framework Directive.
- When consents are issued, a record of the new/ amended structure will be kept along with details of those responsible for it.

set criteria for what defines an asset as significant but the most important consideration is its location, flood history at a site and the consequences of its failure. New sustainable drainage assets will be recorded and asset data is also captured through local studies, such as Surface Water Management Plans and flood investigations.

2.9 Designation of key flood risk Assets

Suffolk County Council, the Environment Agency, Internal Drainage Boards and the District Councils are defined under the Flood and Water Management Act as 'designating authorities'. That is, they may 'designate' features or structures where the following four conditions are satisfied:

1. The designating authority thinks the existence or location of the structure or feature affects flood risk, or coastal erosion risk.
2. The designating authority has flood or coastal erosion risk management functions in respect of the risk which is affected.
3. The structure or feature is not designated by another authority.
4. The owner of the structure or feature is not a designating authority.

If an asset becomes 'designated' its owner cannot alter or remove it without first consulting the designating risk management authority. The aim of designating flood risk assets is to safeguard them against unchecked works which could increase flood risk in the area. Designating of features or structures is not something that will be done regularly but only when there are concerns about the asset. All proposals for designation will be discussed by the Suffolk Flood Risk Management Partnership in order to ensure consistency across the designating authorities.

Note: designation of an asset does not mean there is a duty on anyone to maintain it in its current condition.

2.10 Emergency Planning and Response

As well as trying to minimise flood risk through regulatory activities and use of operational powers, there is a need for robust plans to manage a flood emergency and recover after it.

There is a National Flood Emergency Framework for England which provides guidance on developing local emergency plans. Emergency planning in Suffolk is coordinated by the **Suffolk Joint Emergency Planning Unit** (JEPU) that contributes through the **Suffolk Resilience Forum** to multi-agency flood plans. These are developed to help all the organisations involved in responding to a flood to work better together.

The Environment Agency, working alongside the Met Office, has a key role to provide forecasts and warnings of flooding from rivers and the sea. For details see https://www.gov.uk/prepare-for-a-flood.

Flooding from surface water or intense rainstorms is much more difficult to forecast accurately and thus only general bad weather warnings are issued by the Met Office. These are used to direct the activities of emergency responders, particularly highways authorities.

The Environment Agency and other asset operating authorities also have a role in proactive operational management of their assets and systems to reduce risk during a flood incident.

JEPU also has supports the efficient delivery of civil preparedness and business continuity services within local authorities, working closely with emergency services, the Environment Agency and other relevant bodies in the event of flood emergencies, assisting as appropriate in evacuation, rescue and recovery after a flood. The unit has staff based in district and borough councils and centrally in the County Council and provides expertise to enable councils to meet their statutory responsibilities

Collectively JEPU, activity in preparing for, dealing with and recovering from flooding incidents involves:

- Developing Community Risk Register and Suffolk Emergency Plans.

- Develop Business Continuity Management arrangements.
- Develop arrangements for Civil Preparedness information available for public use.
- Maintain system for warning, informing and advising public in event of any emergency.
- Provide advice and assistance to businesses and voluntary organisations about business continuity management.
- During and after an emergency, JEPU will coordinate county, district and borough councils, particularly with respect to surface and groundwater flooding and flooding from 'non main rivers'; work with the other Category 1 and 2 responders as part of the multi-agency response to floods.
- Coordinate emergency support from the voluntary sector.
- Liaise with central government departments.
- Liaise with essential service providers.
- Open rest centres.
- Manage the local transport and traffic networks.
- Mobilise trained emergency social workers.
- Provide emergency assistance.
- Deal with environmental health issues, such as contamination and pollution.
- Coordinate the recovery process.
- Manage public health issues.
- Provide support and advice to individuals.
- Assist with business continuity.

An increasingly important part of the role of JEPU, supported by the Environment Agency and voluntary organisations, is to encourage the formation of **local emergency groups**. If a community is at risk from flooding it is advisable to create an Emergency Plan which details who can be contacted to lead and assist in an emergency, what equipment is available and the location of premises that can be used as emergency accommodation. Advice and assistance is available through the Joint Emergency Planning Unit at District and Borough councils and at the Suffolk Community

Emergency planning workshop

Emergency Preparedness Site, Get Prepared Now (www.getpreparednow.co.uk).'

In the event of an emergency or major incident Suffolk County Council as the highways authority will aim to provide:

- the means to transport people through its contacts with local bus, coach and taxi operators and the in house fleet to assist with evacuations, and helping uninjured survivors at the scene of a major incident to travel home or to a place of safety.
- assistance in management of the transportation network to restore the flow of traffic in the event of an evacuation or away from the area of an incident. This includes providing equipment such as barriers, cones and signs and setting up and marking route diversions (service provided by Works Contractors in conjunction with the Police) and changing traffic signal controls to improve the flow of traffic.
- use of the Suffolk Traffic Control Centre facilities and established media contacts to keep staff and the public across the county informed on travel related matters, plus detection systems to enable management of traffic on the road network.
- the means to inspect repair or clear the highway network through the provision of staff, materials and equipment sourced through contractors.

Flooded garden in Ipswich

3. The Fens Policy

The area of The Fens located within Suffolk is relatively small but this belies its importance. Water management in this area is critical to maintain flood risk at an acceptable level and, as a consequence, to ensure the continued accessibility to the area for a wide range of human activities including agriculture. The identification of Lead Local Flood Authorities as having a key role in surface water management has given rise to a review of how the management of surface water in Suffolk can be integrated with that for the Fens. There will be continuing dialogue between practitioners to ensure that plans are developed jointly to maintain progress in furthering key aspirations for the Fens and Suffolk generally. To this end an objective and associated action has been identified in Section 5 to cover this. It will be important to ensure that lessons learned from surface water management in the Fens are incorporated into any flood risk proposals in Suffolk.

The sections below provide information on the Fens area, management plans and aspirations.

Figure 3.1 Map of Fens area

3.1 The Fens Area

The Fens cover a large area of eastern England, stretching from the Wash out to Lincoln, Peterborough and Cambridge, with a small area stretching into the northwest corner of Suffolk.

Four different rivers – the Witham, Welland, Nene and Ouse, carry water from surrounding uplands through the Fens and into the Wash.

3.2 Management Plans for the Fens

The Environment Agency has developed Catchment Flood Management Plans for the Anglian Region with the aim of taking a broad view of flood risk at catchment level over the next 100 years. Factors such as climate change, future development and changes in land use and land management were taken into account in developing sustainable policies for managing flood risk in the future.

The Fens area is covered by four different Catchment Flood Management Plans (CFMPs); one for each of the fenland catchments of the Nene, Welland and Glen, Witham and Great Ouse and also by the Wash Shoreline Management Plan (SMP). All five plans recommended that an integrated plan is produced specifically for the Fens in order to develop a sustainable, integrated and long term flood risk management approach for this landscape area. There was also a need for any future plan to bring together organisations and other plans and projects from across the Fens.

Since the development and approval of the CFMPs, the legislative framework for flood risk management landscape has changed considerably, providing opportunities to develop a more integrated approach to upland and lowland flood risk and drainage management from all sources.

The introduction of the duty for LLFAs to produce Local Flood Risk Management Strategies (local strategies) provides an opportunity for integrating and delivering the aims for the Fens. The Fens is also recognised as a strategic area in the Anglian FRMP as to enable partners to consider flood risk management across boundaries and work in a co-ordinated way to manage flood risk. Local strategies are considered an appropriate vehicle due to their key role in setting objectives and identifying priorities and funding needs for local flood risk management. Local strategies will also be driven by LLFAs in partnership, will undergo public consultation and will be informed by CFMPS, SMPs, SFRAs and other relevant strategic and local documents. It is therefore considered a more practical approach to ensure that flood risk and drainage management of fenland areas is coordinated across the relevant local strategies. This is in preference to creating an additional, overlapping single strategy for the Fens, managed within a national, rather than local governance framework.

Local strategies will integrate the needs and opportunities of the local Fens and fenland communities with those of the rest of the local LLFA area, and promote a consistent approach across the Fens as a whole. This consistency is crucial, for example, to IDBs, who often span more than one local authority and whose practices will be similar throughout their area. The LLFAs of Lincolnshire, Peterborough, Cambridgeshire, Norfolk and Suffolk have therefore agreed to work together closely to achieve this aim. Forest Heath District Council has been involved on behalf of Suffolk County Council since Suffolk's fenland is principally located in this area.

3.3 Background to the Fens

Localised drainage took place in the fenland landscape from as early as the medieval period. However, large scale drainage of the Fens first began in the 17th Century, when the 'Fens' as we now know it began to take shape. Today this artificially drained landscape is home to approximately half a million people. The Fens cover an area of almost 1,500 square miles, divided between eleven District and five County Councils. For comparison, figure 3.2 depicts how the Fens landscape might look now had the area not been drained from the medieval period onwards.

The Internal Drainage Boards within the Fens have been established over many years because of the special water level and drainage management needs existing within this area, and the particular need for lowland and inland local flood risk management activities. These local works are funded in the main from funds levied locally by IDBs, and present an effective example of the Government's 'localism' agenda.

Well maintained coastal and fluvial flood defences, supporting an extensive drainage infrastructure are essential in promoting sustainable growth in the Fens. Housing, jobs and services that meet the needs of the market towns and the rural communities can only happen if drainage and flood risk is well managed. Growth in the Fens will need to be embraced in a sustainable way; balancing development needs with the need to promote and protect open spaces, natural habitats, landscapes, the built environment and the unique qualities of the Fens. It is therefore essential that 'Flood Risk Management Authorities', utilities and local communities continue to work closely with local planning authorities, so that consideration of sustainable drainage in particular (and flood and water management in general) are an integral part of the planning and development control process.

Farming contributes significantly to the success of the local economy, supporting a large number of businesses involved in the production of food and rural tourism. The important role that farming plays in the Fens is emphasised by the steady decline in self-sufficiency in the UK, and the Government's renewal of the food security agenda. The Fens account for 50% of all Grade 1 agricultural land in England, producing 37% of all

This illustration depicts how the fens landscape might look now had the area not been drained from the medieval period onwards,. It has been created using geological, height and contour information in conjunction with advice and guidance from Cambridgeshire County Council's Ecologist.

This is for illustration purposes only and not to scale.

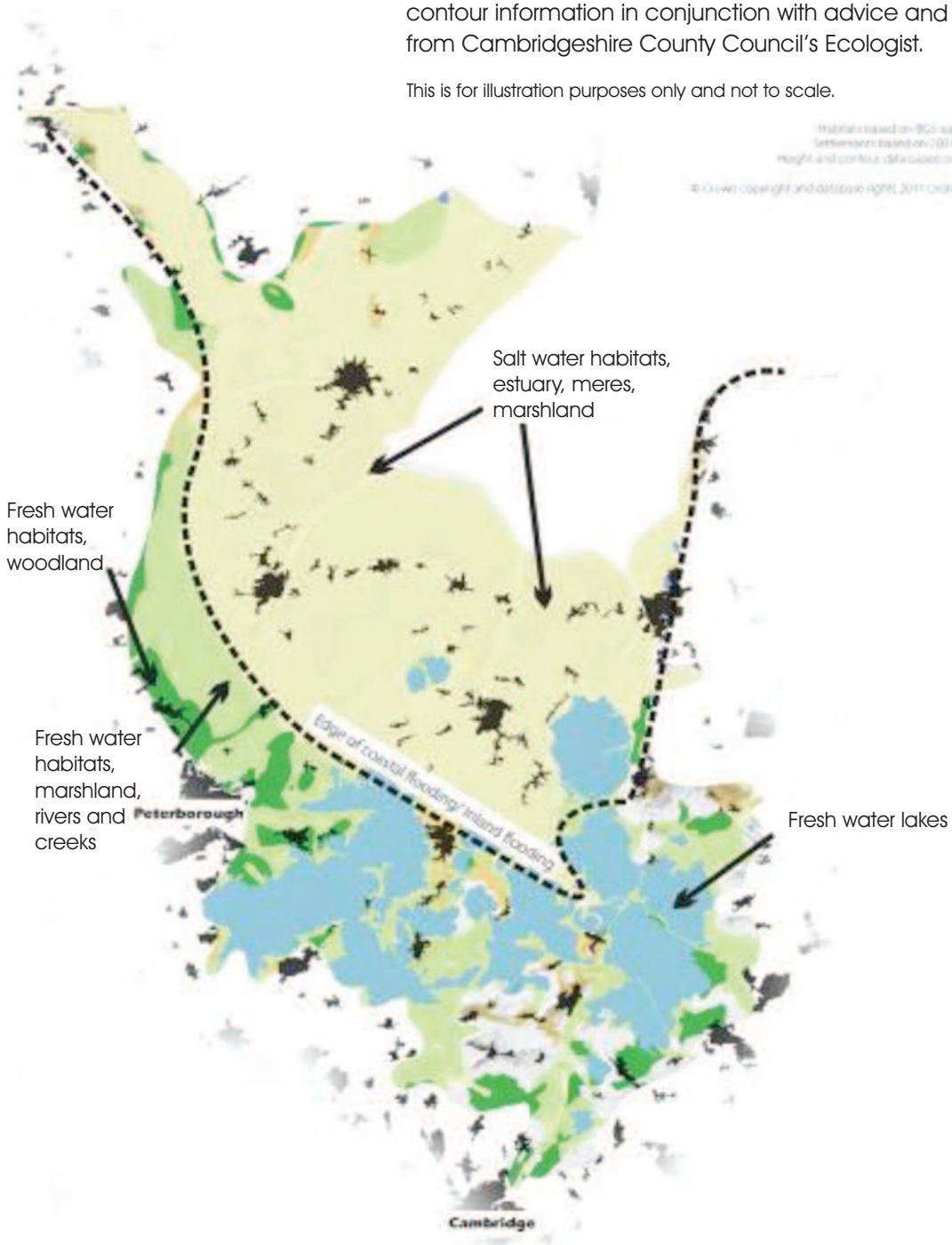


Figure 3.2: An illustration of the Fens before drainage

vegetables and 24% of all potatoes grown in the country, as well as enough wheat to make 250 million loaves of bread every year. The area also supports significant livestock, dairying and outdoor pig production. This supports a large well-established food processing industry. It is critical, therefore, that appropriate flood risk and drainage management measures are taken to protect this nationally important food production area.

