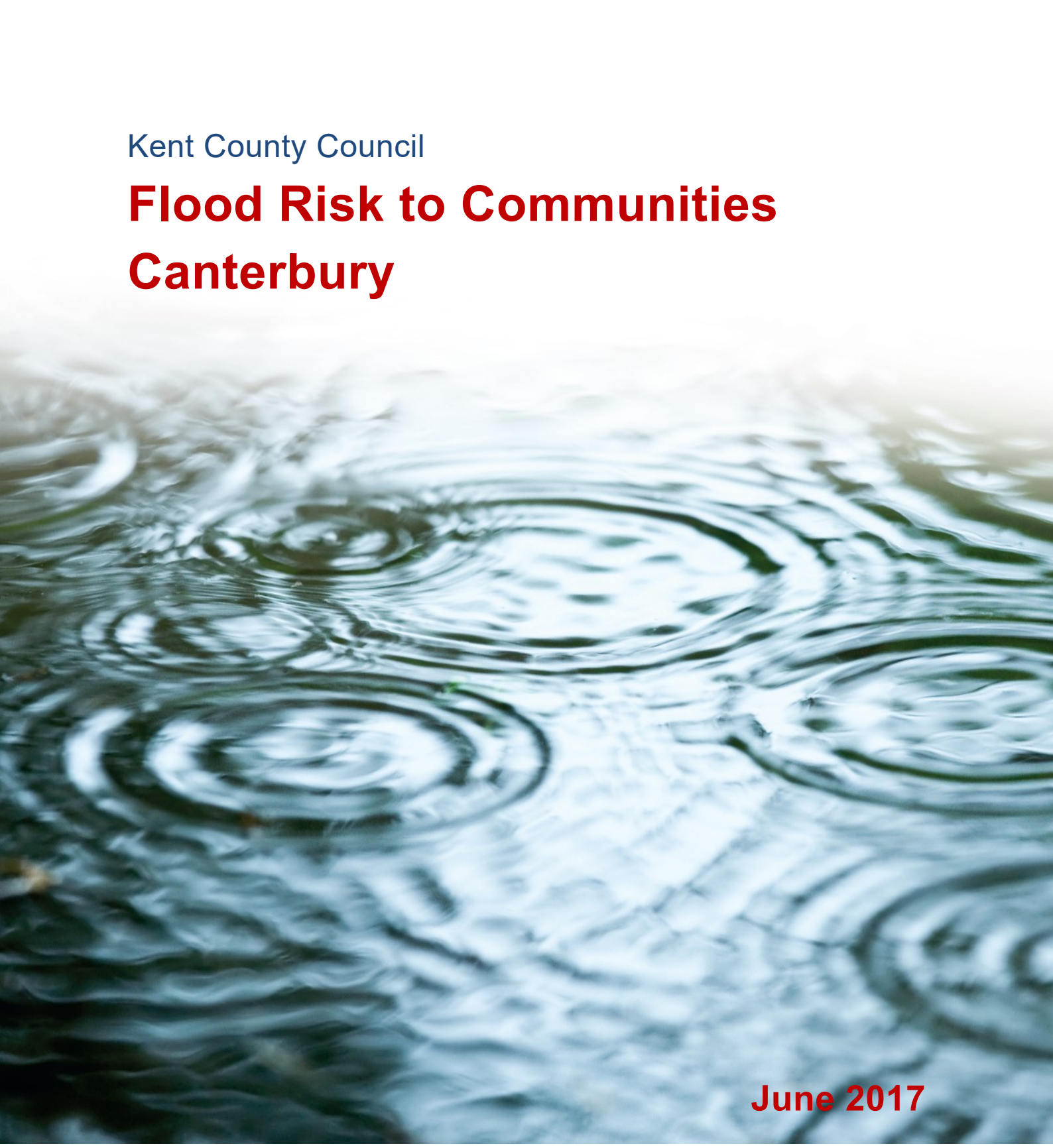
Kent County Council

Flood Risk to Communities
Canterbury



June 2017

www.kent.gov.uk

In partnership with:

Canterbury City Council

Environment Agency

This document has been prepared by Kent County Council, with the assistance of:

- **The Environment Agency**
- **Canterbury City Council**
- **The River Stour (Kent) Internal Drainage Board**
- **Southern Water**

For further information or to provide comments, please contact us at flood@kent.gov.uk

Introduction to Flood Risk to Communities

This document has been prepared for the residents and businesses of the Canterbury City Council area. It provides information on the nature and magnitude of the flood risk across the district, and outlines the existing and proposed approaches to manage the risk identified.

It has been developed with the help and support of the other Risk Management Authorities (RMAs) that operate in Canterbury. These include the Environment Agency, Kent County Council, Canterbury City Council, Southern Water, and the River Stour (Kent) Internal Drainage Board.

This document aims to provide a summary of:

- the main flood risks to the area,
- the key flood risk management assets/structures,
- any flood risk management plans or strategies that are in place and,
- where to find further information.

All links to plans, strategies and other pertinent information have been shortened to facilitate the use of non-electronic versions of this document.

This is a living document and will be periodically reviewed and revised as any relevant new information or plans become available.

Canterbury overview

The administrative boundaries of Canterbury City Council are shown in Figure 1 below.

The district covers an area of 310sqkm and has 21.7 km of coastline. 16.9km of the coastline is managed by Canterbury City Council, with the remainder being looked after by the Environment Agency. In total, 15% of the district lies within Flood Zone 3 and is considered to be at high risk from flooding from the sea or rivers.

The Canterbury district area is drained by numerous main rivers, smaller ordinary watercourses and ditches. In combination with rainfall runoff and groundwater emergence, these features give rise to differing levels and mechanisms of flood risk throughout the area. For example, some areas will be at risk from only tidal, fluvial, groundwater or surface water flooding, while other areas may be at a combined risk from more than one source.

Managing the flood risk throughout the district can therefore be a complex and challenging task.

Flooding from the sea was experienced along the northern coast in 1953 and 1978. These flood events caused significant damage and disruption to the area and resulted in the commitment for the substantial investment that was required to improve the standard of the sea defences protecting the area. Once constructed, the improved flood defences successfully prevented further large-scale inundation during the significant storm-surge events experienced in November 2007 and December 2013.

Notable fluvial flooding occurred throughout the district during autumn 1987, April 2000, winter 2000/1 and over the winter of 2013/14, when the banks of the Great Stour and several of the smaller rivers and watercourses in the district were overwhelmed.

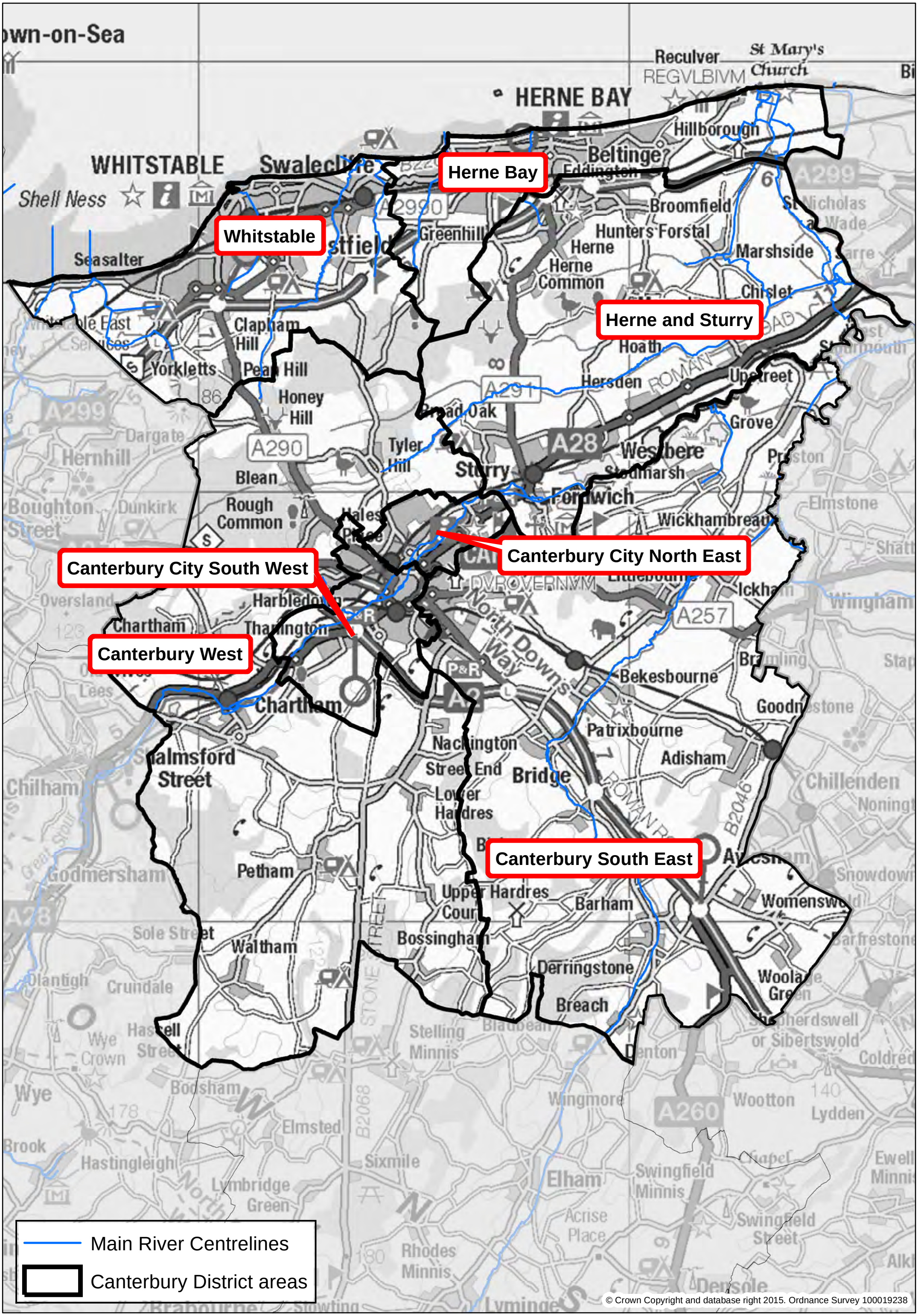
The Nailbourne and Little Stour are designated Main Rivers and are predominantly groundwater fed. The Nailbourne is an ephemeral stream, which anecdotally flows for a period of around six months every seven years. The occurrences of flow in the Nailbourne have been more frequent in recent years, with events recorded in 2000/1, 2003, 2010, 2012/13, 2013/14, 2014/15 and 2015/16. A number of improvements have recently been made to these watercourses in the Barham, Bishopsbourne, Bridge, Patrixbourne and Littlebourne areas to reduce the likelihood and impact of severe flooding.

Flooding from the sea along the district's coastal boundary is managed by Canterbury City Council under the supervision of the Environment Agency. Flooding from the district's main rivers (Great Stour, Little Stour, Nailbourne, Whitehall Dyke, Sarre Penn, North Stream, Chislet Pump Channel and Lampen Stream) is overseen and managed by the Environment Agency.

The Environment Agency is also responsible for defining the extent of the tidal/fluvial flood zones, which are usually derived from detailed computer models.

Flooding from ordinary watercourses, surface water and groundwater across the borough is recorded and overseen by Kent County Council in their role as Lead Local Flood Authority. These watercourses include the upper reaches of the Sarre Penn and the ephemeral Petham Bourne.

Figure 1. Canterbury City Council


Herne Bay
Whitstable
Herne and Sturry
Canterbury City South West
Canterbury City North East
Canterbury West
Canterbury South East
Main River Centrelines
Canterbury District areas
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Roles and functions in the management of flood risk

This section sets out the roles, responsibilities and functions of the main bodies that have a part to play in managing flood risk. Further information on the nature of these Risk Management Authorities is set out in Section 3.1 and Annex A of Kent County Council's Local Flood Risk Management Strategy.

The Local Flood Risk Management Strategy can be found at http://goo.gl/hpw021

The Environment Agency

The Environment Agency (https://goo.gl/ohv7Jv) is a non-departmental public body, responsible to the Secretary of State for Environment, Food and Rural Affairs.

They are responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion. This role includes:

- setting the direction for managing the risks through strategic plans,
- providing evidence and advice to inform Government policy and to support other RMAs,
- working collaboratively to support the development of risk management skills,
- capacity and providing a framework to support local delivery.

The Environment Agency also have operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea (as well as being a coastal erosion risk management authority).

As part of its strategic overview role, the Environment Agency is producing Flood Risk Management Plans with partner Risk Management Authorities (RMAs). Flood Risk Management Plans will highlight the hazards and risks associated with flooding from rivers, the sea, surface water, groundwater and reservoirs; they will set out how RMAs work together with communities to manage flood risk.

The Environment Agency have also prepared the National Strategy for Flood and Coastal Erosion Risk Management to clarify their role and to outline the principles that guide flood risk management in the UK (please see the following Plans and Strategies section for further information).

Their legal powers relating to FCRM are *permissive* and are largely set out in the Water Resources Act 1991 and the Flood and Water Management Act 2010. The term *permissive* means that they have the power to undertake flood and coastal risk management works but are not legally obliged to undertake such activity. The maintenance of a main river channel and its banks is ultimately the responsibility of the riparian landowner. The Environment Agency has powers of enforcement to ensure that riparian landowners keep any main rivers flowing through their land clear of obstruction.

As with any RMA, when they use their permissive powers they must comply with European legislation (particularly the Habitats and Birds Directives, the Floods Directive and the Water Framework Directive) and any other legal requirements.

They prioritise their investment in flood and coastal risk management works according to Government policy (and in line with Treasury guidance on economic appraisal). They implement Government policy such that public money is:

- spent on the works that provide the greatest benefits to society,
- is spent efficiently and effectively, and
- reflects a partnership approach.

They assess the costs, economic benefits, environmental impact and flood risk to set their spending priorities.

The Environment Agency also have a regulatory role to consent works carried out by others in, under, over or within eight metres of a main river or any associated flood defence (unless a watercourse is tidally influenced, in which case their permission must be sought for all works within 15 metres). The Environment Agency has statutory byelaws specifying the range of operations that are either precluded from occurring, or that require the Environment Agency's formal consent, within this area.

Their formal permission is required to ensure that those works do not adversely affect the operation of the drainage system or cause unnecessary environmental damage.

The local Environment Agency office should be contacted in advance of any planned works taking place. For further information on any of the above, please contact KSLE@environment-agency.gov.uk

Maintenance Protocol (2013)

Maintaining some assets that have been maintained in the past may no longer be economically justifiable or the work may not have a high enough priority for central government FCRM funding over the longer term. In these circumstances, they might decide not to maintain them in the future.