In addition to food production, the Fens is popular for tourism, attracting more than 15 million visitors a year. The Fens provide a unique and rich habitat for wildlife and include the Ouse and Nene Washes which while providing flood storage capacity, also retain important wetland for birds. There are also major transport networks, road and rail, as well as houses, critical infrastructure, water, gas and electricity that would be affected if fenland areas were to flood. The Fens also contain heritage sites and form three sides of the Wash, which is internationally designated for animal and plant biodiversity. There are also numerous local sites, ranging from SSSIs to Local Nature Reserves which need to be protected.

3.4 Aspirations

To reflect the importance of the Fens as a highly productive and precious resource, the following aspirations have been identified for the wider area in respect of flood risk and drainage management:

- **Continue to ensure that appropriate flood risk and drainage management measures are taken to protect the nationally important food production areas in the Fens.**
- **Ensure that where appropriate, current levels of protection are maintained in the Fens taking into account climate change.**
- **Manage flood risk and drainage in accordance with principles of sustainable development.**
- **Ensure that new development in flood risk areas is appropriate and incorporates adequate flood resilient measures, so that adverse consequences of flooding are not increased.**
- **Contribute towards the protection and enhancement of the environmental heritage and the unique landscape character of the Fens, including biodiversity.**
- **Support promotion and use of the waterways and other areas in the Fens for tourism and recreation.**
- **Develop effective dialogue with local communities to facilitate their involvement in flood risk management in the Fens.**
- **Work with local planning authorities to help them grow the economy in the Fens, through the early consideration of flood and water management needs.**

4. Assessment of local flood risk

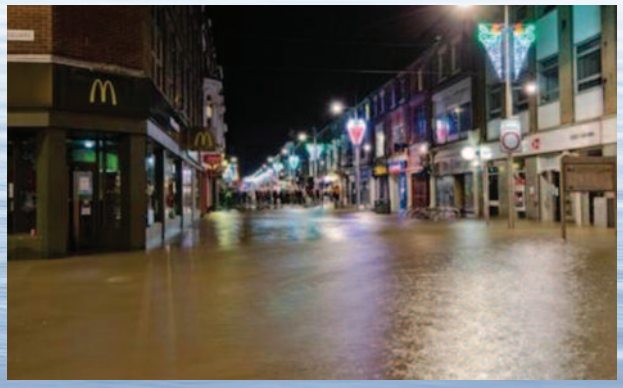
4.1 Historic flooding

The most notorious flood in recent memory was the 1953 tidal flood (see photo right),which resulted from high tides combined with a severe storm in the North Sea. It resulted in over 307 lives being lost in the eastern counties, (40 in Felixstowe) and widespread damage to properties, agricultural land and the natural environment in Suffolk.

A similar magnitude tidal surge was experienced in December 2013 but fortunately without strong winds. With the benefit of modern early warning systems and evacuation of vulnerable areas, no lives were lost. However, over 200 properties were flooded across the county together with many hectares of farmland, roads and infrastructure. As well as overtopping defences, this surge resulted in various breaches to existing defences, some of which were not cost-effective to repair. This scale of flooding could easily occur again.

Unlike areas of the country such as Gloucestershire, Hull and Cumbria, in Suffolk there have been few recent severe fluvial or surface water flooding events that have been worthy of national press coverage. However, in 1993 there was widespread fluvial and surface water flooding across Suffolk resulting in many flooded properties, especially in the south and east of the county.

There have been 1095 incidents of surface water flooding reported in the period January 2012 – August 2015 caused by heavy and/or prolonged rainfall particularly during the wet winters of 2012/13 and 2013/14 and again in summer 2015.



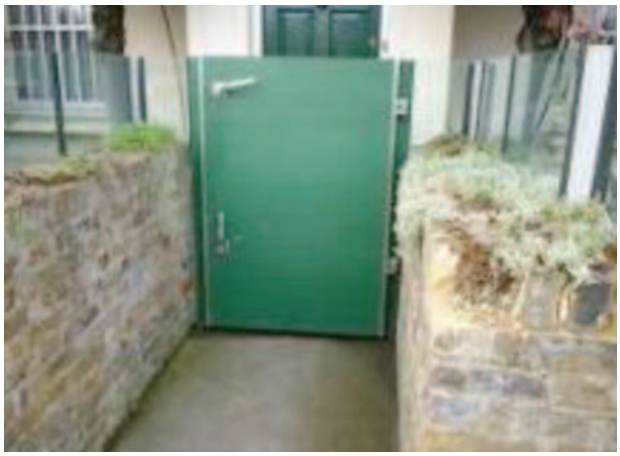
1953 floods

Past records are valuable as it is necessary to look back over a long time period when assessing flood risks. They clearly illustrate that localised floods have and will continue to happen in many areas of the county under severe weather conditions and climate change is likely to make them more frequent and more severe. Our aim is to try to predict and reduce the risks where possible and have emergency plans in place to deal with the exceptionally severe event. Unlike a tidal surge, flooding caused by localised heavy rainfall is hard to predict and as yet there are no adequate warnings available to allow evacuation of an area at risk from this type of event.

Whilst there is good data on past river and sea floods, our information on historic surface water flooding is much more limited. Available information was collated as part of the Suffolk Preliminary Flood Risk Assessment (PFRA)24 process. The data available was inconsistent, but was used to provide an initial indication of where flooding has been recorded in the past.

It will be important to consider the relative significance of incidents of flooding on a county-

Lowestoft Station Square flooded as result of tidal surge in December 2013



Above: Example of a flood gate installed at an individual property

Above: Example of a flood gate installed to a communal car parking area

wide basis and alongside this strategy we have set-up a flood incident reporting process. This permits a better understanding of where the main problems are and where the focus of future help should be placed. The data collected through the flood incident recording process is being used to supplement the current information on historic flooding. This information together with that derived from any flood investigations and surface water management plans undertaken will be reviewed on a regular basis to guide priorities for future work,

One task will be to review the historic flooding information held to see whether it might be possible to identify locations where flood mitigation measures could be implemented. Property flood resilience measures such as flood doors and air brick covers can, in appropriate situations, and if used correctly, provide effective resistance to flooding at minimal cost.

Groundwater flooding is viewed as being a problem in the northwest corner of Suffolk near Brandon. This area comes within the Fens area which is managed by the Ely Group of Internal Drainage Boards who will be consulted on all matters relating to flood risk management in the area.

Extract from the Suffolk PFRA[20]:

'Potential flood risk has been identified primarily from national sources. The Flood Map for Surface Water gives an indication of the areas where surface water would be expected to flow or pond during two different rainfall events (with a 1 in 30 and a 1 in 200 annual chance of occurring) and includes a national allowance for drainage capacity in urban areas. The urban underground drainage system would be expected to be removing a proportion of rain falling, thus reducing flood volumes apparent on the ground surface. This dataset has been used as the 'locally agreed surface water information' defined in the PFRA guidance document.

The data from the Flood Map for Surface Water (Figure 4.2) has been used to develop maps for use in GIS systems. For each of the rainfall events two maps have been produced; one identifying areas where flooding is greater than 0.1m (surface water shallow) and one identifying where flooding is greater than 0.3m (surface water deep).

20. http://www.suffolk.gov.uk/assets/suffolk.gov.uk/Emergency%20and%20Safety/Civil%20Emergencies/SUFFOLKPFRAREPORTFINAL.pdf

4.2 Potential risk of flooding

The Preliminary Flood Risk Assessment (PFRA) was undertaken by the County Council to satisfy obligations under the Flood Risk Regulations 2009. This work identified key areas in Suffolk where the potential risk of surface water flooding is thought to be greatest.

This has allowed us to rank the main towns/villages at risk in the county. Figure 4.2 illustrates this data showing the total population at risk. The identification of the location of these clusters provides a very useful starting point as to where particular effort should be focused in respect of further investigations and flood risk reduction.

NB. It does not, however, mean that these are the only areas with the potential to flood and cause damage.

See Figure 4.4 for summary information on the potential flooding locations and the likely population that would be affected.

4.3 Interactions between the different sources of flooding

Whilst the primary focus of this strategy is local flooding (surface, ground and small watercourses such as ditches and streams), flooding in Suffolk can arise from a number of different sources. To members of the public suffering from flooding, the source of the water may seem irrelevant, but for each source there will be a different responsible organisation – see Chapter 2 for details.

Where the source can be clearly identified, the responsible organisation will be the main point of contact. However, as is often the case, where it is not easy to ascertain the source or where multiple

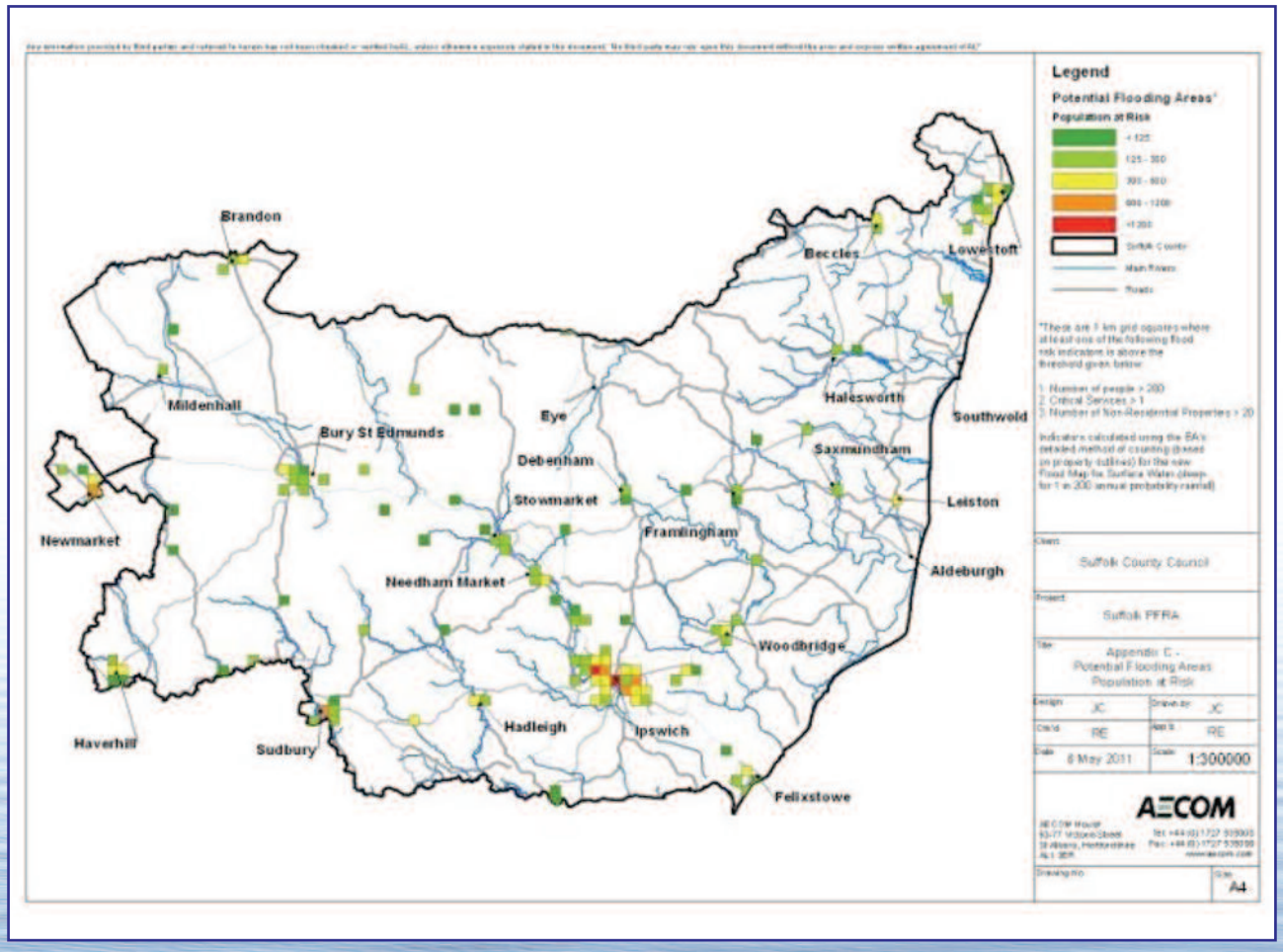


Figure 4.2: Suffolk Surface Water Risk Priority Areas map

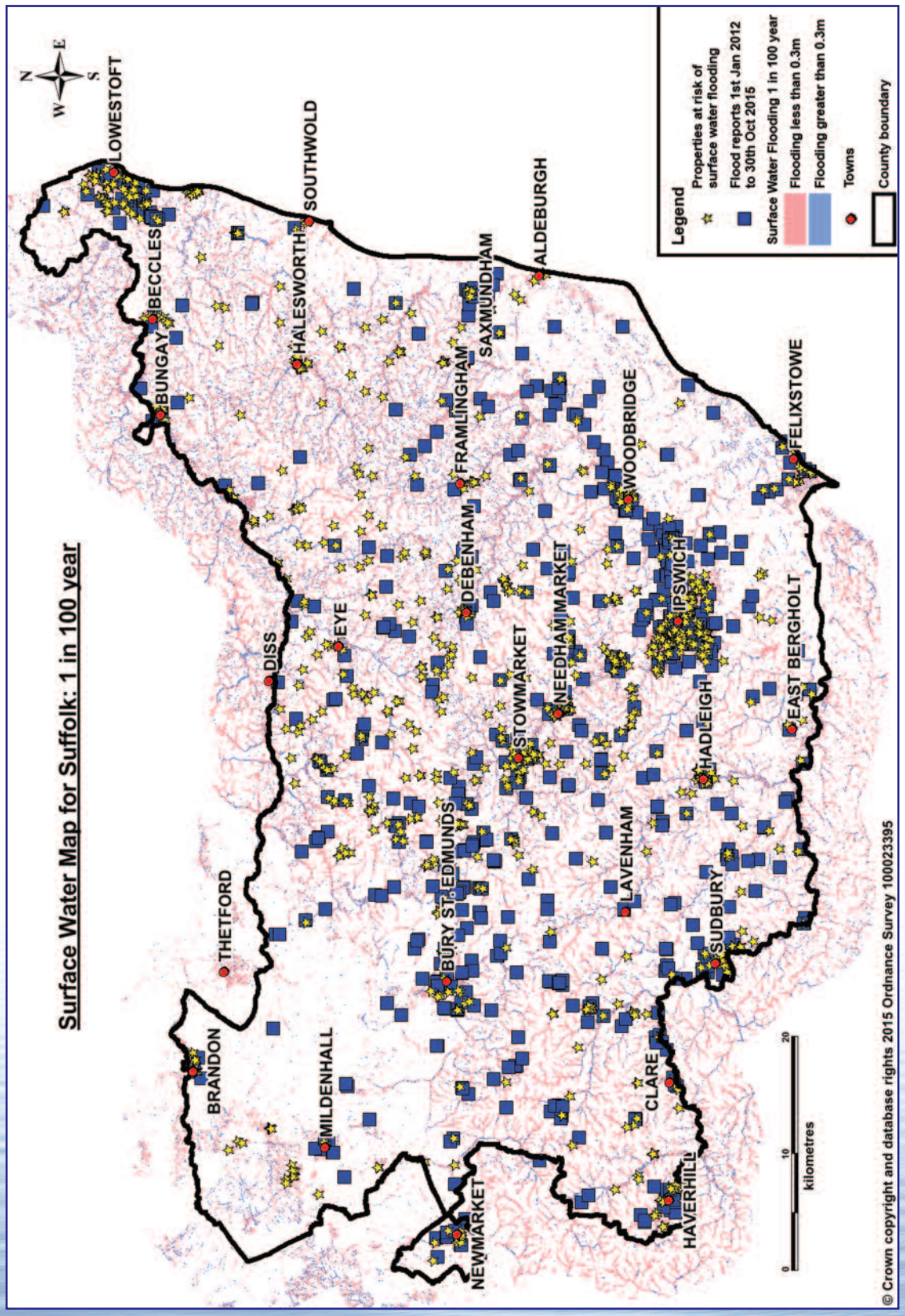


Figure 4.1: Surface water flood risk in Suffolk, together with record of reported incidents in the past 3 years.

Using this information it is estimated that around 2200 properties may be at risk from surface water flooding in a 1 in 100 year rainfall event. This number rises to well over 5000 in a 1 in 1000 year event.

Bungay Sluice, River Waveney

sources are involved, the Lead Local Flood Authority will take the lead and work with partners to investigate and deal with the issue in a manner appropriate to the level of risk.

The flood incident reporting process will have provision within it for the collection of information to enable, where at all possible, the responsible organisation for flooding to be identified. Where the flooding satisfies the criteria for carrying out a full investigation (see section 2.4.2) and it has not been possible, based on information obtained through a flood incident report, to establish the source, this would need to be done as part of the full investigation.

The full investigation will take account of all elements of information such as stakeholders' historic records, hydraulic model output and, critically, information obtained from members of the public at the time of the flooding incident. Parish Councils, landowners and the public will be crucial to helping us increase our knowledge and understanding of localised flooding.

It is important to note that tidal flooding represents a significant problem in Suffolk where the consequences are likely to be very serious, albeit infrequent. Suffolk is ranked number 3 in the national list of critical tidal flooding locations.

In addition to current focus on tidal flooding, there will be full co-operation between partners where there is an interaction between the sea and surface water. In some areas, the ability of surface water to drain into the sea is limited during very high tides, thus increasing the risk of flooding from two sources at once.

Flood water and river catchments do not respect county boundaries and thus close liaison with surrounding Lead Local Flood Authorities is essential to managing all sources of flood and coastal risks in a sustainable and holistic way. Where appopriate we will collaborate with neighbouring counties on cross-border projects.

4.4 Prioritisation of areas across the county where resources will be focused

It is not feasible to look in detail at every potential flooding location straight away. The resources to manage flood risk are finite and it is therefore

Flooding type	Description	Responsible organisation
Coastal flooding	Tidal flooding represents a significant problem in Suffolk where the consequences are likely to be very serious, albeit infrequent	Environment Agency
Ordinary watercourses e.g. streams and ditches	Local, generally smaller watercourses	Riparian owners. Internal Drainage Boards in their areas
Main rivers	Principal watercourses and strategic smaller watercourses (see map Section 2.7.2)	Environment Agency
Reservoirs	Large water pounds which have embankments represent a potential flood risk	Environment Agency
Surface water flooding	High intensity rainfall gives rise to overland flow of surface water which can pond in low lying areas giving rise to flooding. This is also known as pluvial flooding	Suffolk County Council
Sewer flooding	The public sewer system has a finite capacity and at times of heavy rainfall surface water entering designated surface water sewers, combined sewers (ones which receive foul and surface water flows) and designated foul sewers which are subject to penetration of surface water through misconnections etc can become overloaded giving rise to surface flooding	Anglian Water
Groundwater flooding	Geological conditions can cause surface water which has infiltrated into the ground to emerge at certain locations in the form of wells etc. Also high water tables can be present in locations where there are particular ground conditions. This type of flooding generally occurs after long periods of rainfall as water builds up in underground aquifers ultimately causing an increase in flow in features such as leets (groundwater-fed watercourses)	Suffolk County Council
Highway flooding	Highways have extensive drainage systems and at times of heavy rainfall either hydraulic overload or perhaps inadequate maintenance can give rise to ponding of water which can in turn have an impact on property. The presence of deep water on roads can also give rise to problems for road users causing flooded roads to be closed at certain times	Suffolk County Council Highways England
Railway flooding	A rare occurrence, but at times of heavy rainfall there is the potential for hydraulic incapacity or poor maintenance to give rise to flooding which can affect railway operations	Network Rail

Figure 4.3: Potential flooding sources and responsible organisations

necessary to identify locations where the focus of effort will derive the maximum benefit in terms of overall flood risk reduction in Suffolk.

The identification of the flooding clusters shown in Figure 4.2 offers an initial level of priority in relation to surface water flooding but there are other key factors which will have a bearing on where resources should be concentrated:

- Population concentration. The main aim of the strategy is to reduce flood risk for the greatest number of Suffolk residents.
- Proposed development activity. This will give rise to the consideration of drainage arrangements/ opportunities in particular areas which might offer a way of reducing existing flood risks.
- Locations for capital investment. Any capital project might offer opportunities for flood risk reduction through modification of construction proposals. Conversely, where specific flood defence investment is being made, there may be opportunities to modify the project to provide wider benefits to other stakeholders, thus encouraging additional investment.
- The location of static and touring caravan sites because of their particular vulnerability.
- Historic surface water flooding.
- Groundwater flooding.
- Main river flooding. Information on main river flooding is derived from the Environment Agency 'Flood Map' and is considered in detail in the Anglian Flood Risk Management Plan and Catchment Management Plans.
- Tidal flooding. Information on tidal flooding is derived from the Environment Agency 'Flood Map' and is considered in detail in the Shoreline Management Plans.
- Ordinary watercourse flooding. There is currently limited data available on this and, like surface water flooding, will benefit from future records of local flooding incidents.
- Anglian Water records of sewer flooding. Water Companies provide information to Ofwat on flooding experienced on the public sewerage network, referred to as DG 5 information. Anglian Water's investment in reducing flooding from the public sewerage network is focussed on historic flooding locations.
- Environmentally protected sites, historic buildings and monuments. National datasets are available which provide the location of structures and sites which are vulnerable to flood damage. It is worth noting that flooding is not always detrimental to environmental sites.

The risks from coastal erosion are excluded from this list, being outside the scope of this strategy. However, the management of flood and coastal erosion risks need to be integrated and there will need to be close liaison between responsible bodies on a county basis to decide investment priorities. This will be achieved by closer working between the Suffolk Flood Risk Management Partnership and the Suffolk Coast Forum.

Based on information currently available, a priority banding has been identified for surface water flooding using currently available information.

We are continuing to undertake more detailed surface water management plans for these towns and villages. These will provide the means of investigating, in more detail, the locations at risk within these towns and villages, the reasons why they are at risk and whether there is a sustainable, cost-effective means of reducing the risk – either in the short or longer term. The level of investigation will be appropriate to the perceived risk and will follow the national guidelines for undertaking surface water management plans[21].

As can be seen from Figure 4.3, Ipswich and Lowestoft have been identified in Band A of priorities as the population potentially at risk from flooding is significantly higher than the other main locations and have already been the subject of a detailed Surface Water Management Plan[22]. This investigatory work will give rise to the implementation of actions to reduce flood risk in the Ipswich area. A project is underway in Lowestoft looking at all flood risks (tidal, fluvial and surface water) due for completion by 2019/20.

Having carried out further surface water

21 https://www.gov.uk/guidance/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities

22 http://www.greensuffolk.org/assets/Greenest-County/Climate-Ready/Flooding/Ipswich-Surface-Water-Management-Plan-Report.pd.pdf

Priority	Priority group	Location	Properties at risk
1	A	Ipswich	275
2	A	Lowestoft	110
3	B	Newmarket	90
4	B	Sudbury/Great Cornard	70
4	B	Haverhill	70
6	B	Bury St Edmunds	50
7	C	Felixstowe	40
7	C	Needham Market	40
8	C	Woodbridge	38
9	C	Stowmarket	25
11	C	Hadleigh	20
12	C	Brandon	10

Figure 4.4: Initial identification of surface water priority areas based on properties at risk from 1 in 100 year flood risk. Based on National Updated Flood Map for Surface Water (2013).

management plans, all related data will be compiled in a GIS database to enable practitioners to develop a visual impression of problems and opportunities on a spatial basis. Large amounts of relevant information have already been loaded into the Suffolk Surface Water GIS which will be available to other partners as needed.

When this Strategy was first published in 2013, the numbers of properties at surface water flood risk were overestimated. Subsequent refinement of risk maps produced more accurate figures - although they remain estimates based on the best available information at this time.

Other areas where a surface water management plan has been or is in the process of being undertaken are:

- Lowestoft
- Newmarket
- Leiston
- Needham Market
- Sudbury/Great Cornard

As well as the locations listed in Figure 4.4, we will continue to monitor all other areas at risk and where affordable solutions are available will do all we can to reduce risks. This will require the co-operation of local communities and all partners.