The River Medway and its tributaries are split by communities according to the risk of flooding and its economic impact, these are known as asset systems. Each system has a System Asset Management Plan (SAMP); this is a long-term plan covering a collection of assets. The SAMP includes information on the costs for maintaining and replacing assets over their life as well as details of the economic benefits within the system. The available maintenance budget is then directed to areas with the greatest need

Kent County Council

Kent County Council has two main functions that affect flood risk management. They are both the **Lead Local Flood Authority** and the County's **Highway Authority**.

Additionally, and as with any riparian land owner, they are responsible for any land they own, and should maintain all ordinary watercourses and assets in their ownership.

The functions and associated responsibilities of the Lead Local Flood Authority and the Highway Authority are explained below:

Lead Local Flood Authority

Kent County Council (KCC) was made the Lead Local Flood Authority for Kent by the Flood & Water Management Act 2010; this means Kent County Council has a

strategic overview role for **local** flooding (which is defined as flooding from surface water, groundwater and ordinary watercourses). As part of its role as Lead Local Flood Authority, KCC has produced a Local Flood Risk Management Strategy (please see the following Plans and strategies Section).

Kent County Council also has a duty to:

- Maintain a register and record of structures and features
- Undertake flood investigations
- Regulate proposals which affect ordinary watercourses
- Provide advice and guidance on the provision of Sustainable Drainage within new development as a statutory consultee within the planning process.

As Lead Local Flood Authority, Kent County Council is required to oversee the management of local flood risk; this includes the management of risk of flooding from ordinary watercourses. As such, Kent County Council's formal written Consent is required prior to undertaking any works which may obstruct the passage of water within an ordinary watercourse. Such works can include culverting, diversion and the construction of new dams/weirs, etc. They have powers of enforcement over any works which have been undertaken without consent and should be contacted in advance of the commencement of any proposed works. They can be contacted at flood@kent.gov.uk.

It should be noted that Kent County Council do not have any responsibility for the area covered by Medway Council (a Unitary Authority). They are a Lead Local Flood Authority in their own right. Further information can be found here:

Medway website

Highways Authority

Under the Highways Act 1980, Kent County Council has a duty to maintain the highways in Kent (apart from those managed by the Highways Agency). One of their responsibilities is to ensure that the highways are appropriately drained.

The Kent County Council Highways and Transportation department maintains the roadside surface water drains (also known as gullies) which allow rain water to run away freely from roads, pavements and cycleways. Table 1 shows the frequency of gully cleansing, according to the type of road.

Table 1. Highways drainage maintenance schedule.

Type of road	Description	Frequency
Flood routes	Roads known to flood frequently	Every 6 months
High speed roads	Roads with a speed limit of 70mph	Every 12 months
Strategic routes	Roads that are the main connection between towns and villages	Every 12 months
Urban and rural routes	All other roads	Targeted maintenance

The map in Appendix 1 shows the major and strategic routes across the Canterbury City Council area, along with the highways which receive more frequent maintenance owing to known drainage problems. Any road not depicted in red or green should be assumed to be a normal road that receives targeted maintenance, as required (as outlined in Table 1).

Other forms of drainage (catchpits, soakaways, pipes, highway ditches etc.) are checked and cleaned or repaired when required, or when problems are reported to us.

Highways drainage problems should be reported at Website or by phone on **03000 41 81 81.**

Canterbury City Council

Canterbury City Council is a coastal district authority; as such they have powers to undertake works to prevent coastal erosion and flooding. Canterbury City Council is responsible for the management of all of the coastal defences along the frontages in Herne Bay and Whitstable. In the event of any works being planned which may potentially affect the defences or are within 15m of their landward toe, Canterbury City Council should be contacted to discuss their requirements - Website.

Canterbury City Council has powers under the Land Drainage Act 1991 to carry out flood risk management work on ordinary watercourses. They also have the responsibilities of a riparian owner for any land they own and should maintain all ordinary watercourses and assets in their ownership.

Canterbury City Council also have a general responsibility to oversee all matters relating to drainage within the district and to provide information and advice to the public, including specific advice on land drainage. They should be contacted about watercourse alterations, disputes and maintenance of land drainage within council-owned land, and about emergency works elsewhere.

They are a key partner in planning local flood risk management works, and are able to carry out flood risk management works on minor watercourses within their district.

They also work with Kent County Council and the other Risk management Authorities to ensure that the risks to/from any new development are effectively managed through making decisions on planning applications. They are ultimately responsible for ensuring that any new development does not exacerbate the flood risk to the area in which it is proposed.

The River Stour (Kent) Internal Drainage Board

The River Stour (Kent) Internal Drainage Board is the operating drainage authority within their designated drainage district; please see Appendix 2 for a map of this area. They manage and directly maintain approximately 175km of watercourses throughout this area.

Internal Drainage Boards use their powers to maintain watercourses within their district for land drainage, flood risk management, environmental protection/enhancement and water level management purposes.

In-channel weed cutting is currently carried out annually on all River Stour (Kent) Internal Drainage Board designated watercourses, where necessary, in order to maintain conveyance capacities to allow drainage, manage local flood risk and to control water levels.

Approximately 10% of the River Stour (Kent) Internal Drainage Board watercourses are de-silted each year (carried out on a 10 year rolling programme). Tree and shrub maintenance is carried out to allow free-flow and to maintain adequate access for routine channel maintenance. In-channel obstructions are cleared prior to and during periods of heavy rainfall (mainly from bridges, culverts and other in-channel structures). Routine activities also include the operation and maintenance of approximately 140 water level control structures (feeds and stop-board weirs).

Whilst they undertake routine maintenance of adopted ordinary watercourses, pumping stations, and other critical water control infrastructure under permissive powers, the overall responsibility for maintenance still lies with the riparian owner.

They also have a general supervisory duty over all drainage matters within their districts and have consenting and enforcement powers for works carried out by others in or adjacent to ordinary watercourses within their operational district.

This is done by reasonable application of the board's byelaws and the Land Drainage Act 1991, to ensure that any development has regard to secure the efficient working of the drainage system now and in the future and does not cause unnecessary adverse environmental impact as a consequence, including increased risk of flooding.

Public Sector Cooperation Agreement (PSCA)

The new Public Sector Cooperation Agreement (PSCA) provides arrangements for an Internal Drainage Board (IDB), or other Risk Management Authorities, and the Environment Agency to deliver maintenance by a partnership approach. This is a major step forward in securing efficient work practices at a local level, avoiding the need to tender for work.

The River Stour (Kent) Internal Drainage Board is also investigating the possibility of entering Public Sector Cooperation Agreements with other Risk Management Authorities.

If you are planning to undertake works on an ordinary watercourse within their district, please phone **01227 462377** or email enquiries@riverstouridb.org.uk.

The map at Appendix 2 shows the extent of the IDB areas within Canterbury District and shows the watercourses for which they are responsible.

Southern Water

Southern Water is responsible for the maintenance of foul and surface water public sewers. These are usually in roads or public open spaces, but may run through private gardens. They have a right of access to these sewers for maintenance. If they wish to carry out work on sewers on your land they must follow a code of practice; this is available from them upon request.

To report a problem or for general enquiries, please contact them here:

http://goo.gl/FrP68N

Southern Water is a risk management authority and has the following flood risk management functions:

- To respond to flooding incidents involving their assets;
- To maintain a register of properties at risk of flooding due to a hydraulic overload in the sewerage network;
- To undertake capacity improvements to alleviate prioritised sewer flooding problems;
- To provide, maintain and operate systems of public sewers and works for the purpose of effectually draining their operative area;
- To co-operate with other relevant authorities in the exercise of their flood and coastal erosion risk management functions;
- To have a regard to national and local flood and coastal erosion risk management strategies.

Parish councils

Parish councils are involved in managing local issues, and the management of local flooding may be one of the problems they help coordinate. They can also be a source of local information about flood risk and are likely to know which areas are prone to flooding (particularly from local flooding incidents). They may have records of flooding, which may not be recorded by other authorities.

Parish Councils are involved in responding to emergencies and have a consultation role in local planning applications, and can influence how local developments are delivered.

They are also working with the RMAs to prepare Parish Emergency Plans and train Community Flood Wardens. These wardens will act as a link between the Environment Agency and the communities at risk; they will disseminate information to local residents, and will assist with the preparation for flooding and management of incidents when they occur.

Little Stour & Nailbourne River Management Group

The Little Stour & Nailbourne River Management Group is a liaison committee between eleven parish councils representing the villages along the length of the Little Stour and Nailbourne rivers in East Kent. The Group's aim is to work with the RMAs towards an overall strategy for the management of the Little Stour & Nailbourne catchment, along with the stretch of the Great Stour from Fordwich to the sea.

The Group was formed in 2001 after the severe floods that happened in the wet winter 2000/2001. It has met regularly since that time and is supported by the RMAs. It has a strong communication network within the community and lobbies for flood management improvements.

Land owners

If you own land or property next to a river, stream or ditch you are a riparian owner. Under common law, riparian owners possess rights and responsibilities pertaining to any stretch of watercourse which falls within or follows the boundaries of their property. It is normally presumed that a riparian owner owns land up to the centre line of a non-tidal watercourse where the watercourse itself forms a boundary, even if this is not denoted on the Land Registry plan for the property.

Riparian owners have a duty of care towards their neighbours upstream and downstream. This means they must avoid any action likely to cause flooding of their neighbour's land or property; they are therefore responsible for accepting water from the section of watercourse owned by their upstream neighbour and then transferring this, together with drainage from their own property, to their neighbour immediately downstream.

The ultimate responsibility for the maintenance of a watercourse and its banks always lies with the riparian owner, regardless of whether such works have been carried out by any other Authority at its own expense in the past. Such maintenance works can include clearing obstructions, repairing the banks, and the management of vegetation or trees.

It is important that riparian owners preserve access to the banks of rivers and streams for maintenance and safety purposes. Access to the watercourse should therefore be considered when erecting any fencing, and undergrowth and vegetation on and around the banks should be appropriately controlled.

Further information on riparian rights and responsibilities can be found in the Environment Agency’s document ‘Living on the Edge’.

If you are a riparian owner and planning works on a watercourse (or in the vicinity of flood defences) you must contact the relevant authority to discuss whether you need formal consent for your works. This is to ensure that you do not increase flood risk or damage watercourses and flood defences. The relevant consenting authority has powers to remove works that are not consented.

If you are not sure whose consent you may require, please contact the Kent County Council Flood Risk team at flood@kent.gov.uk, or phone 03000 414141.

It should be noted that the abstraction of water from (and the discharge of water to) any watercourse is also regulated by the Environment Agency. They should be contacted prior to the commencement of any such activity.

Flood and Coastal Risk Management investment

The government provides an annual grant to invest in flood defence works; this is known as Flood Defence Grant in Aid. The government offers funding to projects based on the outcomes they will deliver. Whilst the number of homes protected from flooding is the primary consideration, the amount of habitat created and other economic benefits are also taken into account. Any risk management authority can apply for funds from this source.

Flood defence schemes which provide a significant reduction in risk to a large number of properties may occasionally be funded in their entirety by FDGIA; however, smaller schemes which provide a smaller benefit will usually require additional contributions from elsewhere to proceed.

Any other body, organisation or person may make a contribution to meet the shortfall. This process has been established by the government to encourage the communities that benefit from these schemes to invest directly in them. This is known as partnership funding.

Each year risk management authorities from each region are invited to submit details of any proposed flood or coastal erosion management works which will require funding over the next six years. The proposals are captured in a report known as the Medium Term Plan (MTP) by the Environment Agency. Each regional MTP is combined into one national plan to give an indication of investment needs across the entire country.

Projects on the MTP are ranked according to the benefits provided divided by the remaining cost (once partnership funding contribution have been taken into account). The highest ranked schemes receive the greatest proportion of government allocation. The lower ranked schemes typically require a greater contribution from other concerned parties.

Figure 2. shows how this mechanism of flood defence funding differs from how flood defence investment was allocated in the past.

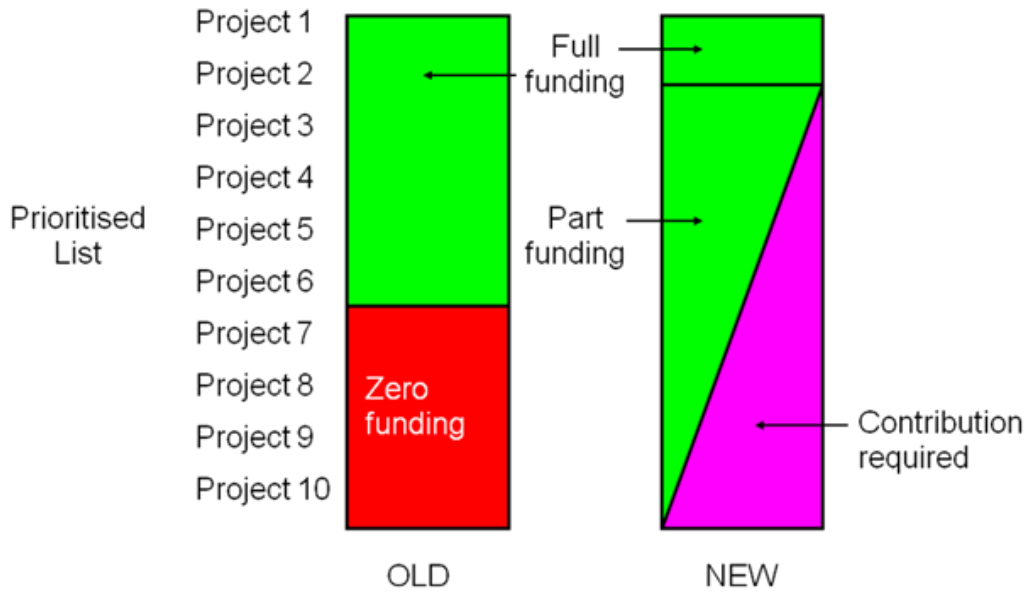


Figure 2. Flood defence investment.

Flood risk management plans and strategies

There are a number of flood risk management plans and strategies that affect how flood risk in Canterbury is managed. More detailed information about flood risk management in Canterbury can be found in these documents.

This section aims to give you an overview of the most important of these documents and tells you where to find them.

National Flood and Coastal Erosion Risk Management Strategy

The National Flood and Coastal Erosion Risk Management Strategy (the National Strategy) provides a national framework for managing the risk of flooding and coastal erosion in England.