4.5 Catchment Flood Management Plans[23]

The paragraphs above largely concentrate on the risks from surface, ground and ordinary watercourse flooding (the Lead Local Flood Authority responsibilities). However, as noted above, the management of these risks will need to be aligned with wider flood risk priorities – as detailed within the Catchment Flood Management Plans (CFMPs), and now incorporated into the Anglian Flood Risk Management Plan (FRMP)[24]. The FRMP focusses on river and tidal flooding and flooding

23. www.defra.gov.uk/publications/2011/06/10/pb13546-surface-water-guidance/
24. https://www.gov.uk/government/collections/flood-risk-management-plans-frmps-2015-to-2021

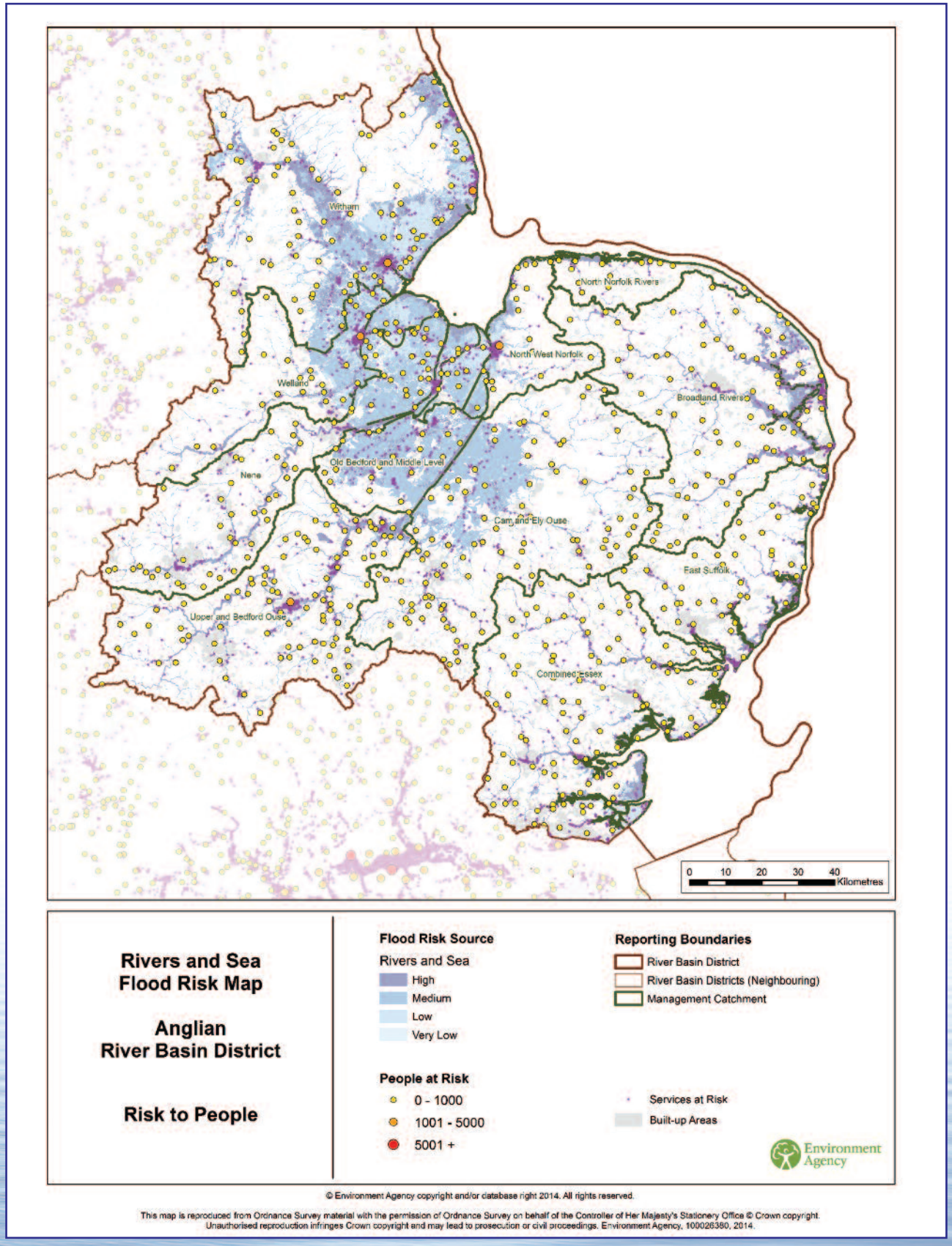


Figure 4.5: Map showing risk from rivers and sea (from Anglian River Basin Flood Risk Management Plan).

Catchment Flood Management Plans

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. They consider all types of inland flooding, from rivers, ground water, surface water and tidal flooding, but not flooding directly from the sea, which is covered in Shoreline Management Plans. They also take into account the likely impacts of climate change, the effects of how we use and manage the land, and how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs.

Definition of CFMPs from Environment Agency website

risk from reservoirs, but also includes flood risk from surface, ground and ordinary watercourse.

There are CFMPs covering the river catchments across Suffolk:

- Broadland Rivers.
- East Suffolk.
- Great Ouse.
- North Essex.

The area covered by the East Suffolk CFMP is entirely within the county of Suffolk.

Figure 4.5 shows the collated data contained in the FRMP covering the Anglian River Basin District, which includes Suffolk. It illustrates the level of risks to properties identified in the plans. Full details of these risks, plus risks to agricultural land and critical infrastructure, together with proposed actions to deal with them, are contained within the individual plans.

Notes:

* Figure quoted is for 0.5% annual probability of a tidal flooding risk.

** The Fens and The Broads are quoted in their entirety making it difficult to quote a Suffolk specific figure. Similarly the Mid Colne and Stour rivers, covering parts of north Essex and South Suffolk (including Stratford St Mary, Nayland, Bures and Hadleigh) are also quoted together.

5. Objectives for managing flood and coastal risk and options to achieve them

This chapter sets out the primary objectives and actions which will be taken forward to make progress in the reduction of risks associated with flooding. The overarching aim will be to ensure a sustainable approach that supports, and where feasible enhances, the economy, environment and society in Suffolk.

In stating these objectives we considered three options for flood risk management:-

Do nothing – potentially more properties will flood and for those already at risk of flooding they will potentially flood to a greater depth and/or more frequently.

Maintain – keep pace with climate change so that there is no net increase in flood risk; existing flood infrastructure will need to be improved over time and all new development will need to take climate change into account.

Improve – take action to reduce the number of properties that would potentially flood and the potential impacts of that flooding.

After discussions with key stakeholders, we propose to **take a pragmatic approach to reduce the current flood risk and ensure that we do nothing to make this worse in the future.**

Where possible we will work with the population of Suffolk to reduce the risks, recognising the limited resources available for flood and coastal risk management and other priorities within the county.

The ways in which we hope to achieve this are summarised in the following table and developed in the table overleaf sections.

Sustainable drainage system in Ipswich

	Objective	Actions to achieve the objective
1	To improve the understanding of flood and coastal risks and ensure everyone understands their roles and responsibilities in reducing the risks.	This strategy will provide a clear explanation of the roles of flood risk management authorities as well as the important roles that residents, businesses and land managers can play. Property owners will be involved in decisions about flood risk management in their areas. Develop clear and consistent guidance for the public to understand the risk of flooding, explaining the actions that residents and businesses can take to manage the residual flood risk and become more resilient to flooding. Develop greater understanding of surface water flood risks by building up a better record of where flooding occurs and through targeted detailed investigations (surface water management plans). Continue to publicise a simple process for recording all flooding incidents so residents and Parish Councils can help us understand existing problems. Continue to utilise a consistent approach to recording of flood assets and make this readily available to all interested parties. Ensure any risks that are recognised but cannot be reduced in the short-term are registered with the Joint Emergency Planning Unit and affected residents are helped to prepare for flooding.
2	To work together (both statutory organisations and the public) to reduce flood and coastal risks, using all available resources and funds to the greatest benefit.	Continue to work in partnership through the Suffolk Flood Risk Management Partnership and the Suffolk Coast Forum. Continue to explore and make use of opportunities for sharing financial burdens and resources associated with the provision of flood and coastal risk management through the new national partnership funding and local initiatives. Collectively we will work with local communities who wish to contribute to short term improvements. At the same time plan ahead to anticipate and reduce future flood risks. Property and business owners will be encouraged to protect their properties if they are at risk from flooding. We will provide information and advice on this and promote and support the formation of local emergency groups to prepare for flooding.
3	To prevent an increase in flood risk as a result of development by preventing additional water entering existing drainage systems wherever possible.	Building on government guidelines on sustainable drainage we will promote the local SuDS guidance which will emphasise that there should be no increase in surface water flow from future development. Ensure that planning decisions are based on up-to-date information about all flood risks and that there is a consistent approach to surface water management in new development as a result of Planning Authorities consulting with the LLFA on surface water drainage matters. *Continued on next page*

	Objective	Actions to achieve the objective
3	*Continued from previous page*.	Ensure that this Strategy informs Local Plans/planning policy and vice versa. Look for opportunities to separate surface and foul water in combined sewers to relieve the pressure on the sewerage network.
4	Take a sustainable and holistic approach to flood and coastal management, seeking to deliver wider economic, environmental and social benefits, climate change mitigation and improvements under the Water Framework Directive.	Promote the concept of water cycle management and multi-functional spaces that will hold flood water, provide space for wildlife and local green space as part of the master planning process. Work with partners to ensure that all planning and other relevant guidance documents include reference to relevant advice on these issues. When undertaking any flood risk management schemes, ensure consideration is given to all relevant plans and policies, e.g. CFMPs, SMPs, RBMPs, SFRA, FRMP and the impact on protected environments. Link all flood and coastal risk management with the River Basin Management Plan and thus deliver improvements in water body status (water quality, quantity and aquatic ecology) wherever possible. Provide advice to homeowners about sustainable water management at a domestic scale.
5.	Encourage maintenance of privately owned flood defences and ordinary watercourses, and minimise unnecessary constrictions in watercourses.	Provide guidance and administer a process for consenting of new structures and maintenance of existing structures on watercourses. This process will discourage further blocking of watercourses wherever possible. Ensure riparian owners are aware of their duties to keep watercourses flowing freely. Provide support and guidance to people who wish to maintain or improve flood defences on private land. Record all appropriate structures/assets on watercourses so that ownership and responsibility can be identified in the event of a future problem with flooding.
6.	To share information on the latest and best ideas for flood and coastal management.	The Suffolk Flood Risk Management Partnership and the Suffolk Coast Forum will share and where relevant publicise exemplars of successful flood and coastal management to aid local decision making. The Partnership will utilise and promote good practice guidance, for example the *Drainage Channel Biodiversity Manual: integrating wildlife and flood risk management.**
7.	To ensure that proposals and policies in this strategy are properly integrated with the rest of the Fens area	Develop effective communication between Suffolk County Council and all organisations with responsibility for flood risk management in the Fens area where water management is particularly critical.

* Published by the Association of Drainage Authorities and Natural England

Some further background information about these objectives and their delivery is given in the following sections.

5.1 To provide a clear explanation of everyone's responsibilities

In the past, the way that flooding has been managed has been fragmented and not coordinated.

A primary issue was the absence of a single organisation having overall responsibility for surface water management and the upshot of this was the identification of Lead Local Flood Authorities as having that responsibility. This responsibility is now enshrined in the Flood and Water Management Act 2010. However, other responsibilities remain with existing organisations and to the layman the issue of flood management is still very confusing.

Chapter 2 outlines the roles and responsibilities of the various flood risk management authorities and other stakeholders, as well defining what riparian owners, the public and businesses should do to contribute to managing flood risk' after 'contribute. Stakeholders can be defined as anyone who may be affected by the problem or solution or will be interested in the problem or solution. They can be individuals or organisations and include the public, businesses and communities.

The Act requires the Lead Local Flood Authority to work with all interested parties.

The Suffolk Flood Risk Management Partnership and the Suffolk Coast Forum will be the main vehicles for co-ordination and collaborative working. In the event of any uncertainty, the County Council will investigate flooding to identify who is responsible for action. Where necessary the County Council will coordinate discussions about a resolution to the problem in discussion with responsible authorities and local residents/businesses/landowners.

All parties have contributed to the development of this strategy.

There are a number of local examples of effective engagement and communications and communities working with risk management authorities to deliver real benefits on the ground, particularly in relation to coastal risk management. The experience from these will be used to inform future collaborative working and will be widely shared with others.

5.2 Involving residents and landowners in flood risk management

There is a lack of understanding on the part of the public on issues associated with drainage and the management of flood risk generally. The administration of surface water has been simplified by recently implemented legislation but most people still to find it difficult to understand the complex issues of water management. There is a need to provide concise and clear guidance to address this and clarify the roles and responsibilities of riparian owners and land managers.

Residents, businesses and property developers also need a better understanding of the issues associated with funding and installation of resistance/resilience facilities to premises where flooding is likely to occur. No matter how much money is spent on flood defences and drainage, there will always be a residual risk of flooding in extreme rainfall events. Everyone needs to understand their own risk and decide whether to take individual measures to protect their property or prepare in other ways for possible flooding.

The information that will be provided to residents and businesses will make clear that significant progress can be made in flood risk reduction if people in Suffolk are willing to make their own contribution, both in terms of practical help and funding. The statutory flood risk authorities will make progress in a wide range of aspects but individuals doing what they can to help will be a very powerful additional source of improvement.

Residents must ensure that any development of their personal property does not give rise to increased flows into surface water systems to ensure there is no increase in flood risk elsewhere. will be very beneficial. Some of these issues are subject to planning law but residents are in a position to assist in reducing flood risk through the

Resilience measures

can be described as those which make it easier and quicker to undertake a clear-up following a flooding inundation.
Such measures could include for instance internal house walls which are constructed in such a way as to enable them to be flushed down after a flooding event. A cement, rather than plaster, based surface material to a wall with a waterproof paint application could be considered as a resilience measure.

Resistance measures

can be described as those which prevent water getting into property. These could include dams located at individual property doorways/air brick flaps and also more regionalised measures such as the installation of temporary dams to provide flooding protection.

use of SuDS such as permeable driveways through use of permeable driveways, swales, rain gardens etc.

There are a number of relevant guidance notes/pamphlets available which provide clear information to non-professionals on all aspects of water management. Arrangements will be made for this information to be more widely distributed, particularly via partners' websites.

Some of the identified topics which require better communication are:

- Riparian owner responsibilities.*
- Installing and operating flood protection and resilience measures to individual properties.
- Opportunities for individual property owners to assist in reducing flood risk, such as reducing impermeable surfaces in gardens and use of green roofs.
- Individuals acting as 'eyes and ears' to notice screens blocking-up and culverts overflowing and reporting flooding incidents.
- Preparing for flooding – the production of emergency plans, etc.

5.3 Working together to use resources and funding in an integrated way and in so doing derive enhanced overall benefit

Chapter 6 outlines the main funding mechanisms for flood and coastal erosion risk management. The Suffolk Flood Risk Management Partnership and the Suffolk Coast Forum working together with relevant stakeholders and community groups will identify schemes and collectively seek appropriate funding. The challenge will be to use existing funding streams in a more coordinated way so as to derive additional benefit in terms of overall flood risk reduction.

Integrated Coastal Zone Management is already being taken forward through the Suffolk Coast Forum and work is underway to streamline the way the various authorities utilise their human and financial resources for coastal management and integrate relevant strategies and plans. This extends to working closely with local community groups to deliver and/or maintain smaller scale projects on the coast and estuaries. The Suffolk Flood Risk Management Partnership is trying to take a similar approach in the inland situation.

Surface water management is a newer discipline for many and thus there is a need to provide appropriate tools and training to all professionals involved in surface water management to enable them to develop an understanding of issues.

5.4 Ensuring a balance between the identification of high level plans and the resolution of local flooding

There is a danger that focussing on high level plans and strategies will delay actually making progress 'on the ground' with flood risk reduction. The success of the overall flood risk reduction strategy will require the demonstration to all residents who have knowledge/experience of problems that progress is actually being made on flood risk reduction at their local level.

* The Environment Agency has recently updated its *Living on the Edge, a guide to rights and responsibilties of riparian owners* - see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454562/LIT_7114.pdf

There of course will be a need to establish long term actions for ensuring that flood risk does not increase. The development of SuDS guidance is obviously an important requirement which will have a major impact on flood risk for the medium and long term, but work on this will need to be done in tandem with the consideration of solutions to more immediate problems.

A primary objective for our work will be an overall reduction in flood and coastal risk in the whole of Suffolk. From a practical point of view it makes sense for resources to be focused not just on the priority areas in terms of the number of properties at risk, but also based on the likelihood of being able to implement flood risk reduction.
Data collected both on risks, actual flooding and investment plans will be incorporated into GIS so as to facilitate improved spatial understanding of all relevant information and focus future investigations in areas where the most activity is planned.

The Suffolk Flood Risk Management Partnership, led by the County Council, will work with any community who wishes to contribute to solutions to existing flood risks. There are a number of examples where this has already happened both along the coast and inland. Lower cost, natural flood management solutions are generally more appropriate in these circumstances.

5.5 Commitment, on a catchment-wide basis, to preventing an increase in flood risk as a result of new development

Urban creep (the increase of paved areas and extensions which results in increased flows being discharged to surface water systems) and climate change will give rise to an increase in the quantity of rainwater which will have to be dealt with in sewers and watercourses. One calculation suggests that these factors, even without new development generating additional impermeable areas, are likely to give rise to an average 1% year on year increase in flows being received which raises the prospect, in the medium/long term, of significant overloading of existing drainage systems. To avoid this increasing flow causing a worsening flood risk would require significant investment in conventional system upgrading.

Water companies will need to be more innovative in their approach to surface water management and are moving away from conventional underground drainage solutions to investment in sustainable drainage (SuDS). This is just one example of the increasing focus on the use of SuDS and in support of this Suffolk will be aiming for a zero overall increase in flows being received by sewers. It is, however, recognised that this may not be feasible in all situations.

The achievement of this aim will have to be considered in relation to the entirety of the public sewerage system, watercourses and rivers within Suffolk as there may be incidences where the zero increase cannot be achieved but where a reduction in current flows would be possible. This aim is in line with other stakeholders' objectives notably:

Anglian Water's Strategic Direction Statement:

"Over the next ten years we aim to make sure that none of the properties in our region are at risk of sewer flooding, due to sewer overloading."

Greenfield Flow

can be described as the natural overland flow generated prior to urbanisation *(Amount varies with location but is commonly of the order of 5 litres per second of flow per hectare.)*

Brownfield Flow

can be described as the flow of surface water to receiving systems that is generated within an urban environment *(Commonly significantly greater the Greenfield Flow.)*

The move to achieving the 'greenfield' pre-development flow rates would represent a step change in surface water management, reversing the trend which has given rise to ever increasing flood risk, habitat loss, biodiversity reduction and reduced recharge of underground aquifers.

Figure 5.1 illustrates the water cycle from natural water balance, through urbanisation and back to water-sensitive urban design water balance. Our aim will be to achieve the latter situation wherever possible.

5.5.1 The preparation of SuDS guidance to establish requirements/opportunities associated with new development.

There are now specific requirements within the planning legislation for managing surface water in respect to any new development. Local SuDS guidance has been produced and a protocol defining how the planning authorities and Lead Local Flood Authority will work together to achieve the most appropriate solution in each site (see Section 2.5) .There is still more to be done to inform and encourage developers to consider surface water drainage at an early stage in planning a site and to develop multi-functional systems..

Planning Authorities ultimately have responsibility for the approval of drainage designs submitted for new development. The County Council will be a Statutory Consultee for major developments and will do all it can to support planning authorities in making good decisions..

5.5.2 Blue Corridors – Green Infrastructure

"Blue corridors" encompass the idea that both new and existing development, particularly within the urban environment, is planned around watercourses, overland flow paths and surface water areas to create a network of corridors designed to facilitate natural hydrological processes that minimise flooding, enhancing biodiversity, improving access to recreation and helping to adapt to climate change. One of the key aims and benefits of developing blue corridors is to provide a network of multifunctional 'blue/green' spaces and corridors within the environment. They offer the potential to allow land to perform a range of functions and provide a far greater range of social, environmental and economic benefits than might otherwise be delivered. Planners are already familiar with the provision of 'green infrastructure' and the two should be complementary[25].

The blue corridors concept is an important one. Essentially it is about protecting natural overland paths for water flow in flood conditions. Where urbanisation has occurred over those

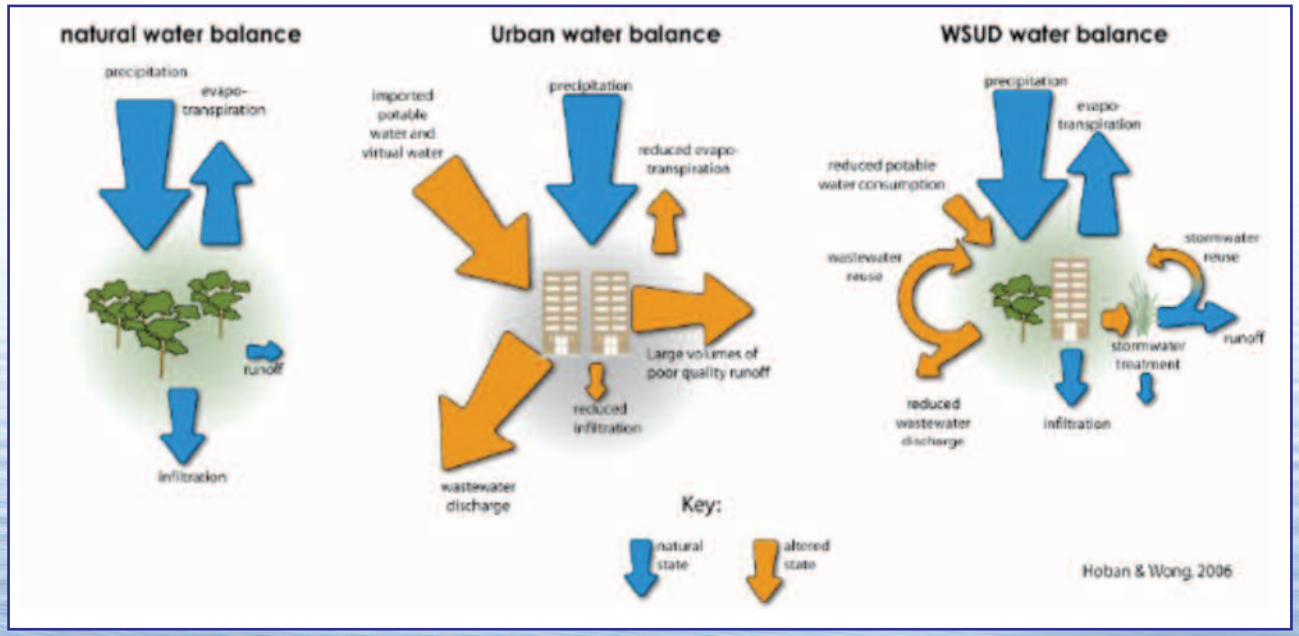


Figure 5.1: Returning to a natural water balance

25. http://publications.naturalengland.org.uk/publication/35033

"Water is an essential part of our natural and built environment. The way we live, work and play to varying degrees are influenced by the availability and quality of water. Increasingly we need to embrace water management as an opportunity rather than a challenge. Successfully delivered sustainable drainage provides communities and wider society with benefits set within the context of adapting to climate change, development and improving our natural environment."

Extracted from 'Planning for SuDS – Making it happen' (CIRIA report C687, 2010)

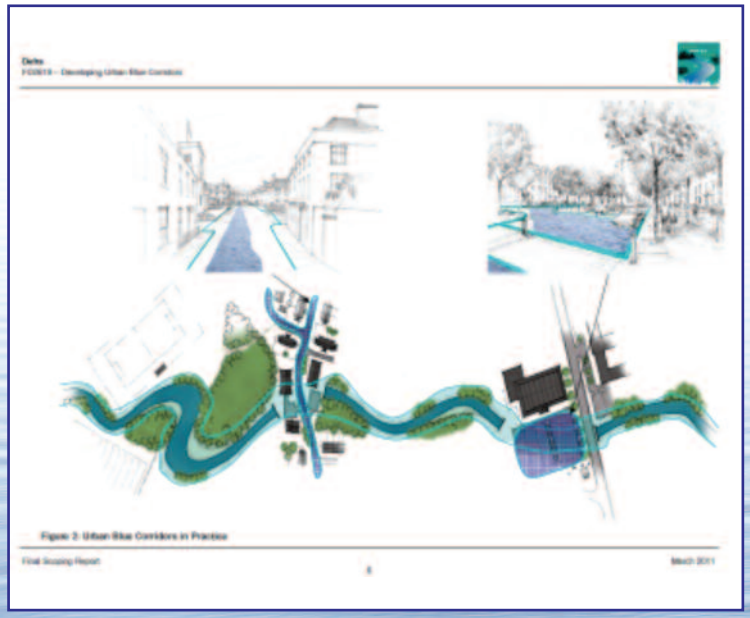
paths, to be aware of this, and make provision in designing areas where flood water can accumulate when rainfall exceeds that which the drainage system was designed for. These paths need to be created away from buildings so that excessive rainfall does not give rise to property flooding.

Drainage systems can only be designed economically to cater for rainfall events of a realistic magnitude but inevitably there will be 'freak' storms when the design capacity is exceeded. Previous practice took little account of this but with the improved understanding it is possible to designate flow routes around properties to cater for this situation. Roads - perhaps with raised kerbs and alternative vehicle cross-over details - are an obvious way of providing for this with often minimal inconvenience being caused.

Design parameters for calculation of the capacity of the surface water system and flood exceedance paths will be provided in the SuDS Guidance.

5.5.3 The integration of surface water system design into all stages of the development process.

To ensure that the maximum benefit can be gained in respect to issues such as availability and quality of water, enhancement of human and natural environments and flood risk reduction, it will be necessary to think about all water related issues at the earliest stage of master planning and at all subsequent stages. The SuDS/Drainage guidelines will establish principles and processes to ensure complete integration of all water related design issues into the overall project design process.



Figures 5.3 and 5.4: Illustrations of blue corridors in practise

5.6 Ensure planning decisions are properly informed by flood risk and that there is a consistent approach to flood risk management in new development

As well as the provision of advisory guidelines, there is a need to ensure that the evidence base used to determine planning decisions is consistent and up-to-date. The Lead Local Flood Authority has developed a system for reporting and recording local flooding incidents and the local flood asset register (see sections 2.6 and 2.8) making this readily available to all who need to see it.

The Environment Agency continues to develop and publish flood[26] (river, sea and surface water) and coastal erosion maps.[27]

Surface water risk mapping and the results of detailed surface water management plans will be made available to all who need it. A methodology for data sharing between partners and thus ensuring all decisions are made using the best available information.

5.7 The adoption of a holistic approach to flood and coastal erosion risk management

The advantages to be gained from thinking holistically about all aspects relating to water generally have long been recognised. We live at a time of climate change where on occasion we have less water than we need for human consumption, food production and to maintain flows in rivers and then, paradoxically, at other times too much water in the form of flooding. Water is also a key component of many natural environments.

The Partnership will be looking to consider issues associated with water supply, land irrigation and flooding 'in the round'. An example of this would be a situation where flooding was being caused to property as a consequence of overland flow from farmland. A possible solution might be the provision of a water storage area to accommodate the flood water which could then be used at some later stage for irrigation or for environmental enhancement. This approach might encourage funding from a landowner or environmental body as beneficiaries from the scheme.

The holistic approach will also be used in the context of new development and investment leading to multiple benefits and thus multiple funding sources.

An example of this might be a situation where a public sewer is overloaded to the extent that property flooding is occurring. A possible solution might be to prevent rainwater from house roofs entering the public sewer locally by disconnecting downpipes and diverting surface water to rain gardens and/or perhaps a permeable pavement.

Possible benefits to be gained from such an approach:

- Resolution of a public sewer related flooding problem without having to resort to costly underground system upgrade (Benefit to Anglian Water in terms of capital cost).

Anglian Water has declared initiatives to increase the understanding of the public in the 'value' of water.

26 and 27 https://www.gov.uk/prepare-for-a-flood

- The introduction of interesting features such as rain gardens to enhance the local environment (benefit to local residents).
- Incorporating, into the surface water system design, features such as surface attenuation located within the highway which could have a dual role to support traffic calming arrangements. (Benefit to highway authority in sharing costs associated with providing traffic calming facilities).
- Incorporating source control/attenuation features such as permeable pavements which can additionally be used for highway drainage. (Benefit to the highway authority if perhaps flooding from the highway has been a problem in the past).
- Funding of ongoing maintenance by a number of organisations. (Benefit to Anglian Water through reduced maintenance costs associated with new assets).