It has been prepared by the Environment Agency with input from Defra, and sets out the objectives and six guiding principles on how flood risk management should be delivered by all risk management authorities in England.

The National Strategy can be found here:

http://goo.gl/27nZp0

Flood Risk Management Plans

By law the Environment Agency and Natural Resources Wales must produce flood risk management plans (FRMPs) for each River Basin District. These FRMPs must cover flooding from main rivers, the sea and reservoirs.

Lead Local Flood Authorities must also produce FRMPs for all Flood Risk Areas covering flooding from local sources (surface water, ordinary watercourses and groundwater). LLFAs may either prepare a separate FRMP or contribute to a joint partnership FRMP for the River Basin District.

Kent County Council do not have any Flood Risk Areas under their jurisdiction, but they may contribute to a joint partnership FRMP. Other RMAs can also contribute to developing the joint partnership FRMP for the River Basin District. Such contributions are carried out on a voluntary basis and will result in better co-ordinated flood management.

The preferred approach to completing a FRMP

The preferred approach to FRMPs is for Environment Agency and Natural Resources Wales to prepare joint FRMPs in partnership with others, in particular LLFAs and other RMAs. Information about all sources of flood risk is combined to form a single FRMP. This approach co-ordinates flood risk management planning with river basin management planning under the Water Framework Directive, in particular the statutory consultation on proposed updates of River Basin Management Plans (RBMPs) and draft FRMPs.

LLFAs preparing separate FRMPs must co-ordinate the activities of interested parties with those developing RBMPs in England and Wales.

What FRMPs contain

Flood Risk Management Plans must include:

- a map showing the boundaries of the Flood Risk Area
- the conclusions drawn from the flood hazard and risk maps
- objectives for the purpose of managing the flood risk
- proposed measures for achieving those objectives
- a description of the proposed timing and manner of implementing the measures including details of who is responsible for implementation
- a description of the way implementation of the measures will be monitored
- a report of the consultation
- where appropriate, information about how the implementation of measures under the FRMP and RBMP area will be co-ordinated

'Flood Risk Management Plans (FRMPs): how to prepare them' provides more guidance for Risk Management Authorities.

https://goo.gl/LzkfUM

Local Flood Risk Management Strategy

Kent County Council's Local Flood Risk Management Strategy (the Local Strategy) sets out a countywide strategy for managing the risks of local flooding; this is defined as flooding from surface water, groundwater and ordinary watercourses. The Local Strategy is prepared by Kent County Council as part of its role as Lead Local Flood Authority. The aims of the local strategy are:

- To coordinate the work of the management authorities to improve the understanding of these risks
- To ensure that RMAs work together to aim to provide effective solutions to problems
- To improve the public's understanding of the risks in Kent and how everyone can play a part in reducing them.

Part of the Local Strategy sets out how KCC prioritises the management of local flooding in the county. The county is divided into areas with similar local flooding issues. These areas are given a policy for the management of this risk according to its complexity. The local flood risk management policies are shown on the map in Appendix 3.

The Local Strategy can be found here:

http://goo.gl/hpw021

Catchment Flood Management Plans

Catchment Flood Management Plans (CFMPs) are produced by the Environment Agency; they set policies for how inland flood risk should be managed within the catchment (coastal flooding is considered in Shoreline Management Plans, see below). Catchment Flood Management Plans pre-date the Flood and Water Management Act and were not prepared with the input of the Lead Local Flood Authorities (or with the additional data that is now available about local flooding).

Catchment flood management plans (CFMPs) consider all types of inland flooding, from rivers, groundwater, surface water and tidal flooding. Shoreline management plans consider flooding from the sea.

CFMPs also include:

- the likely impacts of climate change
- the effects of how we use and manage the land
- how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs

CFMPs help the Environment Agency and their partners to plan and agree the most effective way to manage flood risk in the future.

Canterbury is in the River Stour Catchment Flood Management Plan. The policies, along with an explanation of what each of the 6 policies mean, are shown on the map in Appendix 4**.** The River Stour Catchment Flood Management Plan can be found here:

http://goo.gl/JdlEN8

Shoreline Management Plans

Shoreline Management Plans (SMPs) set policies for the management coastal flooding and erosion risk for sections of the coastline. They are developed by Coastal Groups, which are groups of appropriate risk management authorities that coordinate coastal works regionally. Shoreline Management Plans identify the most sustainable approach to managing the coastal flood and erosion risks to the coastline for three epochs:

- short-term (0 to 20 years)
- medium term (20 to 50 years)
- long term (50 to 100 years)

Canterbury is in the Isle of Grain to South Foreland Shoreline Management Plan. The policies for the first epoch can also be found on the map in Appendix 4. The Isle of Grain to South Foreland Shoreline Management Plan can be found here:

Shoreline management plans

Surface Water Management Plans

Surface Water Management Plans (SWMPs) are prepared by Kent County Council in partnership with the other Risk Management Authorities. They provide an overview of local flood risk for the study area (despite their name) and may cover the risks from other sources of flooding, including where there are combined risks of flooding.

Surface water management plans can vary in scope and detail. Some provide an overview of historic flooding and a general review of existing information. Other surface water management plans use complex rainfall modelling to determine the flood risk from a range of storm durations and intensities to quantify the risks (usually in high risk areas). These plans identify the areas of significant local flood risk and seek to identify options to address the identified risks.

There are two surface water management plans in Canterbury district. One provides an overview of the historic local flood risk in whole district; this can be found here:

Surface water management plans

The results of the modelling undertaken to inform the Canterbury Surface Water Management Plan is shown in Appendix 8.

We have also undertaken a modelling exercise for the middle of Whitstable to investigate the risks to and from the Gorrell Stream, the results of which are shown in Appendix 5.

Strategic Flood Risk Assessment (SFRA)

Strategic Flood Risk Assessments (SFRAs) are prepared by Local Authorities and are primarily used to influence local planning policy decisions to ensure future development in the borough are appropriately located and sustainably constructed. They provide a general assessment of the flood risk from all sources across a borough (tidal, fluvial, surface water, groundwater, impounded water bodies and sewers) and should take full account of the likely impact of predicted climate change.

River Basin Management Plan

River Basin Management Plans are a requirement of the Water Framework Directive; they provide an overview of how water framework directive objectives (achieving the protection, improvement and sustainable use of the water environment) will be met for the water bodies in the river basin that the plan covers. They are not flood risk management documents, but they can influence how rivers and other water bodies are managed.

Canterbury is in the South East River Basin Management Plan, which can be found here:

http://goo.gl/7s6U5Q

Sources of flooding

Flooding sources

Groundwater

Occurs when water stored in the ground rises to the surface. This is most likely in areas with porous underlying rocks (like chalk).

Risk Management Authority
- KCC As the Lead Local Flood Authority.

Reservoirs

Reservoir flooding is extremely unlikely to occur. When the amount of water entering the reservoir is greater than the amount the reservoir is designed to discharge, floodwaters may overtop the crest of the reservoir and flow downstream (some reservoirs are designed to manage excess flows in this way). Occasionally, where a reservoir has been poorly designed, the structure can fail, releasing water.

Risk Management Authority
- EA - regulator.
- Reservoir owner - managing on-site risks.
- KCC/KRT - off-site emergency plan.

Surface water

Occurs when the rate of rainfall is higher than the rate at which water can drain into the ground or enter a drainage system, creating runoff, running down hill and pooling in low points.

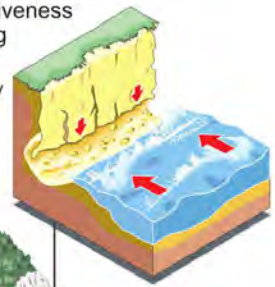
Risk Management Authority
- KCC as the Lead Local Flood Authority and Highway Authority.

Authorities responsible
- KCC: Kent County Council
- EA: Environment Agency
- SW: Southern Water
- TW: Thames Water
- IDB: Internal Drainage Boards
  - o Lower Medway Internal Drainage Board
  - o Upper Medway Internal Drainage Board
  - o Romney Marshes Area Internal Drainage Board
  - o River Stour (Kent) Internal Drainage Board
  - o North Kent Marshes Internal Drainage Board
- DB: District and Borough Councils
- KRT: Kent Resilience Team
- RO: Reservoir Operators

Coastal Erosion

Occurs when the coastline is eroded by the action of the sea, leading to loss of land. Whilst coast protection works are not the same as coastal flood defences, they can contribute to the effectiveness of flood defences along a shoreline.

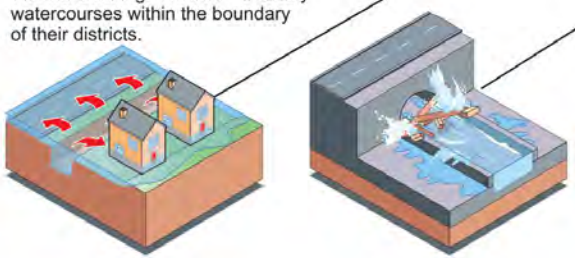
Risk Management Authority
- DB



Main river and ordinary watercourses

Occurs when the water flowing in a watercourse (which may be in a culvert), exceeds the capacity of the channel and goes over its banks. The capacity of the watercourse maybe reduced by blockages and debris in the channel. There are two categories of watercourse: main rivers (those which present the greatest risk to life and property), and ordinary watercourses, which cover all other watercourses, including streams, drains and ditches.

Risk Management Authority
- EA - main rivers.
- KCC - ordinary watercourses, outside the boundaries of Internal Drainage Districts.
- Internal Drainage Boards – ordinary watercourses within the boundary of their districts.



Sewer flooding (including foul sewers)

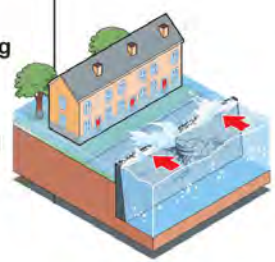
May occur when the sewerage system fails due to blockages or it is overwhelmed by surface water.

Risk Management Authority
- SW and TW for public sewers
- Sewer owner for a private system.

Coastal Flooding

Occurs when the coastline and/or coastal flood defences are either overwhelmed or breached by high tides or a storm surge.

Risk Management Authority
- EA



Understanding flood risk

There are a number of maps available that show the risk of flooding to areas from various sources. This section explains what the easily available maps are and what form of flooding they show.

Flood risk mapping

Not all flood risk is nationally modelled and mapped. For instance, the flood risk arising from ordinary watercourses has not been specifically investigated and depicted on a national scale. It is also important to note that many types of flood map only include one type of flood risk. For example, a flood map of the River Stour in Canterbury would not include the potential for sewer flooding that might occur at the same time (although this does not mean to say that Canterbury is necessarily at risk from this combination of flooding).

Combining the different types of flooding into one model (and one map) is very difficult. The mechanisms involved in combining the different types of flooding are extremely complex and the scales are different, consequently it is not easily computable in one model. However, in some areas where a significant risk from combined sources of flooding has been identified, KCC has investigated flooding collectively and produced mapping to depict this within their Surface Water Management Plans. Unfortunately it is not yet possible to produce a map to show this risk for the whole county.

How flood risk is expressed

The terms Annual Exceedance Probability (AEP) and Return Period are common ways to describe the likelihood of a flood of a certain magnitude happening in any given year.

An AEP is the *probability* of a certain size of flood occurring in any one year. A 1% AEP flood event has a 1% (or 1 in 100) chance of occurring in any one year.

A Return Period is a way of expressing how often a flood of a given magnitude might reoccur over a long period of time. For example, a flood described as having a 1 in 100 year return period is likely to occur, on average, ten times every 1000 years (or once every 100 years).

A 1 in 100 year Return Period flood and 1% AEP flood event are different terms to describe the same event.

It is important to note that while a 1% AEP flood may occur once every 100 years on average, the probability of a flood of that size occurring in any particular year does not change. If a 1% AEP flood was recorded this year, the probability of another flood of that magnitude being recorded in the following year (or any other subsequent year) would still be 1%. Accordingly, it is statistically possible to have several 1% AEP floods over a period of 100 years. Similarly, it is equally statistically possible have a period of 100 years without a single 1% AEP flood being recorded.

Table 2 shows AEP and their equivalent Return Periods for some commonly used storm frequencies.

Table 2. Annual Exceedance Probabilities and their equivalent Return Periods.

AEP (%)	Equivalent return period (yrs)	Magnitude
0.1	1000	Less frequent/more extreme events.
1	100	
1.33	75	
2	50	
3.33	30	
5	20	
10	10	
20	5	
50	2	
100	1	More frequent/less extreme events.

Flood Map for Planning

The Flood Map for Planning is the Environment Agency's original format for flood mapping and depicts the three flood zones used to define areas of risk of flooding from rivers and the sea. It is important to note that these maps show the predicted extent of flooding **if there were no defences or buildings present** to affect the flow of water into and through the natural floodplain.

The three flood zones are:

Flood Zone 3

Flood Zone 3 is the area deemed to be at the highest risk from flooding; it is sub-divided into two categories:

Flood Zone 3a - In the absence of defences, this is an area that would be considered to be at risk from:

- the sea during a flood event that has an AEP of 0.5% (i.e. a Return Period of 200 years)
- a river during a flood event that has an AEP of 1% (i.e. a Return Period of 100 years)

Flood Zone 3b – This zone is also known as the functional floodplain**.** The functional floodplain is defined as the area that would be susceptible to flooding from rivers or the sea during any event up to and including the 5% AEP event (the 1 in 20 yr event, or more frequently). Unlike the other Flood Zones, Zone 3b takes full account of any defences which may offer protection to the area. **The functional floodplain is the area that would flood despite the presence of defences.**

Flood Zone 2 - This shows the additional extent of an extreme flood from rivers or the sea. In the absence of defences, these outlying areas would be affected by a major flood, with an AEP of up to 0.1% (i.e. an area at risk from flooding from an event with a 1000 year Return Period). This is also known as the Extreme Flood Outline.

Flood Zone 1 – This shows all areas not covered by the other two flood zones, it is an area considered to be a negligible risk of flooding from rivers or the sea. However, areas in this flood zone may still be at risk from other forms of flooding.

The primary use of this map is for planning purposes to ensure that new developments can take account of the risk of flooding as they are being planned. It is important to understand that there remains a flood risk, even if there are defences that protect the area from flooding. Flood defences can only reduce the risk from flooding. No matter how well constructed a flood defence may be, there will always be a risk of its overtopping or failure. This residual risk must be taken into account when considering new development to ensure it is appropriately constructed, and to ensure the users, inhabitants or emergency services are not placed in unnecessary danger in the unlikely event of flooding.

The Flood Map for Planning is available on the Environment Agency's website:

Flood map for planning

The Environment Agency are statutory consultees for all development at risk of flooding from rivers and the sea, defined as Flood Zones 2 and 3. They should be consulted as early in the development planning process as possible.

National Flood Risk Assessment

The Environment Agency's National Flood Risk Assessment (NaFRA) mapping provides an assessment of the likelihood of flooding from rivers and the sea during an extreme 0.1% AEP event. Unlike the Flood Map for Planning (as described above), the NaFRA mapping **takes full account of the flood defences protecting an area**. It considers the likelihood of the defences being breached or overtopped during a flood event. This likelihood depends on the type of defence, its location, its condition and the designed standard of protection.

The mapped flood risk is presented as a grid of 50 m² squares. The likelihood of flooding is determined for each 50m² within the entire area of the Extreme Flood Outline (i.e. Flood Zone 2).

Each 50m² area within the Extreme Flood Outline is then assigned one of four categories:

- High – At risk from an event with an AEP of 3.3% or greater (i.e. at risk from floods with a Return Period of 30 years, or more frequently)
- Medium – At risk from an event with an AEP of less than 3.33% AEP but greater than or equal to 1% (i.e. at risk from flooding events with a Return Period of between 30 years and 100 years)
- Low - At risk from an event with an AEP of less than 1% AEP but greater than or equal to 0.1% (i.e. at risk from flooding events with a Return Period of between 100 years and 1000 years)
- Very Low – At risk from events with an AEP of less than 0.1% (i.e. at risk from floods with a Return Period of 1000 years or greater).

The NaFRA mapping is generally considered to present a more accurate representation of the flood risk to an area than the Flood Map for Planning provides owing to its incorporation of existing flood defences.

Properties at risk

In the Canterbury district, there is a total 8322 dwellings in areas considered to be at risk from tidal or fluvial flooding (this figure is taken from the Environment Agency's NaFRA mapping, which takes the presence of flood defences into account); 5564 of these are at a medium-high risk of flooding.

Table 3 (below) outlines the level of this risk within each parish.

Table 3. Dwellings at tidal/fluvial flood risk in Canterbury.

Parish	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Adisham	0	0
Barham	90	109
Bekesbourne with Patrixbourne	51	55
Bishopsbourne	52	59
Bridge	152	171
Canterbury	670	1549
Chartham	132	244
Chestfield	137	168
Chislet	68	82
Fordwich	145	150
Hackington	0	0
Harbledown and Rough Common	0	0
Herne and Broomfield	3	4
Hoath	4	6
Ickham and Well	19	31
Kingston	8	8
Littlebourne	74	92
Lower Hardres	0	0
Petham	13	13
St Cosmus and St Damian in the Blean	15	23
Sturry	185	203
Thanington Without	36	55

Parish	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Upper Hardres	0	0
Waltham	0	1
Westbere	0	0
Whitstable and Herne Bay	3594	5160
Wickhambreaux	116	133
Womenswold	0	0

Surface Water Mapping

The Environment Agency's surface water flood mapping gives a broad indication of the areas likely to be at risk from surface water flooding. These are areas where surface water would be expected to flow or pond if the capacity of the drainage networks and ground were exceeded.

The Flood and Water Management Act 2010 defines surface runoff, and the type of flooding shown by the updated Flood Map for Surface Water fits with the definition given within the Act. It shows the extent of flooding that could occur from any form of precipitation (including melted snow), which:

- Is on the surface of the ground (whether or not it is moving), and
- Has not yet entered a watercourse, drainage system or public sewer.

In 2013, the Environment Agency produced the updated Flood Map for Surface Water (uFMfSW). The aim of the uFMfSW is to provide the best single source of information on surface water flooding for England and Wales which includes local information and knowledge. It is a separate, single, mapping product that draws together:

- The Environment Agency's national scale surface water flood mapping, and
- Appropriate locally produced mapping from LLFAs.

The uFMfSW should not be used to identify the flood risk to individual properties, and should only serve to give a more general indication of an area's susceptibility to surface water flooding.

The updated Flood Map for Surface Water is available here:

http://goo.gl/SN5pJZ

Planning and Flood Risk

The National Planning Policy Framework sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed. The main steps to be followed are set out below; these are designed to ensure that the most vulnerable forms of development are located in the areas least susceptible to flooding. Where, exceptionally, development in flood risk areas is considered unavoidable, it must be demonstrated that the proposals are 'safe'.

Assess flood risk

Local planning authorities should undertake a Strategic Flood Risk Assessment to fully understand the flood risk in the area to inform Local Plan preparation.

In areas at risk of flooding (FZs 2 or 3) or for sites of 1 hectare or more, developers should undertake a site-specific flood risk assessment to accompany applications for planning permission (or prior approval for certain types of permitted development).

Avoid flood risk

In plan-making, local planning authorities apply a sequential approach to site selection so that development is, as far as reasonably possible, located where the risk of flooding (from all sources) is lowest, taking account of climate change and the vulnerability of future uses to flood risk. In plan-making this involves applying the 'Sequential Test' to Local Plans and, if needed, the 'Exception Test' to Local Plans.

In decision-taking local planning authorities also apply the 'sequential approach'. In decision-taking this involves applying the Sequential Test for specific development proposals and, if needed, the Exception Test for specific development proposals, to steer development to areas with the lowest probability of flooding.

Further information on the Sequential Test is available here:

http://goo.gl/KMj5Io

Further information on the Exception Test is available here:

http://goo.gl/HEcd9F

Manage and Mitigate flood risk

Where development needs to be in locations where there is a risk of flooding as alternative sites are not available, local planning authorities and developers should ensure development is appropriately flood resilient and resistant, safe for its users for the development's lifetime, and will not increase flood risk overall.

Local planning authorities and developers should seek flood risk management opportunities (e.g. safeguarding land), and reduce the causes and impacts of flooding (e.g. through the use of sustainable drainage systems in developments).

The requirements to consult the Environment Agency on applications where there is a risk of flooding are available here:

http://goo.gl/YNGxPs

Planning and Sustainable Drainage (SuDS)

Planning authorities must take flood risk from all sources into consideration when they are preparing their local development plans or during their determination of planning applications. This requirement is clearly laid out in Section 10 of the National Planning Policy Framework (NPPF) and within its associated Technical Guidance.

Permission for new development or redevelopment of sites in areas at risk from flooding will not necessarily be withheld, but the planning authorities have a duty to ensure flooding is materially taken into account within any development proposal. Applications are likely to be refused if it cannot be demonstrated that the identified risks can be appropriately managed.

Sustainable drainage systems (SuDS) are an important flood risk management measure to consider when advancing development plans; they aim to manage surface water runoff from developments in a natural way by replicating natural processes and should be considered from the outset and included wherever possible.

Since 15 April 2015, the provision of sustainable drainage within new development has been a material consideration in the planning process. There is an associated requirement for Kent County Council to be consulted by each of the county's twelve Local Planning Authorities whenever they receive an application for major development within their districts.

They will also be consulted on applications for minor development in areas where there are known drainage problems.

Kent County Council's statutory consultee role

Kent County Council are required to provide technical advice and guidance on the surface water drainage strategies, designs and maintenance arrangements put forward by developers for any new major development (as per the definition provided below). Existing planning policies, National Planning Practice Guidance, and the recently published national '*non-statutory technical standards for the design, maintenance, and operation of SUDS*' will provide the guidance upon which their consultation responses will be based.

As statutory consultees, KCC will be seeking to assist the delivery of requirements of the Government's National Planning Policy Framework (NPPF). This framework promotes sustainable development and makes specific recommendations for the incorporation of SuDS into new development.

This role fits with their existing role of Lead Local Flood Authority (LLFA) for the county, in which they develop a strategies to manage local flooding (flooding from surface water, groundwater and ordinary watercourses).

Major development

Major development is defined in planning as any development involving any one or more of the following:

a) the winning and working of minerals or the use of land for mineral-working deposits;

b) waste development;
c) the provision of dwellinghouses where -
    i. the number of dwellinghouses to be provided is ten or more; or
    ii. the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i);
d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
e) development carried out on a site having an area of one hectare or more.

(The Town and Country Planning (Development Management Procedure) (England) Order 2010).

Sustainable Drainage Systems

Kent County Council encourages the use of Sustainable Drainage Systems (SuDS) to manage surface water in a sustainable way in all development. For all new major development it should be demonstrated that:

- an appropriate SuDS system will be incorporated (unless it is clearly demonstrated and agreed that they would inappropriate),
- the minimum standards of operation proposed by the applicant are appropriate,
- that there are clear arrangements in place for the ongoing maintenance of any SuDS scheme over the lifetime of the associated development (through the use of planning conditions or planning obligations, where appropriate).

Further information:

The National Planning Policy Framework can be found at:

http://goo.gl/KlbX9p

The Government's Planning Practice Guidance can be found at:

http://goo.gl/K5i5gz

The associated NPPF guidance related to surface water management can be found at:

http://goo.gl/W4ePfy

The non-statutory technical standards for the design, maintenance, and operation of SUDS can be found at:

http://goo.gl/5pcA7f

Emergency Planning

Planning for and managing flooding emergencies

Severe weather and any associated flooding can lead to an emergency being declared. It is important that plans are maintained to outline the actions that should be taken to both reduce the likelihood of an emergency occurring, and to reduce its impact far as possible if an emergency does occur. Regular training and exercising supports this planning. The Civil Contingencies Act 2004 designates response agencies as either Category 1 or 2 responders, and sets out their roles and responsibilities.

Category 1 responders are known as 'core responders', and they include the emergency services and local authorities. Category 2 responders are 'key co-operating responders' acting in support of Category 1 responders; they include utility companies and transport organisations.

There are a number of bodies responsible for planning for and responding to a flood emergency, their roles and responsibilities are summarised below:

Category 1 Responders

Kent County Council

- Coordinate emergency support within their own functions.
- Establish multi-agency command and control systems (County Emergency Centre).
- Coordinate emergency support from the voluntary sector.
- Mobilise and chair Severe Weather Advisory Group.
- Mobilise military aid to the civil community.
- Liaise with central and regional government departments.
- Liaise with essential service providers.
- Open and support survivor reception and rest centres.
- Manage the local transport and traffic networks.
- Mobilise social care interventions.
- Provide emergency assistance.
- Coordinate the recovery process.
- Provide advice and management of public health.
- Assist with business continuity.

Canterbury City Council

- Deal with emergencies on ‘non main rivers'.
- Establish multi-agency command and control systems (District Emergency Centre).
- Liaise with central and regional government departments.
- Co-ordinate the response to any homelessness issues which may arise.
- Deal with environmental health issues, such as contamination and pollution.
- Coordinate emergency support within their own functions.

Kent Police

- Save life.
- Establish multi-agency command and control systems.
- Coordination and communication between emergency services and organisations providing support.
- Coordinate the preparation and dissemination of public warning and informing.
- Establish and maintain a Casualty Bureau.

Kent Fire and Rescue Service

- Save life rescuing people and animals.
- Carry out other specialist work, including flood rescue services.
- Where appropriate, assist people where the use of fire service personnel and equipment is relevant.

South East Coast Ambulance Service

- Save life.
- Provide treatment, stabilisation and care at the scene.

Environment Agency

- Issue Flood Alerts and Warnings and ensure systems display current flooding information.
- Provide information to the public on what they can do before, during and after a flood event.
- Work with professional partners and stakeholders and respond to requests for flooding information and updates.
- Mobilise and chair Severe Weather Advisory Group.
- Receive and record details of flooding and related information.
- Operate water level control structures within its jurisdiction and in line with permissive powers.
- Flood event data collection.
- Arrange and take part in flood event exercises.
- Respond to pollution incidents and advise on disposal.
- Assist with the recovery process, for example, by advising on the disposal of silt, attending flood surgeries.

Category 2 Responders

Utility providers

- Attend emergencies relating to their services putting life at risk.
- Assess and manage risk of service failure.
- Assist with the recovery process, including the management of public health considerations.

Kent Resilience Forum

The Kent Resilience Forum (KRF) is one of a number of Local Resilience Forums (LRFs) that have been set up across England. The overall aim of an LRF is to

ensure that the various agencies and organisations plan and subsequently work together to ensure a co-ordinated response to any emergency that could have a significant impact on any community.

LRFs are partnerships made up of a number of different organisations and agencies (although they are not legal organisations in themselves). The areas covered by a LRF align with the local police area boundaries.

The various agencies that form the KRF work together in a range of areas including:

- Assessing risks across the county and developing the Kent Community Risk Register
- Planning for emergencies
- Planning for Business Continuity Management
- Producing multi-agency plans
- Carrying out training and exercising
- Warning and informing the public - before, during and after emergencies.

Member organisations of the LRFs are the Category 1 and 2 responders (as outlined above). The KRF is required to meet at least every six months.

Further information:

The National Flood Emergency Framework for England can be found at:

http://goo.gl/vkeV3O

Kent County Council's Flood Response Plan can be found at:

KCC flood response plan

Canterbury City Council's Major Emergency Plan can be found at:

Emergency planning

Sandbags

Canterbury City Council believes that everyone should take their own precautions to protect their own property (including all householders and people with business properties). In order to encourage this attitude a list is maintained of local suppliers where sand and sandbags can be bought in small quantities, as well as a list of alternative means of flood protection such as flood boards and other proprietary systems. This information is available to the public on request, free of charge.

Canterbury City Council can provide sandbags to homes or businesses most in need following an assessment. Alternatively, empty sandbags may be available to buy from Canenco, with a minimum order of 10 bags - please call 01227 947 860 to check availability.

Experience has shown that most houses can be adequately protected by about 10 sandbags, and requests for greater numbers will not normally be accepted except in exceptional circumstances.

The Council will not supply sandbags to protect garages, sheds, greenhouses, outbuildings, etc. They will also not provide sandbags to protect land (including gardens, allotments, agricultural land, recreational land, parks, private driveways, paths, etc).

Sandbags will not be collected after the event and householders will be advised to keep them for use in future events. However if circumstances at a particular property require significantly more than the usual number of sandbags to be deployed then they will, on request, be collected up by the Council once the threat of flooding has disappeared. Sandbags which have been placed in strategic positions and in public areas will be collected by the Council.

Sandbags will not be issued other than during an emergency. Should a request be received Council staff will advise the public about private suppliers in the area.

Personal flood planning and assistance

The Government has produced a guide on what to do before, during and after a flood. It features advice such as how to check whether you are at risk of flooding, checklists to help you prepare and practical advice should flooding occur.