An innovative project to demonstrate Holistic Water Management in the River Deben catchment is being trialled in Suffolk – see www.greensuffolk.org/HWMP

This seeks to take a more natural approach to flood management alongside more traditional method as well as improving water quality and ecology and enhancing local water resources.

Any partner working on one aspect of flood and coastal management will need to consider appropriate plans from other partners. Equally, every effort will have to be made to identify external stakeholders' investment plans that could provide opportunities for flood and coastal management.

5.8 Encouraging the maintenance of privately owned flood defences

In the coastal situation many landowners are realising the importance of contributing to the maintenance and improvement of private defences. They have recognised that public funding for this is likely to be limited unless large numbers of properties benefit from the defences. In order to facilitate this activity the Environment Agency, district councils, Natural England, the Marine Management Organisation, Suffolk County Council Rights of Way and other relevant partners have been working together to coordinate advice and guidance to landowners and simplify the necessary consenting processes for landowners to be able to take action. This approach is being replicated inland.

Repairs to flood bank

5.9 Encourage ordinary watercourse maintenance and minimise unnecessary constrictions

The maintenance of ordinary watercourses is variable across Suffolk. Before embarking on plans for capital spending on watercourse assets it may be necessary to initiate a review of how maintenance is being carried out presently, by whom, and what actions need to be taken to ensure that assets are being used to their full capacity. There may be a particular issue with regards to the maintenance of culverts and associated trash screens which if not done in a timely manner can give rise to localised flooding. There are opportunities for local communities to identify such issues and help resolve them by regular local activities.

Improved maintenance of all surface water assets offers the opportunity to generate a reduction in flood risk without the need for capital expenditure

Figure 5.5 Example of partially blocked watercourse behind houses in Ipswich

There is a clear role for riparian owners to ensure watercourses are kept flowing. But in many situations, especially where ditches remain dry for some of the time, residents do not recognise the importance of the watercourse and their riparian responsibilities until the extreme rainfall event gives rise to flooding. There are numerous cases of ditches near properties becoming blocked by the tipping of garden rubbish (see Figure 5.5) and flow restricted by the addition of un-consented culverts, etc.

In Section 2.4.5 we outline the clear guiding principle to reduce unnecessary constrictions in watercourses and prevent additional constrictions wherever possible. But to achieve this, riparian owners must understand the need to seek advice from the consenting authorities before undertaking any works that may constrict flow.

5.10 To obtain as much information as possible on the latest best practice initiatives within the 'industry' as a whole

The Pitt Recommendations, and related initiatives such as the implementation of the Flood and Water Management Act, have given rise to a profound change in the way that surface water management is carried out in England and Wales.

Through links with neighbouring Lead Local Flood Authorities, the Local Government Association and relevant professional bodies, the Council and partners will share experiences and learn from others. A particular focus for key staff will be understanding best practice in the industry as a whole through continued participation in conferences, attendance at training courses and the obtaining of information from government sources .

In order to inform community decisions, we will share examples of successful local flood management projects between the flood risk management partners and other interested groups.

5.11 Preparing for flood emergencies

There will be an ongoing requirement to ensure that flooding emergency response procedures are comprehensive and up to date. Work on the Preliminary Flood Risk Assessment and the Ipswich Surface Water Management Plan have identified key areas at risk of surface water flooding and this information will need to be incorporated in current emergency response plans which are focussed on tidal and river flooding. When more comprehensive information becomes available this will be incorporated into the Suffolk Resilience Forum plans.

A key aspect of emergency planning is the promotion of local emergency groups and provision of information to enable the public and businesses at risk of flooding to help themselves.

5.12 To ensure that the Strategy proposals/policies integrate with those for the Fens

As detailed in Section 3, the Fens area of Suffolk will require a particular focus when considering policies and practices which can be utilised county-wide. Effective communication processes are already in place to ensure that proper dialogue takes place on aspects of common interest but there will be a need to develop these to ensure that, particularly, the specialist expertise that the practitioners involved in water level management within this special area is properly integrated into overall flood risk strategies.

5.13 Prioritisation of key actions identified

The key objectives and related actions identified above will not all progress concurrently and it is therefore necessary to establish priority in carrying them out – based on the costs of delivering them in relation to benefits achieved, practical and funding considerations.

The Action Plan (Appendix 1*) lists actions, an assessment of costs/benefits and likely timescales for delivery.

Putting in new drainage pipe in Long Melford

* The Action Plan is a working document that will be regularly updated and monitored. It will be a separate document, held on the website www.suffolk.gov.uk/flooding, but is an integral part of the strategy.

6. Funding & delivery of plan

It is important that the local strategy sets out how the proposed actions and measures will be funded and resourced within Suffolk. It is also important to identify what funding mechanisms are available to Suffolk County Council and its partners to pay for the flood risk management measures that are set out in the strategy. Effective practical implementation of flood and coastal policy objectives require adequate resources both for the management and response activities of lead local flood authorities as well as for capital projects.

The following chapter provides a summary of available forms of funding that are being considered and will also help to identify any further actions that will be needed to ensure that particular funding alternatives are feasible.

6.1 Government funding

Government funding is administered through Defra, the Environment Agency and the Department for Communities and Local Government (DCLG). Defra is committed to a six-year programme of capital investment to improve defences up to 2021, of £2.3bn nationally. Figure 6.1 below identifies the various streams of funding open to risk management authorities. The figures in

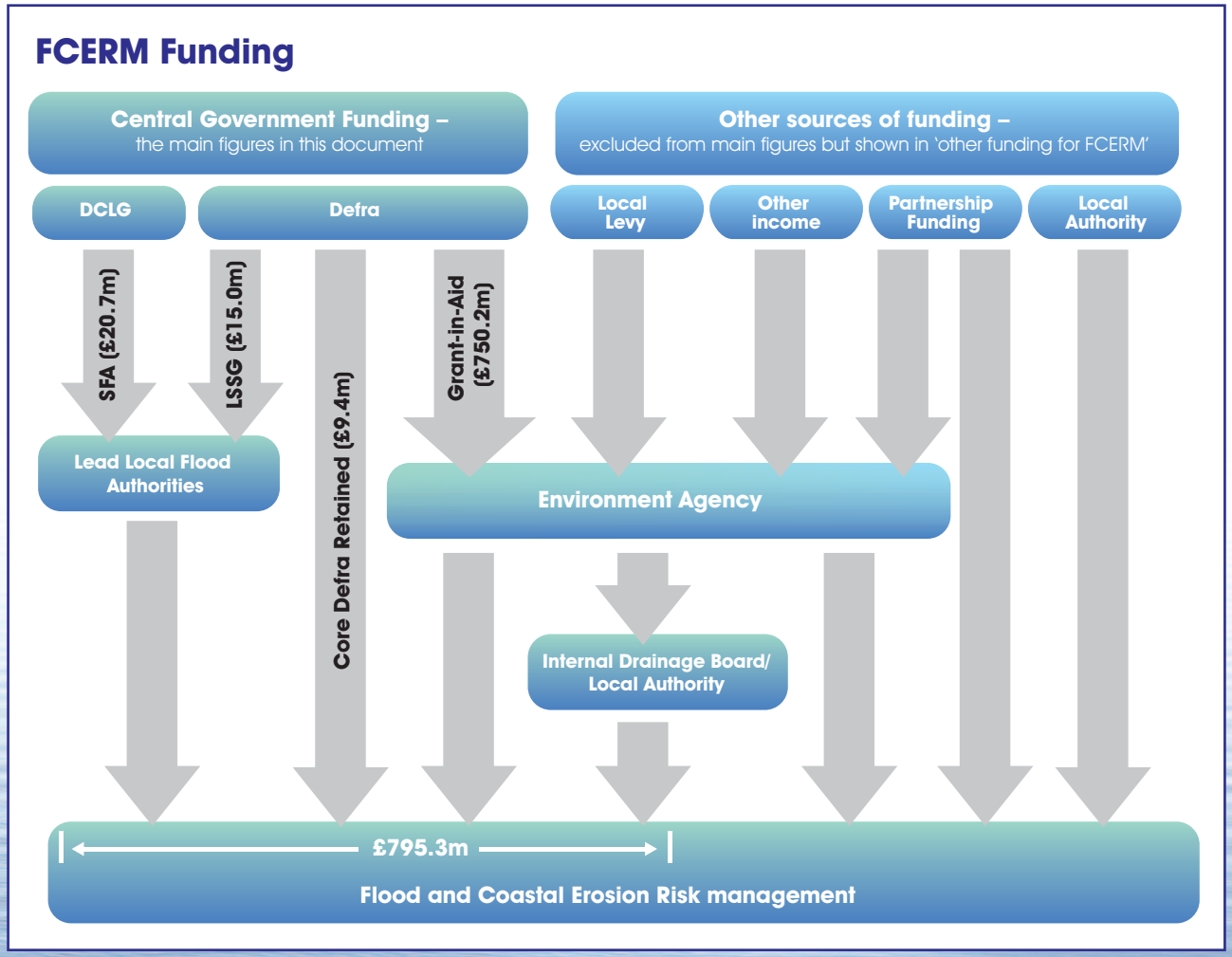


Figure 6.1 – Diagram of FCERM funding. The figures in this diagram are the 2014/15 budget allocations.

the diagram are the 2014/15 national budget allocations.

The current situation of government flood risk management funding is summarised below:

- Defra expects to spend £2.3bn over the next 6 years on flood and coastal erosion risk management in England.
- The Defra money includes 'programme' spend, such as maintenance, flood forecasting, and incident response, and 'admin' spend on Environment Agency staff and office costs.
- Defra currently funds lead local flood authorities to carry out their responsibilities under the Flood and Water Management Act. For Suffolk County Council, this equated to £147,000 in 2015/16 to spend on local flood risk management activities.

6.1.1 Defra's Partnership Funding approach

In May 2011, Defra introduced a new policy, 'Flood and Coastal Erosion Resilience Partnership Funding', better known as `Partnership Funding`. The policy describes an approach to the funding of projects that requires the project costs to be shared between national and local funding sources. Government funding is only available for projects for which the qualifying benefits outweigh the costs.

The overall objectives of the partnership funding arrangements are to better protect more communities and to deliver more benefits by:

- encouraging total investment to increase beyond levels affordable to Government alone
- enabling more local choice, and encouraging innovative, cost-effective options to come forward in which civil society may play a greater role
- increasing levels of certainty and transparency over the national funding for individual projects, whilst prioritising action for those most at risk and least able to protect or insure themselves

The Partnership Funding arrangement means that the maximum amount of Flood and Erosion Coastal Risk Management Grant in Aid (GiA)) available to any project can be calculated based on the outcomes it is expected to achieve, expressed as a Partnership Funding Score. This represents the percentage of project costs that has been secured and hence the size of any funding gap. Once other sources of funding are added, a project will require a score of 100% or more in order to be considered for funding.

Partnership Funding means that organisations and communities that have a financial stake in managing risk, and remain involved throughout the life of their investment, have an incentive to manage project costs throughout the project life cycle. Partnership Funding helps to deliver innovative approaches to managing flood and coastal erosion risks. It encourages efficiencies and reduction in costs, and promotes solutions that bring together the different aims of partners and potential investors. In turn this will deliver benefits wider than those related to flooding or coastal erosion alone.

Flood and coastal erosion risk management grant is administered through the Environment Agency. The allocation of available funds is managed through the Regional Flood and Coastal Committees (RFCC). It is important to note that there are always more schemes proposed than funding available and the RFCCs play a role in agreeing priorities and can allocate extra funding from the local levy (see below) to support specific schemes.

6.2 Funding Sources

As outlined above, in order to attract Defra Partnership Funding it is often necessary to find additional contributions to a project to strengthen the bid. The following information outlines other potential sources of funding that a project developer can consider. It is important to note that funding contributions need to be in place at the time of a bid.

Outlined below is a summary of the principle sources of funding that may be available (correct at the time of writing).

6.2.1. Local Levy

Local levy funding is raised through the Council Tax and its level is determined by the Lead Local Flood Authorities (LLFAs) on the RFCC. The levy can be used as a discretionary contribution as a partnership contribution to projects. It can also be used to support the maintenance budget; to deliver small scale projects and undertake initial project development.

6.2.2 Drainage rates and special levies

The amounts raised are linked to the local levy and determined by the RFCC. There is a general principle of using these funds on maintenance of flood assets in the areas in which the levy is raised.

- Drainage rates are collected from agricultural land and buildings within the Internal Drainage Districts
- Special Levies are issued on District and Unitary Authorities within the Internal Drainage District

6.2.3 Local Authority Funds

Funding from local authorities for capital schemes or maintenance activities is discretionary and therefore funding has to compete with a wide range of other priorities. Where it can be shown that investment delivers more than one benefit then this will strengthen the case for funding allocation.

The County Council funds many flood management activities through its role as a highway authority and coastal authorities invest significantly in coastal defence schemes.

6.2.4 Parish and Town Contributions

There is potential for Parish Councils to raise a precept towards contributions for FCERM funding and this approach has been explored by a few councils.

6.2.5 Community Infrastructure Levy

The Community Infrastructure Levy came into force in April 2010 and potentially could provide Suffolk's councils with an alternative source of funding for flood defence schemes. It allows local authorities to raise funds from new development in their area in order to pay for the impact that the development has on local infrastructure.

Local authorities can use this funding for infrastructure needed to support the development; it can be used to construct new infrastructure, increase the capacity of existing infrastructure or repair failing existing infrastructure. The Planning Act 2008 includes a broad definition of the infrastructure that can be covered by this scheme including transport, flood defences, schools, hospitals and parks.