According to this advice, you should initially:

- Find out if you're at risk,
- Make a Flood Plan,
- Improve your property's protection,
- Get insurance,
- Get help during a flood,
- Get help after a flood.

Further guidance on each of these steps is available at:

http://goo.gl/qPRnP1

Flood advice for businesses

The Government has also produced advice and guidance specifically aimed at businesses at risk from flooding. This guidance can be found at :

http://goo.gl/oyrbfA

Flood Warnings

The Environment Agency provides a free Flood Alert and Warning service in many areas at risk of flooding from rivers or the sea.

Flood warnings give advanced notice of potential flooding by phone, text, email, pager or fax.

To find out if you live within a Flood Warning area and to sign up, please visit Flood warnings or call **0345 988 1188**.

The Environment Agency's live Flood Warning map identifies areas where Flood Alerts, Flood Warnings or Severe Flood Warnings are in force. The map is updated with information from the Flood Warning service every 15 minutes; it can be found here: Live flood map.

It should be noted that the Environment Agency's Floodline Warnings Direct service only pertains to flooding from rivers and the sea.

Table 4. Flood Alert and Warnings

Symbol	Status	Action
	A Flood Alert means that flooding is possible and that you need to be prepared	Residents should make some low impact preparations (e.g. move small / valuable items upstairs) check travel plans and remain vigilant.
	A Flood Warning means that flooding is expected. You should take immediate action and not wait for a severe flood warning.	Put in place home flood defences. Move valuables and people upstairs. Turn off utilities.
	A Severe Weather Warning means that there is severe flooding and danger to life.	These are issued when flooding is posing significant risk to life or disruption to communities.
There is no symbol for this stage.	Warnings no longer in force	This message will be issued when no further flooding is currently expected in your area.

Key contacts

Main sewers (foul and surface water)
Southern Water:
0330 303 0368, customerservices@southernwater.co.uk

Private connections to the main sewer
Householders responsibility.

Domestic drainage in social housing properties
Serco
Serco website

Main rivers
Environment Agency
0345 988 1188 (Floodline 24-hour service),
0800 80 70 60 (24-hour emergency hotline),
Website,
E-mail: enquiries@environment-agency.gov.uk

Ditches, watercourses and land drainage
Kent County Council
03000 41 81 81 (9am - 5pm),
03000 41 91 91 (out of office hours),
Website,
E-mail: flood@kent.gov.uk

River Stour (Kent) Internal Drainage Board
0122 7462 377,
Website,
E-mail: enquiries@rsidb.org.uk

Highway flooding, including blocked gullies (kerbside gratings)
Kent County Council Highways
03000 41 81 81,
Website

Environmental Services
Canterbury City Council
Website

Environment Agency
0800 80 70 60 (24-hour emergency hotline)

Whitstable

In the Whitstable area there is a total of 4438 properties at risk from rivers or the sea (taking the existing defences into account); 3337 of these are at medium to high risk.

Table 3. Number of dwellings at risk from fluvial/tidal flooding in Whitstable

Ward	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Chestfield and Swalecliffe	237	333
Gorrell	222	523
Harbour	2419	2691
Seasalter	361	769
Tankerton	98	122

Whitstable is situated on Kent's Northern coast where the mouth of the Swale meets the North Sea. The western-most extent of the town is constructed on low-lying former marshland, with the land rising towards Tankerton to the East. The entire area is underlain by impermeable London clay.

There are three main rivers that flow through the Whitstable area towards the sea. These watercourses are the Gorrell Stream, the Swalecliffe Brook and the Kite Farm Ditch; they are collectively known as the Oyster Coast Brooks (together with the Plenty Brook and the Westbrook in Herne Bay).

All of the Oyster Coast brooks have relatively small catchment areas and are flashy in nature; this means they tend to respond quickly to rainfall events as a result of the relative impermeability of the underlying clay and topography of their catchment areas.

There is a significant risk of coastal flooding in Whitstable. However, Whitstable is protected from coastal flooding by defences built to a 1 in 200 year standard. These consist of a managed beach in front of raised sea-walls with rear wave walls. They are owned and maintained by Canterbury City Council who should be contacted if further information is required (please see previous Key Contacts Section)

Owing to the substantial and well-maintained defences that protect the town from coastal flooding, Whitstable's greatest risk of flooding is considered to be from a combined high tide and extreme rainfall event. High spring tides and storm surges can prevent the three rivers from freely discharging to the sea. Any extreme rainfall event that coincides with this tide-locking would then quickly drain to the rivers, where their inability to discharge could result in combined surface water and fluvial flooding in the lowest lying parts of the town centre.

The largest risk of flooding in the Whitstable area is from the Gorrell Stream. It runs through the town via a combination of culverted and maintained open channels. The lower reaches are entirely culverted and the watercourse outfalls to the sea by gravity through Southern Water's Gorrell Tank into the harbour. When the gravity outfall is tide-locked the tank is drained to the sea though pumps.

The detailed surface water model results and NaFRA mapping for Whitstable (which shows the areas at risk from flooding with the defences in place) are shown in Appendix 5.

Further information:

- Canterbury Surface Water Management Plan – Stage 1 (April 2012): Section 3.4

Planned flood defence works in the Whitstable area

A major scheme to improve the Whitstable flood defences was completed in 2006.

A further major scheme to improve the protection provided by the Whitstable Harbour South Quay flood defences was completed in March 2016.

Kent County Council and the Environment Agency are investigating options to reduce the risk from flooding from the Gorrell Stream throughout Whitstable. Detailed computer modelling has been undertaken, and various options are being considered.

Herne Bay

In the Herne Bay area there is a total of 890 properties at risk from rivers or the sea (taking the existing defences into account), 394 of which are at medium to high risk.

Table 4. Number of dwellings at risk from fluvial/tidal flooding in Herne Bay

Ward	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Greenhill and Eddington	50	78
Heron	189	575
Reculver	0	8
West Bay	155	229

Herne Bay lies to the East of Whitstable on the North Kent Coast. The area is predominantly underlain by the impermeable London Clay. Further East, towards the River Wantsum, the ground becomes more permeable, but the majority of the urban area sits on clay.

There is a significant risk from tidal flooding in Herne Bay. However, there are substantial and well-maintained coastal defences along the town's entire frontage which significantly reduce the risk. In 2013 improvement works were completed to these defences to ensure that Herne Bay was protected from tidal events up to a 0.5%AEP (i.e. a 1 in 200 year standard of protection). This was achieved through the raising of the existing sea-wall, the construction of a new wall and the installation of new flood gates. Additional timber groynes were also installed to assist with the retention of beach material.

Herne Bay is also protected from significant damage by wave action by the Neptune Arm, a large rock breakwater constructed in 1992.

Following these improvements, it is now considered that greatest threat from flooding to Herne Bay arises from effects of tide locking or the failure of pumps on the surface or combined sewer network. Southern Water have made various improvements to their network to reduce the risk; these include the construction of new, larger or auxiliary sewers, and new or improved pumping stations. This has resulted in a system that should not experience flooding in anything but extreme rainfall events or pump failure.

The Plenty Brook, a predominantly rural main river, has its source near Herne, towards the south of the town. It flows in a northerly direction and passes through a culvert under the railway. After the railway the watercourse is entirely culverted through the town until it reaches its outfall to the sea. The culverted section is 2-3m^2 in cross-sectional area and is designated a Southern Water sewer.

The culverted watercourse and associated connecting sewers are of limited capacity and have historically caused serious problems in the Eddington area. After serious flooding in 2000, various storage structures and attenuation features were created up-stream of the town to alleviate the pressure on the sewer network and to generally increase the capacity of the system.

Since these improvements were completed the town has experienced both less frequent and less severe flooding. It is now considered that the town is protected from events with an AEP of approximately 4% (i.e. around a 25 year standard of protection).

The Westbrook is also largely rural in nature and poses a risk to the western end of the town, particularly when tide-locked and unable to freely discharge.

The NaFRA mapping for Herne Bay (which shows the areas at risk from flooding with the defences in place) is shown in Appendix 6.

Further information:

- Canterbury Surface Water Management Plan – Stage 1 (April 2012): Section 3.5

Planned flood defence works in the Herne Bay area

Further improvements to raise the rear wall sea defences just west of the Pier at Herne Bay have been recently completed.

Herne and Sturry

In the Herne and Sturry area there is a total of 445 properties at risk from rivers (taking the existing defences into account), 405 of which are at medium to high risk.

Table 5. Number of dwellings at risk from fluvial/tidal flooding in Herne and Sturry

Ward	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Herne and Broomfield	3	4
Marshside	72	88
Sturry North	1	3
Sturry South	329	350

The Herne and Sturry area is situated to the south of Herne Bay and to the North East of Canterbury City. The area is predominantly underlain by impermeable London Clay, with some deposits of Head Brickearth adjacent to the Plenty Brook. Towards the east of the ward, the geology changes from London Clay to the slightly more permeable tertiary deposits of the Thanet, Oldhaven and Woolwich beds.

The Plenty Brook rises in Herne and flows north towards the sea through Herne Bay; however, it isn't considered to pose a threat to the village of Herne.

The area around Marshside and the North Stream is particularly low-lying and can be affected by both fluvial and tidal flooding. During flood events, water can come out of the streams and watercourses that drain the area and then spread slowly across the flat, low land. The area of inundation is quite large, affecting mainly agricultural land; however, during extreme flooding events, a number of residential properties are potentially susceptible to flooding.

The North Stream discharges into the sea at Reculver by gravity and therefore becomes tide-locked. However, in order to reduce flood risk at Marshside it is possible to transfer water from the North Stream, via IDB watercourses, into the Chislet Pump Channel which is pumped at Reculver and Sarre.

The Sarre Penn flows through the ward, entering the channel of the River Wantsum to the east. Together with the Stour, the River Wantsum formed the Wantsum Channel, a watercourse which historically separated the Isle of Thanet from the mainland of Kent. The old Wantsum Channel has almost completely silted up and now largely consists of an artificial drainage network and well managed farm land.

The historic town of Fordwich lies to the south of the ward and lies at the tidal limit of the River Stour. Fordwich experienced flooding from the River Stour in 2000/1, and again in early 2014.

The NaFRA mapping for Herne and Sturry (which shows the areas at risk from flooding with the defences in place) is shown in Appendix 7.

Further information:

- Canterbury Surface Water Management Plan – Stage 1 (April 2012): Section 3.5

Planned flood defence works in the Herne and Sturry area

An options review has been undertaken for Fordwich to identify potential flood risk reduction schemes. Enhanced pioneering work was undertaken in 2014 (a programme of river maintenance and undergrowth/tree removal), with a programme of dredging undertaken in 2015/16.

Canterbury Centre

In the Canterbury City area there is a total of 1603 properties at risk from rivers (taking the existing defences into account), 706 of which are at medium to high risk.

Table 6. Number of dwellings at risk from fluvial/tidal flooding in Canterbury City

Ward	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Northgate	74	375
St. Stephens	151	325
Westgate	445	847
Wincheap	36	56

The historic city of Canterbury lies in the centre of the District between the Chalk of the south and the London Clay of the north. The geology of the central region is dominated by the often clayey Thanet Sand Formation, which is overlain by superficial deposits of alluvium. Correspondingly, the Great Stour which follows the central geological band, receives much of its input through the District from small streams and groundwater flow.

Although Canterbury City Council monitor water levels on the Great Stour though the city and operate sluice structures to carefully control water levels on the river to minimise the risk, the lowest lying areas closest to the Great Stour remain susceptible to flooding from extreme fluvial flood events.

As a result of this residual risk, the city ranks first in England in terms of the number of scheduled monuments at risk of flooding (9 monuments) and 13th in terms of the number of listed buildings at risk in a 1% AEP event (3 listed buildings).

Modelling has identified that a number of areas within Canterbury City are also at risk of deep ponding of surface water (>0.3m). The areas which have been identified to be most at risk from surface water runoff (and which have little associated risk from fluvial flooding from the River Stour) are: St. Dunstans, St. Stephens, Hales Place, St. Martins and Martyrs Field. Please see Appendix 8 for the detailed surface water flood risk map.

Like Whitstable and Herne Bay, Canterbury City is served by a combined sewer network. Although not considered to pose a significant risk, flooding has occurred on occasion from the sewer system in certain parts of the city (for example, along St Thomas Hill leading down from the north into St Dunstans).

Within Southern Water's Sewer Incident Report Forms (SIRF) database, all of the locations of internal property flooding from the combined sewer network in the district are located in the city itself (except for one incident in Blean). However, it should be noted that many instances of sewer flooding further into the city have been linked with high levels in the Great Stour.

The under-capacity of the old combined sewer system (originally built to accommodate runoff from a smaller city than now exists) is understood to be a contributory factor to the problems experienced around the perimeter of the city.

However, the risk of flooding from the sewers across the city is considered to be generally low, and in 2011 Southern Water completed a £12 million project to increase the capacity of the wastewater infrastructure in Canterbury. These improvement works will help reduce the scale and impact of any existing problems and enable the city's infrastructure to be capable of accommodating the discharges from future development.

The work has included:

- The construction of an underground storm storage tank in Kingsmead Road and the construction of an above ground storm water storage tank at Canterbury Wastewater treatment Works; combined they can accommodate 3,400,000 litres of storm water during periods of intense rainfall (the equivalent capacity of 1.36 Olympic swimming pools).
- A new pumping station in Vauxhall Road and 0.65 km sewer to transfer the wastewater from the Kingsmead tank to the Canterbury Treatment Works.

Once the heavy rainfall subsides, the water from the tanks will be put back into the system for treatment at Canterbury Wastewater Treatment Works before it is eventually returned to the Great Stour.

In addition to the fluvial and surface water risks outlined above, portions of Canterbury City have been identified as being potentially at risk from groundwater flooding, with the band of susceptibility broadly following the Great Stour river valley.

Consequently, Canterbury City is considered to be at a relatively high combined risk of flooding from surface water and groundwater. Flooding from these sources has been recorded in the recent past (2000/1, 2002 and 2013/14). However, the flooding experienced has not occurred on the same scale that has been witnessed elsewhere in the District (e.g. Whitstable and Herne Bay).

Drainage experts at Canterbury City Council suggest that the importance of the city centre and the Cathedral mean that road gullies and drains are regularly cleared and this may alleviate a proportion of the surface runoff risk.

The detailed surface water model results and NaFRA mapping for Canterbury City (which shows the areas at risk from flooding with the defences in place) are shown in Appendix 8.

Further information:

- Canterbury Surface Water Management Plan – Stage 1 (April 2012) Section 3.7

Planned flood defence works in the Canterbury City area

Approximately £7million has been bid for through the Medium Term Plan process for the investigation, design and construction of a flood storage area in-between Ashford and Canterbury. This will potentially reduce the risk from fluvial flooding to the town and the surrounding area, but still requires further investigation and being granted funding.

To date, a modelling investigation has been undertaken to look at the feasibility of several options but this requires further investigation to how groundwater impacts any potential scheme in this area. Work is currently being undertaken to complete a study to determine the technical, financial and environmental viability of the scheme. This work will form the basis of a business plan.

Canterbury West

In the Canterbury West area there is a total of 281 properties at risk from rivers (taking the existing defences into account), 160 of which are at medium to high risk.

Table 7. Number of dwellings at risk from fluvial/tidal flooding in Canterbury West

Ward	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Blean Forest	15	23
Chartham and Stone Street	145	258
Harbledown	0	0

The Canterbury West ward covers a 91km² area, stretching from Blean in the north to Waltham in the south.

Blean has been identified as an area where drainage problems often occur. Canterbury City Council's SFRA suggests that these problems arise from surface water being unable to naturally drain owing to a perched water table which sits on top of the underlying London Clay. The SFRA also suggests that the maintenance of the drainage infrastructure has been historically poor.

Recorded incidents of flooding are connected with the highway drainage and the combined sewer; although Southern Water have undertaken some improvement works, the management of surface water in this area remains difficult and should be a key consideration when any development proposals are being prepared.

The Petham Bourne is a groundwater fed ephemeral stream which runs in a northerly direction through the ward to Shalmsford Street where it joins the Great Stour. The Petham Bourne's channel is a poorly defined and is ordinarily a dry chalk valley. It flows infrequently, with the most recently observed flows being in 1930, 2000/1 and 2013/14.

The railway to the south of the Stour in Shalmsford Street was flooded by the Petham Bourne in 2000/1and again in 2013/14. Canterbury's SFRA states that properties have also been affected; this is most likely from a combination of fluvial flooding from the Great Stour and groundwater activation of the Petham Bourne and/or local springs.

The Great Stour flows east, bisecting the ward before entering the City of Canterbury. It poses a risk from fluvial flooding to the low lying areas of Shalmsford Street, Thanington and Chartham.

The NaFRA mapping for Canterbury West (which shows the areas at risk from flooding with the defences in place) is shown in Appendix 9.

Further information:

- Canterbury Surface Water Management Plan – Stage 1 (April 2012) Sections 3.2 and 3.3

Planned flood defence works in the Canterbury West area

Approximately £7million has been bid for through the Medium Term Plan process for the investigation, design and construction of a flood storage area in-between Ashford and Canterbury. This will potentially reduce the risk from fluvial flooding to the town and the surrounding area, but still requires further investigation and being granted funding.

To date, a modelling investigation has been undertaken to look at the feasibility of several options but this requires further investigation to how groundwater impacts any potential scheme in this area. Work is currently being undertaken to complete a study to determine the technical, financial and environmental viability of the scheme. This work will form the basis of a business plan.

Canterbury South East

In the Canterbury South East area there is a total of 658 properties at risk from rivers (taking the existing defences into account), 562 of which are at medium to high risk.

Table 8. Number of dwellings at risk from fluvial/tidal flooding in Canterbury South East

Ward	Number of dwellings at medium-high risk (up to 1% AEP)	Number of dwellings at overall risk (up to 0.1% AEP)
Barton	0	0
Barham Downs	98	117
Little Stour	209	256
North Nailbourne	255	285

South East Canterbury is dominated by gently undulating farm-land situated on shallow, lime-rich soils. The underlying chalk is generally permeable to surface water, and its valleys are interspersed with springs and groundwater fed ephemeral watercourses.

The main ephemeral watercourse running through this ward is the Nailbourne, which flows into the upper reaches of the Little Stour; this watercourse anecdotally flows for around 6 months once every seven years. Recently they have been flowing more frequently than this, with groundwater emergence activating them in 2000/1, 2003, 2010, 2012, 2013/14, 2014/15 and 2015/16. Prior to 2000, the last significant flood event in the Nailbourne Valley was in 1960.

The villages along the course of the Nailbourne and Little Stour have historically been flooded from many sources. They have been directly affected by the watercourses, from rising groundwater and the associated emergence of springs, and from surface water runoff from the surrounding hills and valleys. In combination, these sources of flooding have led to further problems caused by the surcharging and backing up of the sewers.

Following the 2000/1 flooding, many improvements to increase the capacity of the channel and various culverts were made (including the construction of a diversion channel at Littlebourne). However, the need for ongoing maintenance of the watercourse and drainage infrastructure was highlighted during the winter of 2013/14, and further improvements to these watercourses will be necessary to reduce both the risk of flooding and its impact to the affected communities.

The NaFRA mapping for Canterbury South East (which shows the areas at risk from flooding with the defences in place) is shown in Appendix 10.

Further information:

- Canterbury Surface Water Management Plan – Stage 1 (April 2012): Section 3.6

Planned flood defence works in the Canterbury South East area

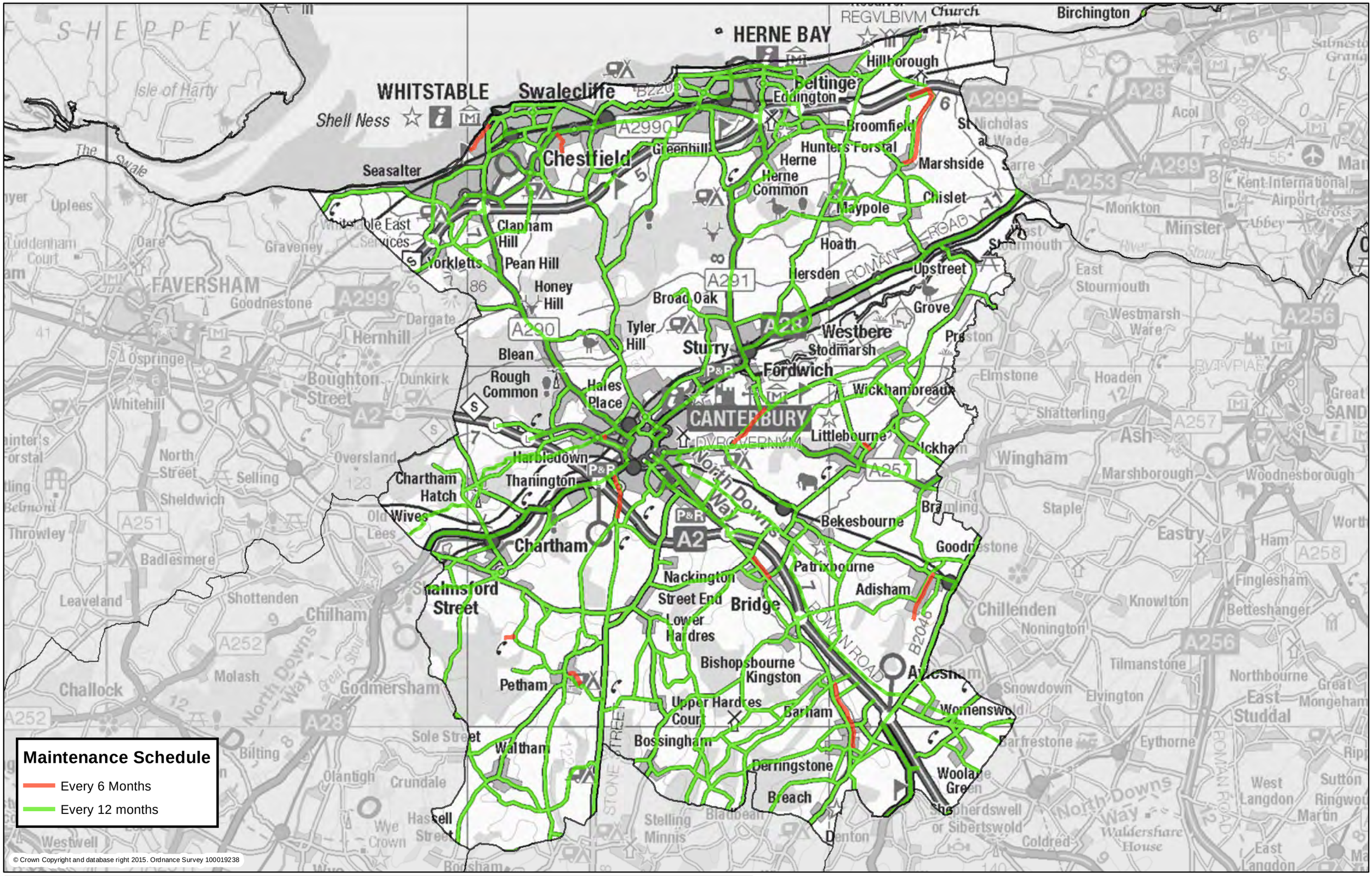
The Environment Agency received additional funding from Central Government to assist with repairing the damage sustained to the catchment over the abnormally wet winter of 2013/14.

The various Risk Management Authorities also produced a plan to outline numerous short-term schemes than were delivered before the onset of winter 2014/15. Much of this short-term work was achieved with funding already available from central Government, along with additional contributions from Canterbury City Council, Kent County Council, riparian land-owners and the local Parish Councils.

A longer-term plan of schemes that will require additional computer modelling, planning and funding has also been produced; these schemes will be progressed over the coming years, with all of the Risk Management Authorities and affected communities contributing to the development of the plans.

Appendix 1

Highways drainage maintenance schedules



Maintenance Schedule

- Every 6 Months
- Every 12 months

KCC Highways are responsible for keeping water off the highway making it safe for drivers and other road users.

They look after drains, ponds and lagoons, pumping stations and soakaways.

They DO NOT look after sewers, water leaks or ditches on private land.

Roads known to flood frequently - Every 6 months

High speed roads (roads with a speed limit of 70mph) - Every 6 months

Strategic routes (roads that are the main connection between towns and villages) - Every 12 months

Urban and rural routes (all other roads) - Every 18 to 24 months

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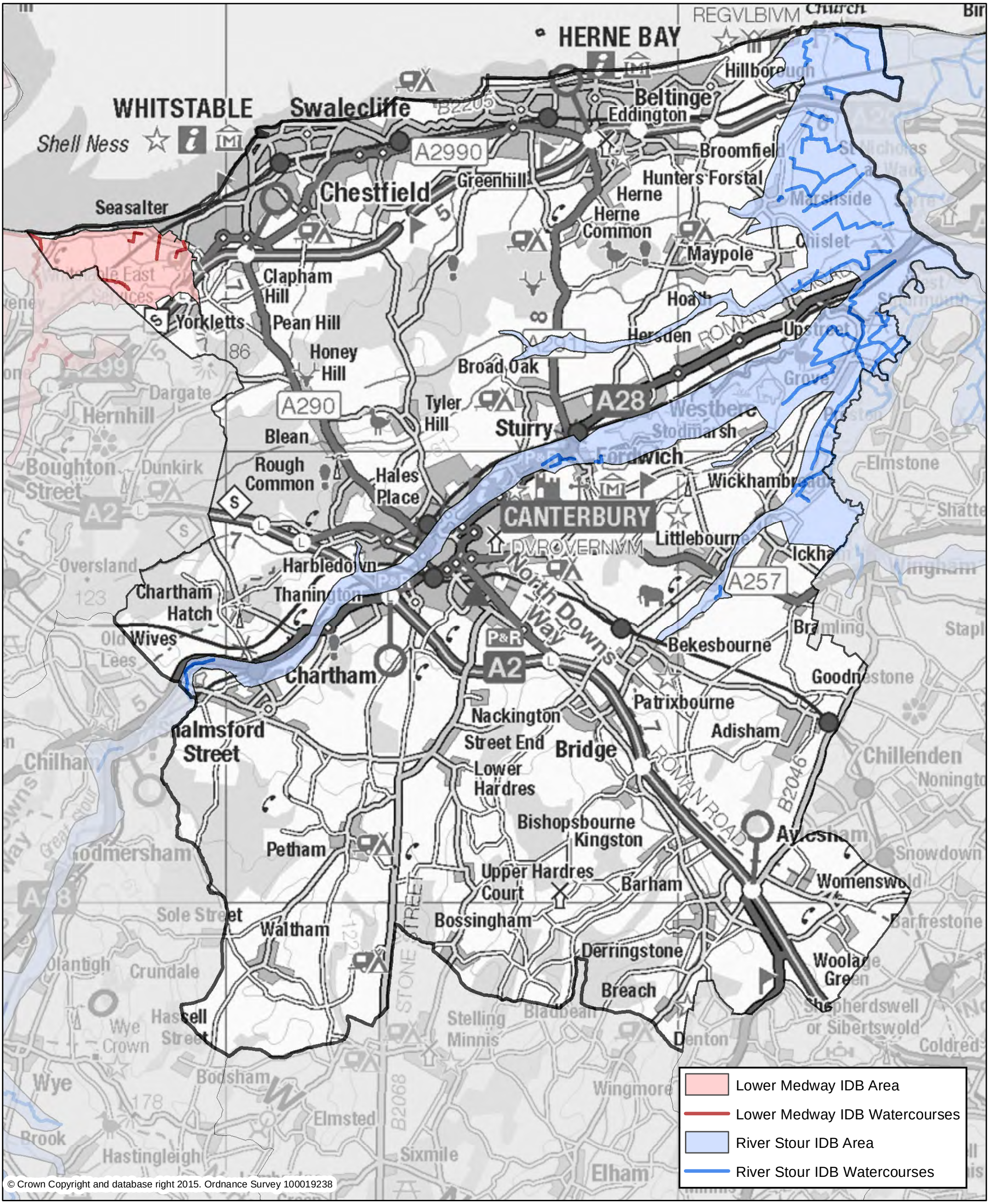
Appendix 2

Internal Drainage Board Areas and Watercourses



Each IDB has permissive powers to undertake work to provide water level management within their Internal Drainage District (IDD), undertaking works to reduce flood risk to people and property and manage water levels for local needs. Much of their work involves the maintenance of rivers, drainage channels, outfalls and pumping stations, facilitating drainage of new developments and advising on planning applications. They also have statutory duties with regard to the environment and recreation when exercising their permissive powers.