Suffolk County Council and the District Councils will look into how this funding could be used to fund flood alleviation schemes within the county. However, it must be recognised that there will be other demands on this source of funding, many with a higher priority than flood alleviation

6.2.6 Section 106 funding – Developer Contributions

Section 106 of the Town and Country Planning Act 1990 allows a local planning authority to enter into an agreement with a landowner or developer in association with the granting of planning permission. A Section 106 agreement is used to address issues that are necessary to make a development acceptable, such as supporting the provision of services and infrastructure. This means that any flood risk which is caused by, or increased by, new development could be resolved and funded by the developer.

6.2.7 Local Enterprise Partnerships (LEP):

The LEP is an organisation that aims to create jobs and remove the barriers to economic growth that exist in Suffolk and Norfolk. One of the barriers that affect a number of growth locations is flood risk. As such it is recognised there may be synergies between investment in flood risk mitigation and increases in economic output and resilience. This source of funding is particularly suitable for FCERM projects delivering economic growth and regeneration – see Lowestoft example below.

6.2.8 Farmers and landowners

Landowners, especially those directly at risk from flooding, have a range of opportunities to support schemes. These can include direct financial investment or donations "in kind", for example materials such as locally sourced clay or land for water storage. Other valuable partnership contributions can also be use of equipment and labour resources.

6.2.9 Private business contributions

Private funding of flood and coastal erosion schemes can either be a direct investment in a private scheme or as a contribution to a partnership project. A recent government announcement provides tax incentives to those contributing to partnership schemes.

6.2.10 Water company funding

Water and sewerage companies have several options for financing improvements to the water services infrastructure. The main route is through the water company's capital programme, which runs in five year Asset Management Plan (AMP) cycles. The water company formulates a submission to Ofwat to determine allowable expenditure in the following AMP period. It will become increasingly important to align the priorities in this strategy with these AMP submissions.

The focus of their investment is a cost beneficial approach to reducing sewer flooding to those on the DG5 register (internal flooding of properties caused by overloaded sewers during a rainfall event not exceeding 1 in 30 years).

Traditionally water and sewage companies have only been allowed to invest in their own assets. However, following a series of recent Ofwat pilots, using sustainable drainage to help reduce sewer flows and treatment costs, an integrated partnership approach is likely in future AMP cycles.

In addition to becoming partners in capital investment, water companies are a key partner in providing contributions in kind to support flood risk schemes - for example undertaking sewer modelling since they have the relevant skills and data.

6.2.11 Utilities

Where utility providers have assets at risk of flooding, and a scheme would reduce that risk, there is potential to negotiate with the utility company to contribute some funds. This would be based on the value of assets at risk, loss of revenue, industry regulator imposed penalties, and the cost of repairs in the event of damage.

6.2.12 European Funding

The two main sources of European funding are the European Regional Development Fund & European Agriculture Fund for Rural Development. These funds are primarily focused on job retention and creation. One key priority for these funds is to promote corporate, agricultural and community resilience to flooding and climate change

6.2.13 Trusts, Foundations, Landfill Community Funds, Big Lottery.

National and local charitable funds may be available, notably when the flood project delivers wider environmental or community benefits.

The **Coastal Communities** Fund is one example. This is administered by the Big Lottery, and based on the Crown Estates annual marine estate surplus. This fund aims to encourage the economic development of UK coastal communities by awarding funds to create sustainable economic growth and jobs. Application windows are sporadic and the qualifying criteria have varied over the years.

Case Study 1: Rural Defence Project

A small market town is at a 1 in 20 risk of being flooded, and a £2 million scheme has been prepared by the LLFA that would protect 75 homes to a 1 in 200 year standard, achieving £10 million in long term benefits.

The comparatively low cost benefit ratio means that the project has in the past been deferred and remains low priority.

Under payment for outcomes, the scheme has the potential to attract approximately £900,000 of the necessary funds through Flood Defence Grant in Aid (rather than the full £2 million). In addition, the scheme will be supported by the Regional Flood and Coastal Committee whose members vote to provide a further £500,000. With a reduced and clear funding goal to aim for the LLFA and local community groups work hard to raise the remaining £600,000 required to allow the scheme to go ahead.

Case Study 2: Lowestoft Flood Management Project

A project is currently in development in Lowestoft to protect the town from tidal, fluvial and surface water flood risks. As well as protecting existing houses and business, a key aim of the project is to support the town's economic regeneration and development. The key areas at flood risk are identified for inward investment.

The estimated cost of the project is £25-30million, but under the current partnership funding criteria, the project will only attract about £8million of Defra Grant in Aid funding.

The RFCC has supported the project with £2.8million of levy; Suffolk County and Waveney District Councils are contributing around £5million from own funds.

The Local Enterprise Partnership, with evidence provided by the project team, recognise the economic potential generated by the flood protection scheme are adding a further £10million to the funding pot. Any further funds required are likely to be raised from private companies, investors and developers.

6.3 Prioritisation and distribution of funding

It is highly unlikely that sufficient funding will be available to finance all of the mitigation measures that might be desirable in the areas of Suffolk that are at risk of flooding or coastal erosion. It follows therefore that some decisions will need to be made about how available funding will be distributed.

As set out in this strategy Suffolk will primarily take a risk-based approach to the prioritisation of resources, generally focussing investment of resources in the areas of highest risk.

Decisions on how funding is to be distributed will require the agreement of multiple agencies, but inevitably such decision making will be determined by the assessment and ranking methodologies of the individual funding bodies, each of which is likely to have its own values and priorities.

In many instances, the cost effectiveness of measures will be a significant factor. If a lot of properties and people can be protected for a relatively low cost then that would normally be considered to be an effective way of spending limited financial resources, rather than protecting a small number of properties through the implementation of a resource intensive project.

Where there are simple and less expensive measures that can be easily undertaken, these may come forward at an earlier stage simply because they are possible and affordable within the timescale of currently available and/or emerging funding streams.

It may be possible to attract third party funding to projects where the wider benefits are also beneficial to that party. This can be possible even where the focus of the funding is for non-flood risk benefits e.g. the funding of open space on a new development that can also be used as a flood storage area. In such circumstances mitigation measures may need to be spatially linked to the funders' development, in order that they would benefit from the expenditure.

In some circumstances, it may simply be impractical to protect properties that are at severe risk of flooding, because of the high cost of doing so, relative to the benefits that might result. In areas where flood mitigation measures are unlikely to be affordable or practical, the partners will endeavour to advise landowners and businesses how they might adapt their property to become more resilient.

All of the above factors mean that developing a rigid strategy for prioritising expenditure, based purely upon risk may not be possible.

7. Achieving county wide environmental benefits through effective flood and coastal risk management

The primary purpose of this report is to set out the strategy for reducing flood risk in Suffolk but if this is done with sensitivity, good design and planning it is possible to derive significant benefits countywide in the context of sustainability, environmental and social improvement.

The Suffolk Climate Action Plan 2* sets out the county's contribution to creating the 'Greenest County'. It supports a radical, pro-active approach to environmental issues which are be mirrored by objectives and related plans of action identified in this Suffolk Flood Risk Management Strategy.

This document sets out some parameters which have particular relevance for water.

- Recent UK Climate Projections 2009 predict that by 2080 the East of England will experience:
  - 3.6 °C increase in average summer temperature.
  - 20% increase in winter rainfall leading to increased winter flooding.
  - 20% decrease in summer rainfall leading to summertime droughts and impacts on crop yields.
- At a local level, the future implications of these climate projections could include:
  - Increased coastal and flood-plain flood events leading to damage to property and disruption to economic activity.
  - Water shortages.
  - Higher incidence of damage to transportation, utilities and communications infrastructure caused by an increase in the number of extreme weather events (e.g. heat, high winds and flooding).

Effective surface water management will give rise to improved water cycle management generally and also derive benefits for the human and natural environments. In addition to this there are opportunities for deriving benefits in terms of carbon use reduction.

The environmental benefits that can be achieved in relation specifically to flood risk reduction need to be considered in the wider context of sustainability in Suffolk as embodied in 'Suffolk Climate Action Plan 2' which outlines the county's contribution to creating the "Greenest County".

The benefit which can be achieved for the human and natural environments through water sensitive design will need to be a continuing 'thread' in the strategy. In fact an innovative approach to surface water design can often reverse the 'not in my back yard' mentality to proposed drainage infrastructure activity, creating elements such as ponds and rain gardens that people actually want to have in the places where they live and work.

In 2008 the Suffolk Strategic Partnership developed the new community strategy for 2008-2028 called "Transforming Suffolk". It has a 20 year vision:

By 2028 we want Suffolk to be recognised for its outstanding environment and quality of life for all; a place where each person can realise their potential, benefit from and contribute to Suffolk's economic prosperity and be actively involved in their community.

Extract from 'Transforming Suffolk 2028'[28]

* http://www.greensuffolk.org/about/suffolk-climate-change-partnership/

28. https://www.ipswich.gov.uk/sites/default/files/scd07_-_suffolk_community_strategy.pdf

An Important Note for Developers

The creative use of water can give rise to an *increase* in property value maximising income from new development.

The paradigm shift, which will be required if the 'industry' is to make real headway in flood risk reduction, will only occur when key professionals such as planners and developers start to appreciate that early involvement of drainage specialists can offer real benefit in furthering the aspects that they perceive, from their own perspective, to be important.

Surface water management has been historically regarded as something that has to be sorted out at the end of the development design process almost as an afterthought. The strategy should encourage emphasis on the positive benefits that can be achieved through early consideration of surface water issues.

Water resource planning, urban scene enhancement, biodiversity, carbon use reduction are all important areas where drainage engineers are able to provide considerable assistance to people from other disciplines.

The key areas to focus on will be water cycle management, opportunities to enhance both the natural and human environments and opportunities for reducing carbon use.

7.1 Water cycle management opportunities

The South East of England is already suffering a shortage of water for human consumption and this situation will be exacerbated by climate change and the planned increase in development in the region. The object of water cycle management is to make better use of the water that we have. Even Suffolk, noted as a relatively dry county, experiences times of rainfall sufficient to cause flooding and what is required is to manage water surplus and shortage effectively.

In the context of flood risk reduction this argues for a complete change in the way that we deal with new development and endeavour to deliver flood risk reduction and these new practices are being employed increasingly.

Source control is the primary means of supporting improved overall water management through

Planning for water

There is a finite capacity within the environment, and it cannot simply provide more and more water. Equally, there is a limit to the amount of waste water that can be safely returned to our rivers and the sea without having a detrimental impact on the environment. Furthermore, we know that extreme rainfall can overwhelm drains and overtop flood defences. Climate change is bringing fresh challenges as patterns of rainfall are predicted to change, with more intense rainfall events. We must also make sure that water infrastructure contributes to the shift to a low carbon economy that is essential if greenhouse gas emissions are to be reduced. Planning for water has to take into account these natural constraints, and factors such as the timing and location imposed by the development itself.

Extract from Water Cycle Study Guidance - Environment Agency 2009

Climate change will bring about changes in rainfall with warmer drier summers and wetter warmer winters. Rainfall may occur in heavier downpours which could lead to more flooding and droughts. It is predicted that the amount of water in rivers and groundwater reserves will decrease which could lead to shortfalls in water supply. Reducing water use places less demand on decreasing resources and reduces carbon emissions as water supply and treatment processes use energy.

Extract from 'Water Resources Strategy for England and Wales 2009' Environment Agency

better surface water management. Source control can take a number of forms but the basic philosophy is to emulate the natural pre-urbanisation situation where water is held close to where it falls rather than being rushed over impermeable surfaces and into sewers from where it can be disposed of, rather than used. This can be achieved in a number of ways:

- Ground infiltration – where ground conditions permit the passing of rainwater into the ground, which has a number of benefits:
  - Reduced loading on receiving surface water sewers.
  - Possibility for recharging underground water aquifers *(The use of underground sources of water to feed into water supply is becoming more important. Ground infiltration can provide a means of topping-up these supplies of water so that they can be used at times of water shortage. Aquifer re-charge is also beneficial in respect to maintaining healthy flows in watercourses that are fed primarily from underground sources and in so doing contributing to the maintenance/enhancement of biodiversity).*

Note: Ground infiltration is generally not possible in areas where there is a high water table or heavy clay soils.

- Roof gardens and living walls.
- Water features such as ponds and rills.
- Rain gardens.
- Underground storage of storm flows.
- Swales *(open ditches or indentations in landscaped areas to provide attenuation of flow).*

The benefit of source control to water cycle management can be summarised as:

- Reduction in peak flow to sewers and watercourses.
- Reduction in flood ponding volumes (pluvial flooding reduction).
- Retention of water in the catchment for recreational use, biodiversity enhancement, potential water supply improvement, etc.

7.2 Human environment enhancement potential

Human beings have an affinity to water, and built environments that use water effectively are generally regarded as being of greater interest as places for people to live and work. This is evidenced by the focus of development adjacent to the sea, rivers, canals, docks, and lakes.

Good design in respect to surface water management can often improve the human and natural environment. Where a significant volume of attenuation is required for surface water it might be possible to design more facilities which have recreational value for humans. Fairlands Lakes in Stevenage for instance (see figure 7.1), are part of the surface water management system but they have been designed in such a way that they have become recognised as a regionally important recreational facility. Separate areas have been designed to cater for wildlife in soft engineered areas, model boating, sailing and also for fishing.

Green roof on a shed

Swale

Detention Basin, Ipswich

Infiltration basin in dry state, Ipswich

Some examples of SuDS that increase infiltration. The two above are taken from a practical example at Lambs Drove, Cambourne, Cambridgeshire[29], the others in Ipswich.