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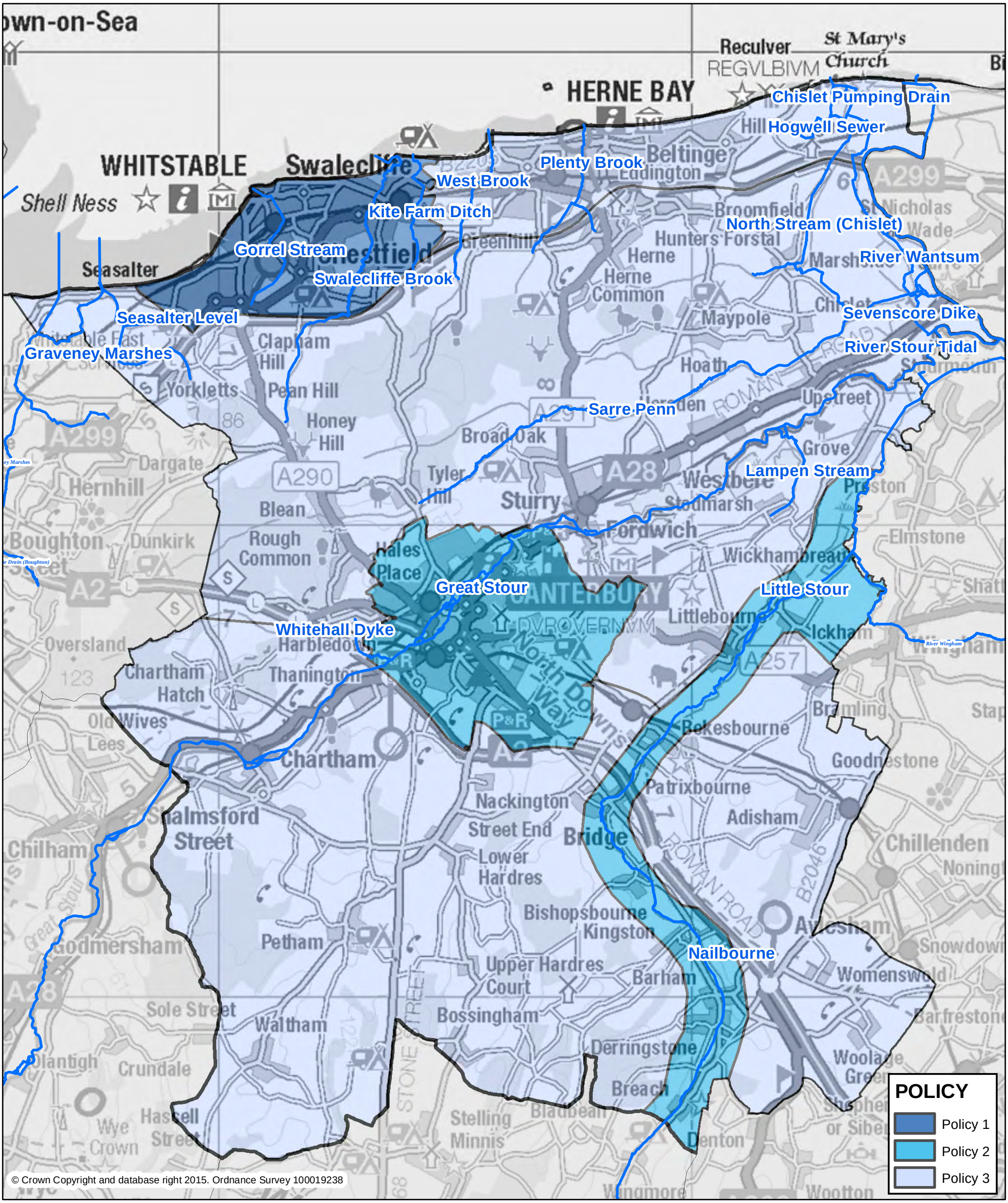
Appendix 3

Canterbury Local Flood Risk Management Policy areas



Local Flood Risk Management Policies:

Policy 1
Areas with complex local flood problems.
This policy will be applied to areas where we are aware of flood risk issues that are complex. These are the problems which are technically challenging to understand or where a number of different risk management authorities may be involved in their resolution. These areas will typically have local flood risks that affect large areas, for instance a town centre or suburb. An action plan of feasible options to manage the identified risks will be developed and delivered by the relevant risk management authorities.

Policy 2
Areas with moderate local flood problems.
This policy will be applied to areas where there are known local flood problems which need to be investigated but are relatively straight-forward. These areas will typically have local flood risks that affect localised areas, for instance one or two roads, that require more indepth assessment and interventions than have been used in the past. These areas may not need an in depth assessment of the risks and may be dealt with by ensuring the relevant risk management authorities work ogether effectively to investigate the problems although in some instances these may be necessary.

Policy 3
Areas with low local flood risk which are being managed effectively
This policy will be applied to areas where local flooding risks are currently not significant. That does not mean that these areas are not at risk of local flooding, but the risks can be managed by each risk management authority undertaking its duties effectively.

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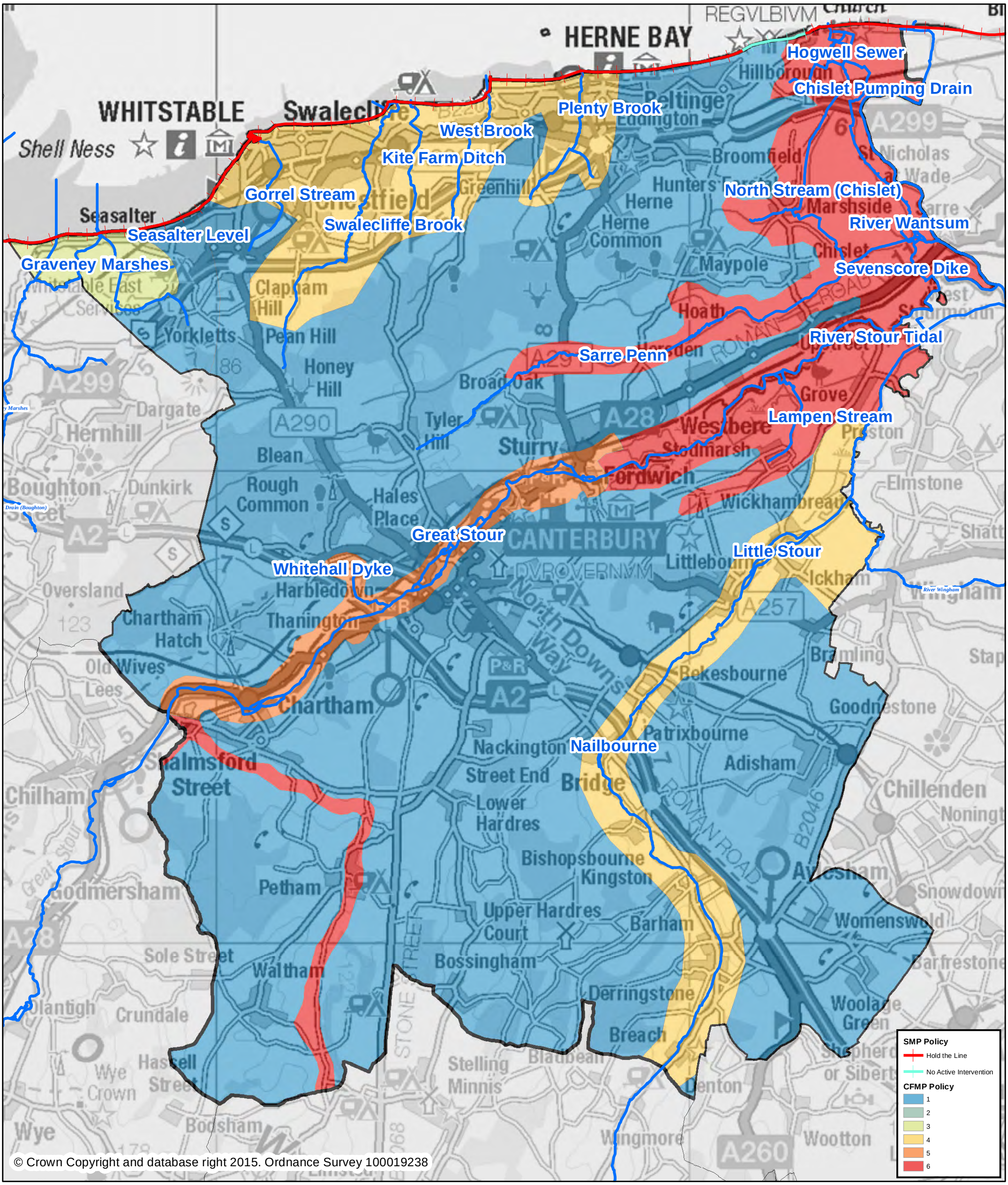
Appendix 4.

Catchment Flood Management Plan and Shoreline Management Plan policy



Environment Agency Catchment Flood Management Plans

Policy 1
Areas of little or no flood risk. The situation will continue to be monitored.

Policy 2
Areas of low to moderate flood risk where the existing flood risk management actions can be generally reduced.

Policy 3
Areas of low to moderate flood risk where the existing flood risk is generally being managed effectively.

Policy 4
Areas of low, moderate or high flood risk where the existing flood risk is already being effectively managed, but where further actions may be needed to keep pace with climate change.

Policy 5
Areas of moderate to high flood risk where further action can be taken to reduce flood risk.

Policy 6
Areas of low to moderate flood risk where further action will be taken to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

Isle of Grain to South Foreland Shoreline Management Plan (next 20 years)

Hold the line
Maintain or improve the existing standard of protection

No active intervention
No investment in coastal defences or operations

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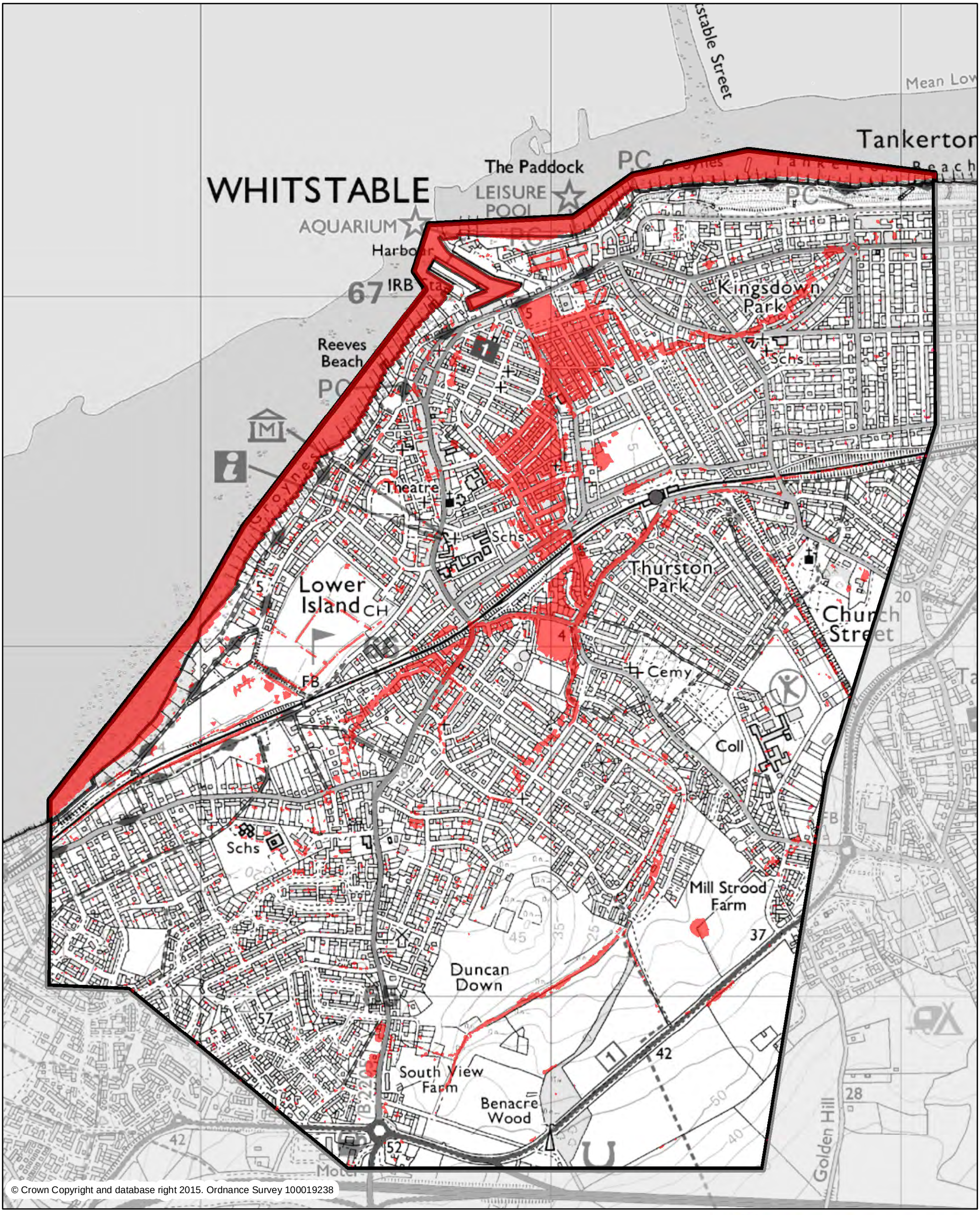
Appendix 5

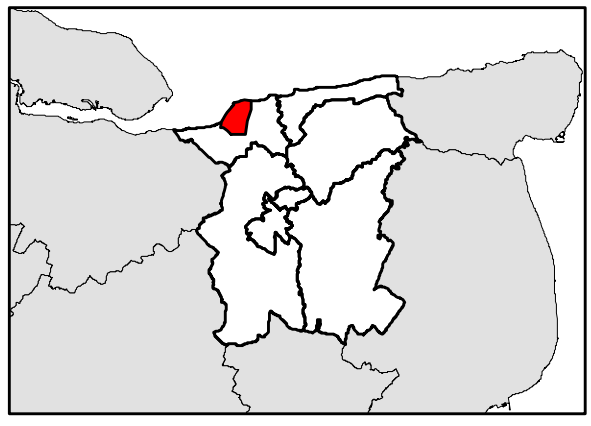
Whitstable: detailed surface water flood risk and NaFRA mapping



Areas at risk from surface water flooding during a 3.3% AEP event (1 in 30yrs)

The Gorrell Stream runs through the town of Whitstable via a combination of culverted and maintained channels. The lower reaches are entirely culverted and the watercourse outfalls to the sea by gravity through Southern Water's Gorrell Tank (or via the adjacent Diamond Road pumping station when the gravity outfall is tide locked).

This map shows the area likely to be affected by a 0.33% AEP rainfall event in Whitstable (1 in 30 yr event). The modelling project that provided these results was commisiioned to provide a better understanding of flood risk within the catchment and town. The study area lies within the boundary drawn above.



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Appendix 6

Herne Bay: NaFRA mapping

Herne Bay

- District Wards
- Main Rivers
- High
- Medium
- Low
- Very Low

NaFRA:

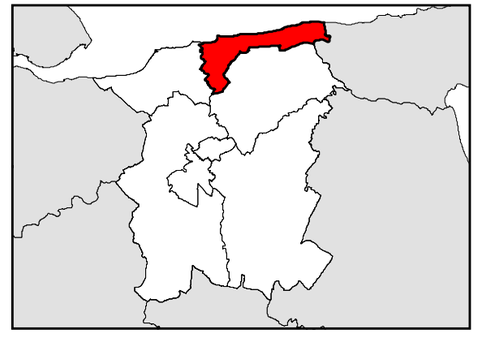
National Flood Risk Assessment (NaFRA) is a national assessment of flood risk across England and Wales which shows the likelihood of flooding in any year from rivers and the sea. It considers the location, type and condition of defences, mapped on a 50m x 50m grid in four probability bandings:

High – At risk from an event with an AEP of 3.3% or greater

Medium – At risk from an event with an AEP of less than 3.33% AEP but greater than or equal to 1%

Low - At risk from an event with an AEP of less than 1% AEP but greater than or equal to 0.1%

Very Low – At risk from events with an AEP of less than 0.1%



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Caveats:
Properties at risk have been defined using the National Flood Risk Assessment data (NaFRA), which calculates the liklihood of flooding from rivers or the sea. The assessment takes into account the type, location and condition of flood defences, and the chance of these defences overtopping of failing during a flood event. This data is DRAFT, and subject to further checks to verify the information. This should be used as a guide only.

Appendix 7

Herne and Sturry: NaFRA mapping

Herne and Sturry

- District Wards
- Main Rivers
- High
- Medium
- Low
- Very Low

NaFRA:

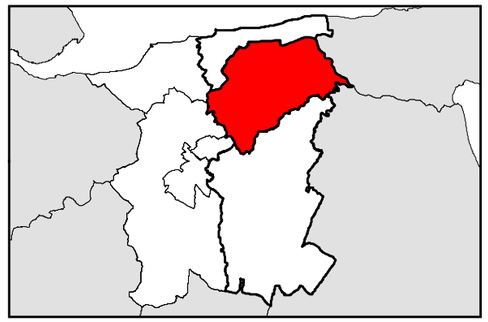
National Flood Risk Assessment (NaFRA) is a national assessment of flood risk across England and Wales which shows the likelihood of flooding in any year from rivers and the sea. It considers the location, type and condition of defences, mapped on a 50m x 50m grid in four probability bandings:

High – At risk from an event with an AEP of 3.3% or greater

Medium – At risk from an event with an AEP of less than 3.33% AEP but greater than or equal to 1%

Low - At risk from an event with an AEP of less than 1% AEP but greater than or equal to 0.1%

Very Low – At risk from events with an AEP of less than 0.1%



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Caveats:
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Appendix 8

Canterbury City: detailed surface water flood risk and NaFRA mapping

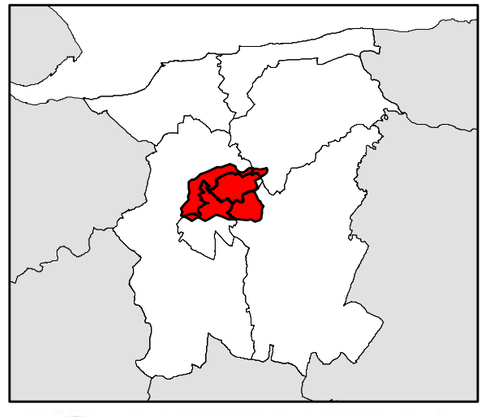
Areas at risk from surface water flooding during a 3.3% AEP event (1 in 30yrs)

The Stage 1 SWMP for Canterbury concluded that the predicted flood risk is not supported by historical flood incidents. Therefore, a more detailed modelling study was been commissioned to fully understand the surface water flood risk to Canterbury.

This involved creating a model as a tool to understand surface water flood risk.

The outputs from the Canterbury model were contrasted to the updated Flood Map for Surface Water (uFMfSW). In general the results of this study show a reduced flood extent compared to the uFMfSW.

This difference was attributed to the explicit representation of the surface water sewer network and the reduced runoff rate from the green spaces within the urban area in the Canterbury surface water model. Whereas in the uFMfSW, the capacity of surface water drainage is estimated and there is no account for open space within an urban area



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Appendix 9

Canterbury West: NaFRA mapping

Canterbury West (North)

- District Wards
- Main Rivers
- High
- Medium
- Low
- Very Low

NaFRA:

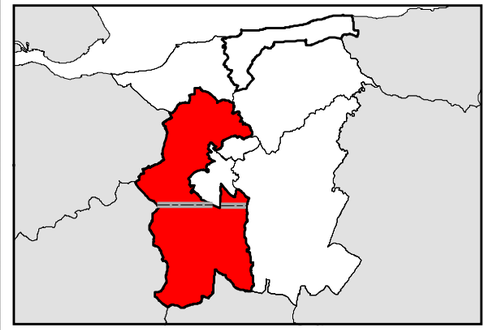
National Flood Risk Assessment (NaFRA) is a national assessment of flood risk across England and Wales which shows the likelihood of flooding in any year from rivers and the sea. It considers the location, type and condition of defences, mapped on a 50m x 50m grid in four probability bandings:

High – At risk from an event with an AEP of 3.3% or greater

Medium – At risk from an event with an AEP of less than 3.33% AEP but greater than or equal to 1%

Low - At risk from an event with an AEP of less than 1% AEP but greater than or equal to 0.1%

Very Low – At risk from events with an AEP of less than 0.1%



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Caveats:
Properties at risk have been defined using the National Flood Risk Assessment data (NaFRA), which calculates the liklihood of flooding from rivers or the sea. The assessment takes into account the type, location and condition of flood defences, and the chance of these defences overtopping of failing during a flood event. This data is DRAFT, and subject to further checks to verify the information. This should be used as a guide only.

Appendix 10

Canterbury South East: NaFRA mapping

Canterbury West (South)

- District Wards
- Main Rivers
- High
- Medium
- Low
- Very Low

NaFRA:

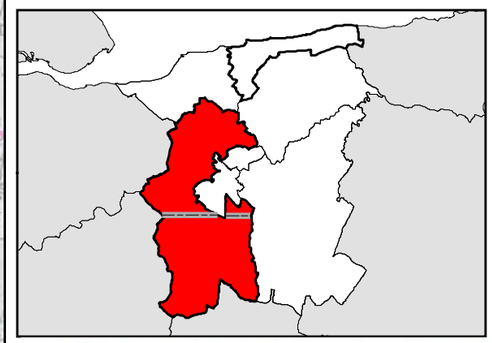
National Flood Risk Assessment (NaFRA) is a national assessment of flood risk across England and Wales which shows the likelihood of flooding in any year from rivers and the sea. It considers the location, type and condition of defences, mapped on a 50m x 50m grid in four probability bandings:

High – At risk from an event with an AEP of 3.3% or greater

Medium – At risk from an event with an AEP of less than 3.33% AEP but greater than or equal to 1%

Low - At risk from an event with an AEP of less than 1% AEP but greater than or equal to 0.1%

Very Low – At risk from events with an AEP of less than 0.1%



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Caveats:
Properties at risk have been defined using the National Flood Risk Assessment data (NaFRA), which calculates the liklihood of flooding from rivers or the sea. The assessment takes into account the type, location and condition of flood defences, and the chance of these defences overtopping of failing during a flood event. This data is DRAFT, and subject to further checks to verify the information. This should be used as a guide only.

Canterbury South East (North)

- District Wards
- Main Rivers
- High
- Medium
- Low
- Very Low

NaFRA:

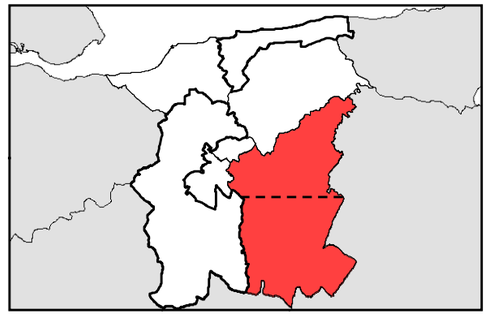
National Flood Risk Assessment (NaFRA) is a national assessment of flood risk across England and Wales which shows the likelihood of flooding in any year from rivers and the sea. It considers the location, type and condition of defences, mapped on a 50m x 50m grid in four probability bandings:

High – At risk from an event with an AEP of 3.3% or greater

Medium – At risk from an event with an AEP of less than 3.33% AEP but greater than or equal to 1%

Low - At risk from an event with an AEP of less than 1% AEP but greater than or equal to 0.1%

Very Low – At risk from events with an AEP of less than 0.1%



Environment Agency

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Caveats:
Properties at risk have been defined using the National Flood Risk Assessment data (NaFRA), which calculates the liklihood of flooding from rivers or the sea. The assessment takes into account the type, location and condition of flood defences, and the chance of these defences overtopping of failing during a flood event. This data is DRAFT, and subject to further checks to verify the information. This should be used as a guide only.

Canterbury South East (South)

- District Wards
- Main Rivers
- High
- Medium
- Low
- Very Low

NaFRA:

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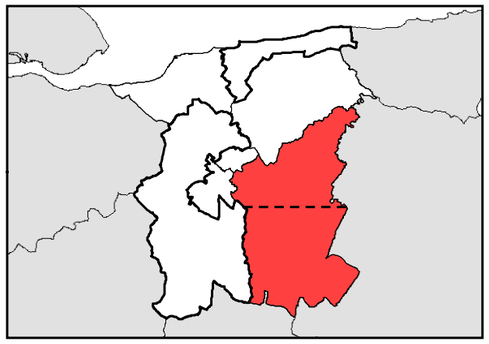

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Glossary

Aquifer	A source of groundwater compromising water-bearing rock, sand or gravel capable of yielding significant quantities of water.
Attenuation	Attenuation is the process of water retention on site and slowly releasing it in a controlled discharge to a surface water or combined drain or watercourse. The amount of discharge will vary depending whether it is a brown or greenfield site. For brownfield sites the developer must determine the likely run off and agree an acceptable discharge with the LLFA, environment agency or water authority.
Brownfield site	Any land or site that has been previously developed.
Catchment	The area contributing surface water flow to a point on a drainage or river system.
CIRIA	Construction Industry Research and Information Association. www.ciria.org
Climate change	Long-term variations in global temperature and weather patterns both natural and as a result of human activity (anthropogenic) such as greenhouse gas emissions
Culvert	A structure which fully contains a watercourse as it passes through an embankment or below ground.
Development	The undertaking of building, engineering, mining or other operations in, on, over or under land or the making of any material
	any buildings or other land.
EA	Environment Agency. Government Agency responsible for flooding issues from main river, and strategic overview of flooding.
Flood event	A flooding incident usually in response to severe weather or a combination of flood generating characteristics.
Flood risk	The combination of the flood probability and the magnitude of the potential consequences of the flood event.
Flood Risk Assessment	An appraisal of the flood risks that may affect development or increase flood risk elsewhere
Flood Zones	Flood Zones provide a general indication of flood risk, mainly used for spatial planning.
Floodplain	An area of land that would naturally flood from a watercourse, an estuary or the sea.
Freeboard	A vertical distance that allows for a margin of safety to account for uncertainties.
Flood and Water Management Act	The Flood and Water Management Act clarifies the legislative framework for managing surface water flood risk in England.
Flow control device	A device used to manage the movement of surface water into and out of an attenuation facility.

Geocellular storage systems	Modular plastic systems with a high void ratio, typically placed below ground which allow for storage of storm water to infiltrate or discharge to another system.
Gravity drainage	Drainage which runs through pipework installed to a fall, and not therefore under pressure.
Greenfield	Undeveloped land.
Greenfield runoff rate	The rate of runoff which would occur from a site that was undeveloped and undisturbed.
Groundwater	Water that exists beneath the ground in underground aquifers and streams.
Groundwater flooding	Flooding caused by groundwater rising and escaping due to sustained periods of higher than average rainfall (years) or a reduction in abstraction for water supply.
Impermeable	Will not allow water to pass through it.
Impermeable surface	An artificial non-porous surface that generates a surface water runoff after rainfall.
Infiltration	Infiltration or soakaway is the temporary storage of water to allow it to naturally soak away into the ground. Because water soaks into the ground gradually, reduces the risk of flooding downstream. Infiltration may be used where
	there is no surface water sewer or where existing systems are at full capacity. Infiltration helps to recharge natural ground water levels.
Local Flood Risk Management Strategy	Strategy outlining the Lead Local Flood Authority's approach to local flood risk management as well as recording how this approach has been developed and agreed.
Main River	A watercourse designated on a statutory map of Main rivers, maintained by Department for Environment, Food and Rural Affairs (Defra).
Mitigation measure	A generic term used in this guide to refer to an element of development design which may be used to manage flood risk to the development, or to avoid an increase in flood risk elsewhere.
National Planning Policy Framework	Framework setting out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.
Overland Flow	Flooding caused by surface water runoff when rainfall intensity exceeds the infiltration capacity of the ground, or when the soil is so saturated that it cannot accept any more water.
Permeability	A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium.

Pitt Review	An independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.
Rainwater harvesting	Collection and Re-use or recycling of rainwater for the purpose of garden irrigation, car washing, toilet flushing etc.
Runoff	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.
Source Protection Zone	Defined areas showing the risk of contamination to selected groundwater sources used for public drinking water supply.
Strategic Flood Risk Assessment	A study to examine flood risk issues on a sub-regional scale, typically for a river catchment or local authority area during the preparation of a development plan.
Surface water flooding	Flooding caused by the combination of pluvial flooding, sewer flooding, flooding from open channels and culverted urban watercourses and overland flows from groundwater springs
Surface Water Management Plan	A study undertaken in consultation with key local partners to understand the causes and effects of surface water flooding and agree the most cost effective way of managing surface water flood risk for the long term.
SUDS	Sustainable (urban) drainage systems. A sequence of management practices and control structures that are designed to drain surface water in a more sustainable manner.
Watercourse	A term including all rivers, streams, ditches drains cuts culverts dykes sluices and passages through which water flows.