(Courtesy of Cambridgeshire County Council)

29. See http://www.susdrain.org/case-studies/case_studies/lamb_drove_residential_suds_scheme_cambourne.html

Figure 7.1: Angling area within a recreational complex in Hertfordshire

7.3 Natural environment enhancement potential

See also section 5.5.2 in respect of green-blue infrastructure provision.

The availability of good quality water is often a critical factor in maintaining bio-diversity in natural environments. Effective surface water management can support the preservation of those existing environments that need a supply of clean water by maintaining the quantity and quality of the surface water that they need, but also has the potential for generating new water based environments. For example, a design for a new development, may require not only source control surface water management features located within a development but also perhaps the further attenuation of water in 'regional' facilities such as lakes, ponds or water meadows. This offers the opportunity to create an asset which not only satisfies the surface water management requirements but also deliver an environmental and water quality (WFD) improvements.

There are a number of examples where water meadows have been used to attenuate flow from new development to protect receiving watercourses from the inundation of surface water which would have caused environmental damage and property flooding. These meadows provide the required attenuation almost un-noticeably and as naturalised areas are very valuable for both water reliant and dry flora and fauna.

Develop and maintain ecologically resilient landscapes to allow climate adaptation and redistribute habitats and species.

Extract from 'Suffolk Climate Action Plan 2'

Figure 7.2: Water Meadows in Bury St Edmunds in dry state (left) and after heavy winter rainfall (right). An example of natural sustainable drainage

An additional benefit of designing facilities which enhance biodiversity is that environmental charities, e.g. Wildlife Trusts, may be happy to take on responsibility for some element of the ongoing costs of maintenance of the asset, thus reducing the ongoing funding liability.

In fluvial and tidal flood management, the practise of 'making space for water' and working with the natural environment (for example encouraging salt marsh in front of coastal defences) have been common practise for many years and demonstrate that working with nature is not only effective but often the cheapest option for local flood management.

Case Study: River Quaggy, Sutcliffe Park, southeast London

A series of flood alleviation works along the culverted River Quaggy within Sutcliffe Park reinstated the channel along its previous meandering alignment. The old culvert was retained to accommodate excess water. The previously underused park was converted into a substantial flood storage area which also incorporates a diverse range of park and wetland habitats. As well as reducing flood risk to 600 properties and 4000 people, the project is seen as an excellent example of a multifunctional solution to flood risk that works with natural processes. The works were completed in 2004 and Sutcliffe Park is now recognised by conservation groups such as the National Trust.

Photographs of the watercourse before and after restoration[30]

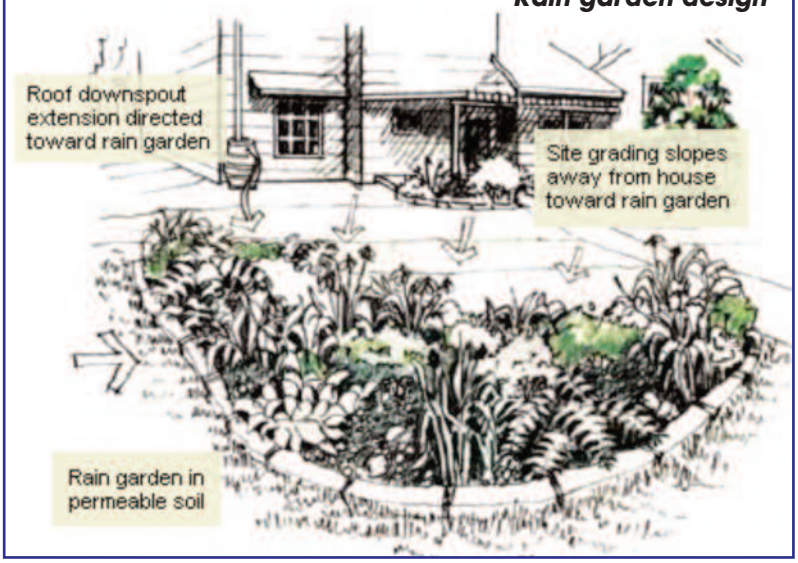
30. https://www.gov.uk/government/publications/anglian-district-river-basin-management-plan

7.4 Carbon use reduction potential

In order to deliver Suffolk's vision to be the Greenest County, it is essential that all flood and coastal management authorities aim to reduce their carbon footprint. Sensitive flood and coastal management can assist as a consequence of:

- The reduced embedded carbon in soft engineered flood risk reduction measures when compared to conventional solutions using reinforced concrete, metal etc.
- The minimisation of the pumping requirement for surface water and the consequent reduction in the need to use energy. *(Keeping water above ground for as long as possible using source control features integrated with natural surface flow paths can minimise the requirement to pump surface water to a 'disposal' point, minimising the likelihood that pumping will be required in the system).*
- The reduced energy needed for water treatment by minimising the amount of surface water entering foul/combined sewer systems.
- Water storage areas and wetlands (including inter-tidal areas) for flood management also act as areas of carbon capture.

Rain garden design



Some degree of climate change is inevitable and 'locked-in' through CO_2 emissions to date, as a result of time lags in the climate system. Adapting our infrastructure, communities and businesses to the impacts of future climate change, such as increased frequency of winter flooding and summer heat wave events, will foster resilience and minimise these projected impacts locally.

Extract from 'Suffolk Climate Action Plan 2'

7.5 Things which residents and business owners can do to assist

There are a number of ways in which local residents and business owners can make a contribution in regards to water sustainability, which if repeated on a wide scale could be significant at county level.

People who are currently experiencing flood problems may be more motivated towards some innovative surface water management methods but for others it is unlikely that flood risk alleviation in itself would be a sufficient motivation. What is required is the identification of facilities that have a dual role, being aesthetically pleasing as well as having a role in flood reduction and landscape/ biodiversity enhancement.

There are a number of arrangements that could help:

- Rainwater harvesting (e.g. using water butts) – a very easy way of reducing flow received by the sewers and watercourses, while at the same time reducing potable water consumption.
- Rain gardens – aesthetically very pleasing naturally planted areas that serve as attenuation for rainwater by slowing the flow of water passing to receiving sewers, but also facilitate evapo-transpiration from plants and allow water to penetrate into the ground for

irrigation of vegetation (see example on previous page).

- Ground infiltration of one type or another – arrangements that enable rainwater to be passed into the ground rather than to a sewer or watercourse.
- Use of drive and pathway materials that facilitate the direct passing of flow into the ground. Gravel type drives give rise to far less if any flow passing into sewers.

7.6 The Water Framework Directive

This Anglian River Basin Management Plan[31] outlines the pressures facing the water environment in the Environment Agency's Anglian region, and the actions that will address them. It was prepared to satisfy the requirements of the Water Framework Directive, and is the second of a series of six-year planning cycles.

The objectives which are relevant to this local flood risk management strategy are:

- to prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- to achieve at least good status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027;
- to promote sustainable use of water as a natural resource;
- to conserve habitats and species that depend directly on water;
- to progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- to progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;

The Anglian River Basin District is a unique environment; the landscape ranges from gentle chalk and limestone ridges to the extensive lowlands of the Fens and East Anglian coastal estuaries and marshes. Water is essential to the maintenance of the rivers, lakes, estuaries, coasts and groundwater that underpins these landscapes and their wildlife. And it is vital to the livelihoods of those who live and work here. In the past there has been considerable progress in protecting the natural assets of the river basin district and in resolving many of the problems for the water environment. However, a range of challenges remain, which will need to be addressed to secure the predicted improvements.

The main challenges include:

- **point source pollution from sewage treatment works**
- **the physical modification of water bodies**
- **diffuse pollution from agricultural activities**
- **water abstraction**
- **diffuse pollution from urban sources**
- **the introduction and spread on non-native/invasive species.**

In order to meet these targets, it is important for everyone to play their part now and in the future. River basin management is an opportunity for this generation – for people and organisations to work together to improve the quality of every aspect of the water environment – to create an environment we are all proud of and can enjoy.

Extract from the Anglian River Basin Management Plan

31. http://publications.environment-agency.gov.uk/PDF/GEAN0910BSPP-E-E.pdf

- to contribute to mitigating the effects of floods and droughts.

It is clear from the above that flood and coastal risk management activities have the potential to help deliver some of the improvements needed. Some examples of relevant actions that risk management authorities, land managers and the public can take to overcome the challenges are:

- Prevent pollution. It is essential to avoid pollutants from industrial and domestic drains entering watercourses (everything from hazardous industrial chemicals to pouring oil down household drains). This can be achieved through education as well as regulation and any activities relating to watercourse. The correct application of infiltration SuDS will also assist in pollutants reaching watercourses and aquifers.
- Reduce sediments getting into water bodies through landscaping and use of SuDS and managing activities and soils prone to run-off.
- Protect and enhance wildlife – both through wetland creation schemes (could be part of SuDS) or by taking appropriate precautions with local flood management schemes.
- Save water – as outlined in Sections 5.4, 5.7 and 7.1 there is a clear need to think about flood management in a holistic way, looking at the whole water cycle.
- Avoid further artificial modifications to water bodies The use of more natural forms of flood and coastal defences is widely promoted and used where applicable, not only to deliver the aims of the Water Framework Directive but also because they are the most sustainable and least expensive option. The principle stated in Sections 2.4.7 and 5.9 to reduce structures in watercourses (in part through the consenting process) will also help to deliver this aim. Flood management activities should also look for opportunities to remove existing barriers and, for example, introduce additional fish passes.
- Avoid introduction and spread of non-native invasive species. Any flood risk management activity must be carried out in a manner to reduce the introduction and spread of invasive species in and around the water environment – e.g. floating pennywort (see picture below). This can be achieve by ensuring operators are aware of the risks and ways to overcome them as well as educating the public about the issues.

The Environment Agency is providing a range of material in this respect, see **www.environment-agency.gov.uk/homeandleisure/wildlife/31350.aspx**

Floating pennywort (Hydrocotyle ranunculoides) ***©GBNNS, thanks to British Waterways***

8. Next Steps

Monitoring, reviewing and updating this Strategy and the associated action plan, will be essential both to ensure it continues to be 'fit for purpose' but also as a way of demonstrating success in delivering reduced flood risks to the people of Suffolk.

The Suffolk Flood Risk Management Partnership's first strategy was adopted in 2013. This review, three years later ensures the contents are compatible with current legislation and new information/plans. Alongside this document is the action plan – which is reviewed at each Partnership meeting using a traffic light system to indicate progress:

Red: no progress has been made

Amber: action ongoing but not complete/some progress made towards it

Green: action completed satisfactorily

For Red and Amber actions there will be a short explanation of why the action has yet to be completed.

The latest iteration of the action plan is available on www.greensuffolk.org/SFRMP and the progress is scrutinized by the Suffolk Joint Flood Scrutiny Panel and through other local authority political processes as appropriate

Suffolk County Council also reports annually to central government relevant information on flooding, flood risk management and other matters related to the Flood and Water Management Act, as required within Section 18 of the Act.

Key Achievements 2012 - 2015

	Notes
Developed and promoted processes for reporting, recording and investigating flooding and flood assets.	
Developed and disseminated local guidance on surface water management and SuDS in new developments and implemented new legislative requirements.	
Developed and agreed policies for consenting of structures on watercourses and designation of flood risk assets.	
Promoted guidance to riparian owners, businesses and householders to help their understanding of flood risk, understand their responsibilities and prepare for flooding.	Includes publication of booklet What to do before, during and after a flood
Taken all opportunities to learn from other partnerships and share good practise – e.g. through Suffolk Coast Forum, Local Government Association, workshops and conferences.	
Undertaken modelling and associated practical activities to reduce flood and coastal risks in the following areas:	
• Ipswich	Lovetofts Drive & Stonelodge Park
• Lowestoft	Major project covering tidal, fluvial and surface water risks. Expected completion 2020.
• Newmarket • Needham Market • Leiston • Debenham	SWMP complete ongoing Mini-SWMP completed Part of Holistic Water Management Project – ongoing.
• Pin Mill • Tunstall • Chevington • Woodbridge • Boxford • Sudbury & Great Cornard	 ongoing SWMP commencing December 2015
• Ipswich Tidal Barrier	Major Environment Agency Project due for completion 2017.
• Deben Estuary Plan and associated works	Plan complete 2015. Works ongoing
• Felixstowe Central coast protection works	Complete
• Lowestoft South Beach coast protection works	Ongoing
Undertaken S19 Investigations into significant flooding in: • Terry Gardens, Kesgrave • East Street, Sudbury • Lawshall • Kirkley Stream area, Lowestoft • Langar Park area, Felixstowe	Recommendations within the S19 reports are taken forward by the relevant partners and monitored by the Suffolk Flood Risk Management Partnership.

Notes

If you need help to understand this information in another language please call **03456 066 067.**

Se precisar de ajuda para ler estas informações em outra língua, por favor telefone para o número abaixo. 03456 066 067 **Portuguese**

Jeigu jums reikia sios informacijos kita kalba, paskambinkite 03456 066 067 **Lithuanian**

Jeżeli potrzebujesz pomocy w zrozumieniu tych informacji w swoim języku zadzwoń na podany poniżej numer. 03456 066 067 **Polish**

Dacă aveți nevoie de ajutor pentru a înțelege această informație într-o altă limbă, vă rugăm să telefonați la numărul 03456 066 067 **Romanian**

এই লেখাটি যদি অন্য ভাষাতে বুঝতে চান তাহলে নিচের নম্বরে ফোন করুন 03456 066 067 **Bengali**

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